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## Dissecting current scientific evidences

### *Dissecando as evidências científicas atuais*

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Scientific evidence has become the safety basis for diagnostic and therapeutic choices for our patients. There is no question that methodological advances make clinical practice much more reliable, and the more controlled is the study, the higher the reliability of its results. Investigators are competent characters, neuter observers who should not tend to confirm or deny the hypothesis, and who look for explaining observed phenomena. This is the expected ethical behavior. However, it is necessary to explain the clinical practice taking into consideration what is considered scientific advance, as well as implications of the use of population samples in the management of painful individuals.

Although general and professional common sense considers that science looks for the truth, this is not an idea endorsed by scientific trends of the last century. By the way, as from the moment where perception of reality is conditioned to a subjective “me”, as from Descartes, and that nothing more can be evaluated except appearances, the discoveries of which refer to themselves and not to the supposed inaccessible reality, as in Kant, it is natural the understanding that scientific truth is not accessible, making scientific development a consensus about theories which are periodically replaced by a kind of revolution (Thomas Kuhn). So, evidence is not a truth about facts, but rather a theory about appearance, waiting for the next revolutionary proposal.

Also in the last century, positivism was a factor promoting strong technological development, although limiting aspects which could be or not studied by science. It is possible to address psychic and spiritual factors in a scientific manner; but in practice, what is observed in international contexts and worldwide recognized congresses is the valuation of materialist and reductionist aspects even in the emotional approach of pain, which has made it just a behavior, and nothing more. So, we have evolved a lot on what we know about appearance of phenomena, but there are factors considered inaccessible which are determinants in painful patients and which have to be accepted as research problems for the advance of the real understanding of what goes on with individuals.

It is necessary to understand patients to treat them in a tailored way. However, studies with highest scientific value are those with larger samples, resulting in significant, however generic and not always generalizable data. For such, scientists have to use inclusion and exclusion criteria which make that group less representative of general population, or samples become more realistic as fewer are such criteria, although the understanding of observed associations is complicated to the point to question observed findings, thus using logic as resource. So, a lot can we know about the appearances of what we observe, but we are increasingly far away from the unique individual, singular combination of the patient coming to our office.

Evidences are discussed and readers need to know what they really represent today. In practice, many believe in the dogmatic belief of published evidences, which may or not be accepted in the future and which may soon be replaced by some other news. These evidence scientists are not skeptical, quite the opposite. They remain skeptical just with regard to contents with materialist and reductionist philosophy which does not allow investigation, an analytical and logic rhetoric reinforcement apart from the phenomenon itself.

Going beyond, if the method is reliable and the hypothesis may be questioned, how to explain the very significant statistical difference between published articles with positive results (which have proven the hypothesis) as compared to the very low frequency of articles with negative results (refuting the hypothesis)? What we see in practice is the lack of interest on part of scientific journals when results are not what was expected, in addition to resistance to results of impeccable, although innovative, methodology which make data we call scientific evidence worth a methodological approach by themselves to understand such biases.

The study of pain is a scientific field daring to revolutionize these barriers when raising questions such as quality of life, emotions and alternative therapies for research and evidence. It is possible to produce high quality results in these areas which shall allow adding future clinical knowledge and benefit.

**Silvia Regina Dowgan Tesseroli de Siqueira**  
*Professora Associada, Escola de Artes, Ciências e Humanidades  
da Universidade de São Paulo; Coeditora Revista Dor*

# Immediate effects of joint mobilization compared to sham and control intervention for pain intensity and disability in chronic low back pain patients: randomized controlled clinical trial

*Efeitos imediatos da mobilização articular em relação à intervenção sham e controle na intensidade de dor e incapacidade em pacientes com dor lombar crônica: ensaio clínico aleatorizado controlado*

Fernando Augusto Gonçalves Tavares<sup>1</sup>, Thais Cristina Chaves<sup>1</sup>, Ednéia Denise Silva<sup>2</sup>, Gabriela Dionísio Guerreiro<sup>2</sup>, Joysse Ferreira Gonçalves<sup>2</sup>, Adriana Aparecida Alves de Albuquerque<sup>2</sup>

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** A possibility to treat chronic low back pain is joint mobilization. There is moderate literature evidence of the effects of mobilization on chronic low back pain; however, few studies have used sham mobilization as comparison group. This study aimed at evaluating the effects of back joint mobilization on the following outcomes: pain intensity and incapacity in chronic low back pain patients.

**METHODS:** Participated in the study 60 individuals of both genders with the following eligibility criteria: aged between 18 and 55 years with chronic nonspecific low back pain for at least three months. Selected volunteers were randomly distributed in three groups of 20 individuals: joint mobilization group MG: 39.15±11.45 years, sham mobilization group SG: 37.10±12.57 years, and control group CG: 30.60±8.97. All groups were evaluated by the same blind investigator and have answered to the following tools pre-and immediately after the ten intervention sessions: pain numeric scale to evaluate pain intensity, Oswestry Disability Index to evaluate low back pain-related incapacity and Catastrophic Thoughts Scale to evaluate pain-related catastrophizing.

**RESULTS:** There were significant pre-and post-treatment differences in pain intensity for MG ( $p<0.001$ ) and SG ( $p<0.001$ ). There has been significant difference in mean pain intensity value in MG as compared to CG (-2.55).

**CONCLUSION:** Our results suggest sham effect related to the application of mobilization in chronic low back pain patients.

**Keywords:** Clinical trial, Joint mobilization, Low back pain, Manual therapy, Pain catastrophizing.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** Uma das possibilidades de tratamento da dor lombar crônica são as mobilizações articulares. Há evidência moderada na literatura sobre os efeitos de mobilizações para dor lombar crônica, entretanto, poucos estudos têm utilizado mobilizações-sham como grupo de comparação. O objetivo deste estudo foi avaliar os efeitos da mobilização articular lombar sobre os seguintes desfechos: intensidade da dor e incapacidade em pacientes com dor lombar crônica.

**MÉTODOS:** Foram selecionados 60 indivíduos de ambos os sexos com os seguintes critérios de elegibilidade: idade entre 18 e 55 anos, que apresentassem dor lombar crônica não específica há pelo menos três meses. Os voluntários selecionados foram distribuídos aleatoriamente em três grupos de 20 indivíduos: grupo mobilização articular GM: 39,15±11,45 anos, grupo mobilização sham GS: 37,10±12,57 anos e grupo controle GC: 30,60±8,97 anos. Todos os grupos foram avaliados por um mesmo pesquisador encoberto e responderam os seguintes instrumentos pré e imediatamente após as 10 sessões de intervenção: escala numérica de dor para avaliação da intensidade da dor, *Oswestry Disability Index* para avaliação da incapacidade relacionada à dor lombar e Escala de Pensamentos Catastróficos para avaliação da catastrofização relacionada à dor.

**RESULTADOS:** Foram observadas diferenças significativas pré e pós-tratamento para a variável de intensidade de dor nos GM ( $p<0,001$ ) e GS ( $p<0,001$ ). Na comparação entre os grupos de intervenção, foi verificada diferença significativa no valor médio de intensidade de dor entre GM *versus* GC (-2,55).

**CONCLUSÃO:** Os presentes resultados sugerem efeito sham relacionado à aplicação de mobilizações em pacientes com dor lombar crônica.

**Descritores:** Catastrofização da dor, Dor lombar, Ensaio clínico, Mobilização articular, Terapia manual.

## INTRODUCTION

Low back pain (LBP) is a multifactorial disease which may affect functional activities. It may be considered a major cause of musculoskeletal incapacity with impairment of adjacent

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structures and secondary joints, leading to biomechanical compensations and overload<sup>1</sup>.

Approximately 10 to 40% of individuals with LBP develop chronic pain where pain episode duration is maintained for more than three months<sup>2</sup>. LBP duration may be an important factor for its chronicity and consequent incapacity. Approximately 90% of cases are classified as nonspecific LBP where no evidence of pathologic abnormality can be observed by means of available imaging techniques<sup>3</sup>.

In chronic low back pain (CLBP) there might be decreased joint mobility between spinal vertebrae, worsened by movement and consequent functional loss, paravertebral muscles hypoactivity and adjacent lumbar structures inflammatory processes<sup>4</sup>.

Among noninvasive pain control methods, Maitland Concept is characterized by specific evaluation and intervention techniques for spinal dysfunctions by means of joint mobilization and is based on the application of smooth passive movements to structures with decreased movement amplitude<sup>5</sup>. There are reports in the literature on the association between increased water diffusion in the intervertebral disc (L5/S1) and immediate pain intensity decrease in patients with nonspecific CLBP submitted to mobilization or manipulation<sup>6,7</sup>.

A systematic review<sup>8</sup> has shown no evidence for treatments based on mobilization and exercises or mobilization and medical follow-up with orientations for pain intensity and function improvement in the short and long term in patients with nonspecific CLBP. However, most included studies have not used mobilizations alone.

There are few studies observing the isolated effects of joint mobilizations<sup>9-11</sup>. Immediate pain intensity decrease effects were reported as compared to an untreated control group<sup>9</sup> as well as decrease in pain intensity and stiffness measured by means of increasing supported load in the lumbar region of LBP individuals as compared to healthy controls<sup>10</sup>. One of the few studies including patients with nonspecific CLBP was by Shah & Kage<sup>11</sup>. Authors have observed similar results between groups submitted to mobilization versus stretching exercises in pain intensity decrease, lumbar stretching movement amplitude increase and LBP-related incapacity.

However, authors have not included a sham group. Licciardone et al.<sup>12</sup> have not observed differences in comparison between mobilization + manipulation versus sham manipulation in pain, incapacity and satisfaction with treatment for CLBP patients. However, there are no studies in the literature comparing the effects of mobilization intervention versus sham mobilization.

Considering above-mentioned aspects, this study aimed at primarily evaluating the effects of a 10-session program of posterior-to-anterior joint mobilization on pain intensity and LBP-related incapacity primary outcomes, as compared to a group submitted to the sham technique (inert treatment), as well as controlling possible effects of catastrophizing on pain intensity and incapacity measurements.

## METHODS

This is a randomized and controlled clinical trial carried out in the Clínica Escola de Fisioterapia da União das Faculdades dos Grandes Lagos, São José do Rio Preto. The study complied with recommendations of the Consolidated Standards of Reporting Trials – CONSORT<sup>13</sup>.

Participated in the study individuals of both genders with the following eligibility criteria: 1) age between 18 and 55 years; and 2) with nonspecific, continuous and recurrent CLBP with minimum duration of three months<sup>14</sup>. Sixty participants were selected. Post hoc sample calculation was performed considering the difference between groups in mean post-treatment pain intensity (Control Group - CG:  $4 \pm 1.53$ ; Mobilization Group – MG:  $0.25 \pm 0.79$  and Sham Group – SG:  $1.65 \pm 1.76$ ) (Power 95%,  $\alpha=0.05$ ). It was observed a power of 97% with effect size of 1.13 and the need for 18 participants per group.

Exclusion criteria were pregnancy and red flag signs (neoplasia, spinal fracture, spinal osteomyelitis, infection or cauda equina syndrome, rheumatic diseases, diseases impairing cognition). Females in luteal phase were rescheduled<sup>15</sup>.

### Interventions

Primary outcomes considered in this study were pain intensity and incapacity. Catastrophic thoughts were considered co-variable.

Selected individuals were randomly distributed, by means of randomized sequence generation software (randomizer) and the use of brown sealed envelopes, in three groups of 20 individuals: MG patients were submitted to joint mobilization, SG to sham technique and control group (CG) has received no intervention. All groups were evaluated by the same blind investigator and have answered to the Brazilian Portuguese version of tools: Oswestry Disability Index – ODI, pain numerical scale (PNS) and Pain Catastrophizing Scale (PCS) before session 1 and after session 10.

All MG patients were blind for the therapy and a single investigator has applied the evaluation protocol for administered interventions. Treatment was always applied by the same investigator for mobilization and sham maneuvers. Treatment lasted 5 weeks, twice a week in a total of 10 sessions. MG received central posterior-to-anterior pressure technique for 30 seconds with mean of 30 repetitions in each lumbar vertebra, from L5 to L1, using level II joint mobilization.

Therapy was performed with therapist's caudal hand keeping 2<sup>nd</sup> and 3<sup>rd</sup> fingers abducted, being the 3<sup>rd</sup> finger with flexion of interphalangeals to standardize the length of all fingers. By means of a lumbrical clamp of the 1<sup>st</sup> and 2<sup>nd</sup> fingers of the cephalad hand. First and second fingers of the other hand were adducted to perform smooth pressure. So, caudal hand was placed in relaxed position to help palpation, with spinous processes between its fingers, and cephalad hand directed to perform palpation. The same technique was performed for remaining vertebral levels from L5 to L1<sup>16</sup>. During application

of the techniques, patient would remain in prone position and procedure was repeated once for each segment.

SG received the sham mobilization technique, reproducing the same positioning of hands used for the MG group, however without rhythmic oscillations, just with the hands at rest. Similarly, positioning was maintained for 30 seconds for each lumbar vertebra. CG received no intervention.

**Evaluation tools**

PNS was used for pain intensity evaluation. This is a simple and easy to measure scale consisting of a sequence of numbers from zero to 10, where zero represents “no pain” and 10 represents “worst possible pain”. Used PNS had its measurement properties tested in CLPB patients<sup>17</sup>.

To evaluate incapacity related to pain and pain intensity, ODI<sup>18</sup> version translated and adapted to Brazilian Portuguese was used. Adapted index has shown adequate measurement properties and is used to evaluate LBP-related functional incapacity<sup>18</sup>. It is made up of 10 items each with six alternatives. Total score is calculated by the sum of points and cannot exceed 50. Higher scores represent higher LBP-related incapacity.

PCS scale was translated and validated for Brazilian Portuguese by Sehn et al.<sup>19</sup>. Scale is made up of 13 staggered items in a Likert scale varying from zero to 5 and associated to the words “almost never” and “almost always” in both edges. Total score is the sum of items divided by the number of answered items, being that minimum score may be zero and maximum score 5 for each item. Higher scores indicate stronger presence of catastrophizing thoughts. Scores of the three domains of the scale are obtained by the sum of respective questions. Total scale score may vary between zero and 52 points.

This study was approved by the Ethics Committee, Faculdade dos Grandes Lagos, under number 150/15 from September 09, 2015. All participants have signed the Free and Informed Consent Term.

**Statistical analysis**

A model of mixed effects was used for statistical analysis to observe the effects of interventions among different groups and the interaction among treatment subgroups versus time. Terms were created for intervention and the factor time. In addition, moderator effect of catastrophizing on studies outcomes (difference before and after treatment) was observed. It was also observed the effect of interactions between terms and the co-variable catastrophizing on dependent variables pain intensity and incapacity. Bonferroni post hoc test was used to minimize the effect of multiple comparisons. Patients not completing 10 treatment sessions were included in the study as treatment intention analysis as recommended by CONSORT<sup>13</sup>.

Variance analyses (ANOVA-one way) were used to verify differences between groups in gender and body mass index ( $p < 0.05$ ).

Linear regression analyses were carried out to verify the association between catastrophizing, weight, height and pain intensity. In the presence of significant interaction effects,

Bonferroni post hoc test was used for multiple comparison analysis, while primary effects were investigated in the lack of interaction effects.

Individual Minimum Clinical Difference (MCD) values were also analyzed according to recommendations of Ostelo et al.<sup>20</sup> (30% for PNS and ODI before and after treatment).

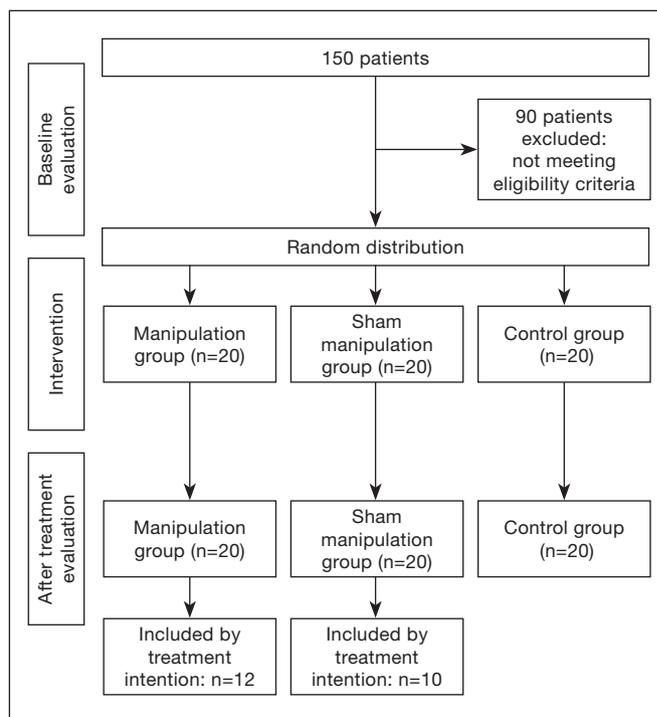
Variables were described considering mean values and confidence interval of 95% (CI95%). Software used for analysis was IBM SPSS software package, version 22 (IBM Corp, Armonk, New York) and significance level for all analyses was  $p < 0.05$ .

**RESULTS**

From 150 recruited patients, 90 did not fit inclusion criteria. Sixty were randomly allocated to the three study groups. However, 12 MG patients and 10 SG patients were included by treatment intention analysis. In average, patients included by treatment intention have attended to seven intervention sessions (Figure 1).

There has been significant difference in age for all groups. CG had mean age significantly lower than other intervention groups (Table 1). However, there has been no influence of age, catastrophizing and incapacity on pain intensity ( $R^2 = 0.01$ ,  $p = 0.91$ ).

There have been significant differences before and after treatment for pain intensity variable in MG ( $p < 0.001$ ) and SG ( $p < 0.001$ ). For LBP-related incapacity, all groups had significant decrease in ODI scores. For catastrophizing, only CG and MG groups had significant decrease before and after treatment (Table 2).



**Figure 1.** Flowchart describing involved participants and who attended to different study stages

**Table 1.** Clinical and anthropometric characteristics<sup>1</sup>

Treatment groups	Catastrophizing	High score PCS>23 <sup>1</sup>	Mean age (SD)	Mean BMI (SD)	Gender
MG (n=20)	20.4 (7.92)	9	39.15 (11.45)	25.80 (4.46)	15F/5M
SG (n=20)	19.75 (13.62)	9	37.10 (12.57)	25.43 (4.19)	18F/2M
CG (n=20)	21 (10.19)	8	30.60 (8.97)*	23.66 (3.36)	18F/2M
ANOVA	F= (2.57) 0.06 p = 0.93		F= (2.57) 3.23. p = 0.05	F (2.57)=1.61. p = 0.21	

PCS = Pain Catastrophizing Scale; MG = mobilization group; SG = sham mobilization group; CG = control group; SD = standard deviation, F: females, M: males; BMI = body mass index; \* significant difference with regard to other groups (MG and SG).

**Table 2.** Description of mean values, standard-deviation and mean difference (before and after intervention) of primary outcome variables (pain intensity, incapacity) and co-variable (catastrophizing) in the three groups

Outcome variables	Before	After	Adjusted mean difference Before-after (CI95%)	p level
CG (n=20)				
PNS	4.10 (3.10 – 5.03)	3.85 (3.09 – 4.61)	-0.25 (0.47 – 0.97)	0.48
ODI	7.10 (5.25 – 8.95)	4.50 (3.08 – 6.01)	-2.55* (1.58 – 3.51)	p<0.001
PCS	21.00 (16.02 – 25.98)	15.60 (10.85 – 20.34)	-5.40* (2.90 – 7.90)	p<0.001
MG (n=20)				
PNS	4.85 (3.50 – 6.15)	0.25 (-0.12 – 0.63)	-4.60* (3.33 – 5.87)	p<0.001
ODI	11.35 (8.41 – 14.28)	3.10 (1.23 – 4.96)	-8.25* (5.10 – 11.30)	p<0.001
PCS	20.40 (16.51 – 24.29)	6.60 (1.25 – 11.94)	-13.80* (8.90 – 19.50)	p<0.001
SG (n=20)				
PNS	4.75 (3.57 – 5.91)	1.65 (0.79 – 2.50)	-3.10* (2.10 – 4.11)	p<0.001
ODI	9.40 (7.53 – 11.27)	4.50 (2.75 – 6.35)	-4.85* (3.27 – 6.42)	p<0.001
PCS	19.75 (13.05 – 26.44)	13.90 (6.68 – 21.11)	-5.85 (-0.52 – 12.22)	0.07

\*Mixed effects model, Bonferroni post hoc (p<0.05); PNS = pain numeric scale; ODI = Oswestry Disability Index; PCS = Pain Catastrophizing Scale.

**Table 3.** Description of mean difference and 95% confidence interval (CI) of the difference among mobilization (MG), mobilization-sham (SG) and control (CG) subgroups for primary outcome variables (pain intensity, incapacity)

Outcome variables	Adjusted mean difference	CI 95%	p level (post hoc)
Pain intensity		F = 39,17, p <0,001	
MG – CG	-2,55*	(0,83 - 4,26)	0,02
MG – SG	-0,84	(-2,16 - 0,45)	0,34
SG – CG	-1,70*	(0,02 – 3,36)	0,05
Lumbar incapacity		F = 2,30, p =0,10	
MG – CG	-1,18	(-2,61 – 5,00)	0,16
MG – SG	-0,52	(-3,43 – 2,38)	0,24
SG – CG	0,68	(-3,03 – 4,41)	1,00

\* Mixed effects model, Bonferroni post hoc (p<0.05).

When difference in catastrophizing before and after treatment was considered in the model (catastrophizing as treatment mediator effect) there has been interaction between time versus catastrophizing ( $F_{(1,54)}=12.23$ ,  $p<0.001$ ) and interaction between treatment versus catastrophizing ( $F_{(2,54)}=5.00$ ,  $p=0.01$ ). However, there has been no interaction between time versus treatment versus catastrophizing ( $F_{(2,54)}=1.65$ ,  $p=0.19$ ). There has been significant difference in mean pain intensity value between MG versus CG (-2.55,  $p=0.02$ ) and SG versus CG (1.70,  $p=0.05$ ) when comparing among intervention groups. There have been no differences in incapacity levels among groups (Table 3).

MCD was calculated for each group. In CG just 15% (n=3) had PNS changes before and after treatment of at least 30%, in MG 75% and in SG 60%. For incapacity, it was observed that just 20% (n=4) of MG patients with LBP had MCD. In remaining groups, no patient had 30% of ODI improvement.

## DISCUSSION

Our first hypothesis was that significant decreases in pain intensity and incapacity in the group of patients submitted to joint lumbar spine mobilization with regard to controls

and sham would be observed. Our study results partially support the initial hypothesis since there has been significant pain intensity decrease in mobilization and sham groups as compared to control group; however, this difference was not observed between mobilization and sham groups. So, results show effects of mobilization and sham intervention on pain intensity on individuals with nonspecific CLBP. And the lack of differences between mobilization and sham groups shows that it is possible that the effect of the treatment with mobilization be basically placebo/sham effect.

In our study, there has been significant pain intensity decrease in the group treated with mobilization and mobilization-sham as compared to control group. In the mobilization group, 75% of participants had 30% change (value considered clinically relevant)<sup>20</sup> in pain intensity versus 60% in the sham group, while in control group this was true for just 15% of participants. Comparison among groups has not shown significant difference between mobilization and mobilization-sham groups. These results emphasize possible sham effect of mobilization.

Previous studies have shown effects of joint mobilization techniques for pain intensity, incapacity and joint stiffness. Studies of Goodsell, Lee & Latimer<sup>9</sup>, and Shum, Tsung & Lee<sup>10</sup> have evaluated the effect of just one intervention session. Shah & Kage<sup>11</sup> have observed similar effects between groups submitted to seven mobilization sessions versus prone press-up exercises in decreasing pain intensity, increasing lumbar stretching movement amplitude and improving LBP-related incapacity. There were also better effects for mobilization as compared to stretching exercises. However, authors have not included a sham group<sup>9,10</sup>.

One of the few studies comparing mobilization interventions and an inert technique has not observed sham effect after application of just one Hidalgo et al.<sup>8</sup> type mobilization session. There has been significant decrease in pain intensity and pain at movement in the mobilization group as compared to control group (without treatment). Authors suggest sham effect related to intervention since there were no differences before and after intervention in objective movement amplitude measurements and joint stiffness between sham versus intervention groups.

In line with our results, Hancock et al.<sup>21</sup> have observed sham effect when comparing mobilization and turned-off US in patients with acute LBP for pain and functionality. One of the few studies using manual technique as sham technique was performed by Licciardone et al.<sup>12</sup>. Authors have also not observed differences in comparison between mobilization + manipulation versus sham manipulation in pain intensity, incapacity and satisfaction with treatment of CLBP patients, but there have been differences regarding the group with no intervention. Both results were considered as moderate evidence by a recent systematic review<sup>8</sup>.

A key-issue of the Manual Therapy research is related to the development of a feasible placebo/sham. Sham manipulation/mobilization may be considered a more adequate placebo procedure since it mimics the interaction among patient, therapist and the clinical context. However, it is necessary to consider that it is not possible to exclude all effects of a

technique applied with the aim of not inducing therapeutic effects. So, it is possible that sham technique applied in this study has not worked exactly as a placebo/sham technique.

This way, some factors could be related to real effects in the application of simulation techniques, such as the sham technique applied in this study: 1) effect of laying on of hands, 2) effect of the interaction between therapist and patient, and 3) effect of expectation with regard to applied therapy. Licciardone et al.<sup>12</sup> and Bialosky et al.<sup>22</sup> discuss in a review article the importance of redefining sham/placebo. Conventionally accepted definition of placebo is that it is an inert or “with no effect” treatment. However, it is suggested that placebo is an active psychological and physiologic process associated to robust hypoalgesic response<sup>23</sup>. So, placebo/sham should be considered not only an inert treatment method, but rather as simulations of active treatment, dependent on the psychosocial context where they occur.

Our study has used Maitland posterior-to-anterior mobilizations level II because one primary outcome of the study was pain intensity<sup>17</sup> as well as the fact that many CLBP patients are susceptible to local painful sensitization processes<sup>24</sup>. Major neurophysiologic effects of mobilization are related to passive stretching of contracted tissues. Rhythmic and repetitive mobilization movements increase synovial fluid distribution on joint cartilage and disc, resulting in lower resistance to joint movement<sup>25</sup>. There are some studies emphasizing possible hypoalgesic effects of mobilization at spinal and supraspinal levels. Studies have shown a bombardment of proprioceptive stimuli in spinal cord after manipulations<sup>26</sup> which in turn may lead to hypoalgesia through the pain gateway mechanism. Decreased pain intensity and increased parasympathetic activity seem to be associated to action mechanisms mediated by periaqueductal gray matter (descending pain inhibitory mechanisms) after the application of manual therapy techniques<sup>22</sup>, as well as local release of endogenous opioids<sup>26</sup>.

However, such neurophysiologic mechanisms explain effects observed in the group treated with mobilizations, but not in the sham group. So, some authors suggest a psychological effect associated to the application of mobilization/manipulation techniques. Considering that psychosocial context might influence results of simulated interventions (sham) it is possible that differences in catastrophizing levels may explain differences in our findings. However, there were no differences in total baseline PCS score among the three studied groups, as well as there were no differences in percentage of individuals classified with high catastrophizing levels (PCS score above 23)<sup>27-29</sup>.

On the other hand, all groups had significant decrease in catastrophizing levels before and after intervention, except for the group treated with sham, and all analyses were conducted considering the difference before and after catastrophizing as the co-variable. This result suggests some possible mechanisms: 1) mobilization has major neurophysiologic effects which influence catastrophizing levels and pain intensity reports, or 2) the group receiving the sham technique was not “convinced” of the treatment received. Anyway, our results

suggest that a mediator effect of catastrophizing is possible on pain intensity of CLBP patients<sup>30</sup>.

In addition, almost half the sample of this study (43%) had higher catastrophizing levels, suggesting a sample susceptible to sham/placebo effect regardless of administered interventions. So, future studies could verify possible differences in the effect of intervention with mobilization versus sham between subgroups with and without predominance of high psychosocial aspects (catastrophizing, depression, anxiety and fear-avoidance).

Our study had several limitations: 1) Sample size may be considered small and future studies should consider larger samples, notwithstanding post hoc sample calculation showing a Power of 97%; 2) Future studies should verify effects of mobilizations with higher levels as compared to the simulated technique (sham) used in this study; 3) It is also recommended the inclusion of an inert comparator treatment to rule out possible therapeutic effects of the sham technique; and 4) This study was not registered as clinical trials, which could contribute to minimize possible report biases.

## CONCLUSION

Our results have shown that joint mobilization was effective to improve incapacity, pain intensity and catastrophizing before and after intervention. However, when comparing the effects among intervention groups, there has been significant pain intensity decrease just in mobilization and sham groups as compared to control group. So, we suggest a sham/placebo effect associated to the application of 10 level II mobilization sessions.

## REFERENCES

1. Chou R, Qaseem A, Snow V, Casey D, Cross JT Jr, Shekelle P, et al. Clinical Efficacy Assessment Subcommittee of the American College of Physicians; American College of Physicians; American Pain Society Low Back Pain Guidelines Panel. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med.* 2007; 147(7):478-91
2. O'Sullivan P. Diagnosis and classification of chronic low back pain disorders: maladaptive movement and motor control impairments as underlying mechanism. *Man Ther.* 2005;10(4):242-55.
3. Maher C, Underwood M, Buchbinder R. Non-specific low back pain. *Lancet.* 2016;10:p11: S0140-6736(16)30970-9.
4. Franke H, Fryer G, Ostelo RW, Kamper SJ. Muscle energy technique for non-specific low-back pain. *Cochrane Database Syst Rev.* 2015;(2):CD009852.
5. Karvat J, Antunes JS, Bertolini GR. Mobilizações póstero-anteriores na coluna lombar em voluntárias saudáveis. Avaliação da dor ao frio e à pressão: ensaio clínico cruzado. *Rev Dor.* 2014;15(1):21-4.
6. Beattie PF, Arnot CF, Donley JW, Noda H, Bailey L. The immediate reduction in low back pain intensity following lumbar joint mobilization and prone press-ups is associated with increased diffusion of water in the L5-S1 intervertebral disc. *J Orthop Sports Phys Ther.* 2010;40(5):256-64.
7. Beattie PF, Butts R, Donley JW, Liuzzo DM. The within-session change in low back pain intensity following spinal manipulative therapy is related to differences in diffusion of water in the intervertebral discs of the upper lumbar spine and L5-S1. *J Orthop Sports Phys Ther.* 2014;44(1):19-29.
8. Hidalgo B, Detrembleur C, Hall T, Mahaudens P, Nielsens H. The efficacy of manual therapy and exercise for different stages of non-specific low back pain: an update of systematic reviews. *J Man Manip Ther.* 2014;22(2):59-74.
9. Goodsell M, Lee M, Latimer J. Short-term effects of lumbar posteroanterior mobilization in individuals with low-back pain. *J Manipulative Physiol Ther.* 2000;23(5):332-42.
10. Shum GL, Tsung BY, Lee RY. The immediate effect of posteroanterior mobilization on reducing back pain and the stiffness of the lumbar spine. *Arch Phys Med Rehabil.* 2013;94(4):673-9.
11. Shah SG, Kage V. Effect of seven sessions of posterior-to-anterior spinal mobilisation versus prone press-ups in non-specific low back pain - randomized clinical trial. *J Clin Diagn Res.* 2016;10(3):YC10-3.
12. Licciardone JC, Stoll ST, Fulda KG, Russo DP, Siu J, Winn W, et al. Osteopathic manipulative treatment for chronic low back pain: a randomized controlled trial. *Spine.* 2003;28(13):1355-62.
13. Moher D, Hopewell S, Schulz KF, Montori V, Gøtzsche P C, Devereaux P J, et al. CONSORT 2010 explanation and elaboration: Updated guidelines for reporting. *International J Surg.* 2012;10(1):28-55.
14. Traeger A C, Moseley G L, Hubscher M, Lee H, Skinner I W, Nicholas M K, et al. Pain education to prevent chronic low back pain: a study protocol for a randomized controlled trial. *BMJ Open.* 2014;4(6):e005505.
15. Hartvigsen L, Kongsted A, Hestbaek L. Clinical examination findings as prognostic factors in low back pain: a systematic review of the literature. *Chiropr Man Therap.* 2015;23(13).
16. Maitland GD. *Maitland Manipulação Vertebral.* 7ª ed. Rio de Janeiro: Elsevier; 2007. 384.5p.
17. Costa LO, Maher CG, Latimer J, Ferreira PH, Ferreira ML, Pozzi GC, et al. Clinimetric testing of three self-report outcome measures for low back pain patients in Brazil: which one is the best? *Spine (Phila Pa 1976).* 2008;15;33(22):2459-63.
18. Vigatto R, Alexandre NM, Correa Filho HR. Development of a Brazilian Portuguese version of the Oswestry Disability Index: cross-cultural adaptation, reliability, and validity. *Spine (Phila Pa 1976).* 2007;32(4):481-6.
19. Sehn F, Chachamovich E, Vidor LP, Dall-Agnol L, de Souza IC, Torres IL, et al. Cross-cultural adaptation and validation of the Brazilian Portuguese version of the pain catastrophizing scale. *Pain Med.* 2012;13(11):1425-35.
20. Ostelo RW, Deyo RA, Stratford P, Waddell G, Croft P, Von Korf M, et al. Interpreting change scores for pain and functional status in low back pain: towards international consensus regarding minimal important change. *Spine (Phila Pa 1976).* 2008;133(1):90-4.
21. Hancock MJ, Maher CG, Latimer J, McLachlan AJ, Cooper CW, Day RO, et al. Assessment of diclofenac or spinal manipulative therapy, or both, in addition to recommended first-line treatment for acute low back pain: a randomised controlled trial. *Lancet.* 2007;370(9599):1638-43
22. Bialosky JE, Bishop MD, George SZ, Robinson ME. Placebo response to manual therapy: something out of nothing? *J Man Ther.* 2011;19(1):11-9.
23. Vase L, Petersen GL, Riley JL 3rd, Price DD. Factors contributing to large analgesic effects in placebo mechanism studies conducted between 2002 and 2007. *Pain* 2009;145(1-2):36-44
24. Roussel NA, Nijs J, Meeus M, Mylius V, Fayt C, Oostendorp R. Central sensitization and altered central pain processing in chronic low back pain: fact or myth? *Clin J Pain.* 2013;29(7):625-38.
25. Bialosky JE, Bishop MD, Price DD, Robinson ME, George SZ. The mechanisms of manual therapy in the treatment of musculoskeletal pain: a comprehensive model. *Man Ther.* 2009;14(5):531-8.
26. Pickar JG, Wheeler JD. Response of muscle proprioceptors to spinal manipulative like loads in the anesthetized cat. *J Manipulative Physiol Ther.* 2001;24(1):2-11
27. Degenhardt BF, Darmani NA, Johnson JC, Towns LC, Rhodes DC, Trinh C, et al. Role of osteopathic manipulative treatment in altering pain biomarkers: a pilot study. *J Am Osteopath Assoc.* 2007;107(9):387-400
28. Williams NH, Hendry M, Lewis R, Russell I, Westmoreland A, Wilkinson C. Psychological response in spinal manipulation (PRISM): a systematic review of psychological outcomes in randomised controlled trials. *Complement Ther Med.* 2007;15(4):271-83
29. Werltl MM, Eugster R, Held U, Steurer J, Kofmehl R, Weiser S. Catastrophizing-a prognostic factor for outcome in patients with low back pain: a systematic review. *Spine J.* 2014;14(11):2639-57.
30. Werltl MM, Burgstaller JM, Weiser S, Steurer J, Kofmehl R, Held U. Influence of catastrophizing on treatment outcome in patients with nonspecific low back pain: a systematic review. *Spine (Phila Pa 1976).* 2014;39(3):263-73.

# Incidence of low back pain according to physical activity level in hospital workers

## *Ocorrência de lombalgia segundo o nível de atividade física em trabalhadores hospitalares*

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** Hospitals integrate several risks posed by physical, chemical, psychosocial and ergonomic factors, which may be noxious for different healthcare professionals. This study aimed at evaluating the level of physical activity, the presence of musculoskeletal risk factors and the incidence of low back pain among nursing professionals of a hospital Materials and Sterilization Center.

**METHODS:** Sample was made up of 56 individuals of both genders, working for the *Associação Beneficente de Campo Grande/MS-Hospital Santa Casa*. Participants were divided in two groups: G1 (insufficiently active, n=27) and G2 (sufficiently active, n=29). In addition to the level of physical activity, anthropometric data, incidence of pain and functional incapacity, flexibility and muscle resistance were evaluated.

**RESULTS:** The incidence of low back pain was lower in G2 (13 cases; 44.8%) as compared to G1 (24 cases; 88.9%). Body mass index, pain intensity and functional incapacity index were lower for G2. Time of physical activity was lower in G1. Abdominal muscles resistance was higher in G2.

**CONCLUSION:** In nursing professionals, the level of physical activity influences the presence of low back pain, pain intensity and functional incapacity index.

**Keywords:** Low back pain, Musculoskeletal, Nursing, Risk factors, Workers' health.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** O ambiente hospitalar integra uma série de riscos decorrentes de fatores físicos, químicos, psicossociais e ergonômicos, que podem ser prejudiciais a diferentes profissionais da área de saúde. Este estudo teve por objetivo avaliar o nível de atividade física, a presença de fatores de risco musculoesqueléticos e a ocorrência de lombalgia em profissionais de enfermagem de Centro de Materiais e Esterilização hospitalar.

**MÉTODOS:** A casuística integrou 56 indivíduos de ambos os gêneros, trabalhadores da Associação Beneficente de Campo Grande/MS-Hospital Santa Casa. Os participantes foram alocados em dois grupos: G1 (insuficientemente ativos, n=27) e G2 (suficientemente ativos, n=29). Além do nível de atividade física, foram realizadas análises antropométricas, de ocorrência de dor e incapacidade funcional, flexibilidade e resistência muscular.

**RESULTADOS:** A ocorrência de lombalgia foi menor em G2 (13 casos; 44,8%) que em G1 (24 casos; 88,9%). Índice de massa corporal, intensidade da dor e índice de incapacidade funcional foram menores em G2. O tempo de atividade física foi menor em G1. Resistência dos músculos abdominais foi maior em G2.

**CONCLUSÃO:** Em profissionais de enfermagem, o nível de atividade física influencia a ocorrência de lombalgia, intensidade de dor e índice de incapacidade funcional.

**Descritores:** Dor lombar, Enfermagem, Fatores de risco, Musculoesquelético, Saúde do trabalhador.

### INTRODUCTION

Low back pain is a major public health problem, reaching epidemic levels among general population, affecting economically active people and considered the most important reason for medical leave<sup>1</sup>. Pain is multifactorial, involving individual, psychosocial, occupational, genetic, and biomechanical factors. Among intrinsic risk factors there are age, gender, body mass index, muscle imbalances and sedentary life<sup>2</sup>. Low back pain induced by mechanical-postural conditions is responsible for a large part of back pain referred by population<sup>1</sup>. Postural stress may change several musculoskeletal system structures, generating imbalances and decreasing muscle strength. Loss of flexibility, regardless of cause, may also induce pain and decrease muscle strength<sup>1,2</sup>.

Extrinsic factors, such as labor-related functional overload<sup>1</sup>, may also contribute for low back pain development and

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worsening. Hospital environment poses several risks caused by physical, chemical, psychosocial and ergonomic factors, which may be noxious to the health of professionals of the area<sup>3</sup>. Among professionals working in hospitals, nurses are professionals more often affected by low back pain, with high incidence rate and prevalence per year<sup>3</sup>. Their work is not limited to direct patients' assistance, but rather is extended to indirect assistance by means of Central Materials and Sterilization Department (CMSD). This is a technical support sector, mostly made up of nurses and aimed at receiving contaminated materials, decontaminating them, preparing and sterilizing them, as well as at preparing and sterilizing clean clothes coming from the laundry and storing such materials for future distribution<sup>4</sup>.

Considering the high incidence of low back pain among nurses and the scarcity of CMSD-related studies, this study aimed at evaluating the level of physical activity, the presence of musculoskeletal risk factors and low back pain among nurses of a hospital CMSD. Additionally, the association between these potential risk factors and the incidence of low back pain was investigated.

## METHODS

Observational and cross-sectional study with nurses of both genders, working in the CMSD of the Associação Beneficente de Campo Grande – Hospital Santa Casa, Campo Grande/MS. Inclusion criteria were minimum age of 18 years and minimum experience of six months on the job.

Participants have signed the Free and Informed Consent Term (FICT) and were allocated in groups, according to the level of physical activity, which was evaluated by the International Physical Activity Questionnaire (IPAQ), reproduced and validated in Brazil by the Centro de Estudos do Laboratório de Aptidão Física de São Caetano do Sul<sup>5</sup>. To characterize subjects, demographic data such as age, gender, job or function were collected by means of interviews. To evaluate body mass, a digital scale, gauged and checked (model Glass 3 Control, G-TECH) was used. Height was measured with a flexible measuring tape, with 3m length and resolution of 0.1cm, fixed on the wall.

Individuals were asked about the presence or not of low back pain, being it defined as pain and discomfort below the costal margin and above inferior gluteal sulcus, followed or not by lower limb pain<sup>6</sup>. Pain intensity in the lumbar region was evaluated by means of the visual analog scale (VAS). Functional incapacity was measured with the application of Roland-Morris (RM) questionnaire, as used in previous study<sup>7</sup>.

Posterior thigh muscles flexibility was evaluated with Sit and Reach in the Wells bench test. Individuals' performance was classified, according to *Canadian Standardized Test of Fitness* (CSTF), in: excellent, above average, average, below average and poor<sup>8</sup>. Thomas test was used to evaluate hip flexors extensibility<sup>9</sup>. Muscle resistance was evaluated with Maximum Repetition test in one minute for abdominal muscles<sup>10</sup>.

Based on studied population, with 87 individuals, to determine sample size, prevalence of 90% of professionals with history of occupational low back pain was established<sup>1,3</sup>, with significance level of 95% and admitting sample error of 5%. With this, minimum of 54 participants were obtained to develop the study.

This study was approved by the Research Ethics Committee, Universidade Federal de Mato Grosso do Sul, opinion 545.584.

## Statistical analysis

Results are presented in descriptive format. Student *t* test for parametric data and Mann Whitney test for non-parametric data were used to compare between groups. Goodman test was used for proportion analyses. Significance level was 5%.

## RESULTS

Study sample was made up of 56 individuals who agreed to participate in the survey. From these, 43 were nursing technicians (76.8), 11 were nursing assistants (19.6%) and 2 were nurses (3.6%). With regard to shift, 22 (39.3%) worked in the morning, 18 (32.1%) in the afternoon and 16 (28.6%) in the evening. As to weekly workload, 43 (76.8%) worked 42 weekly hours and 13 (23.2%) had double jobs, in a total of 74 to 84 weekly hours. Among individuals with double jobs, 69.2% (n=9) worked as nursing technician, 15.4% (n=2) as elderly caregivers and 15.4% (n=2) in other jobs.

Group 1 (G1) was made up of 27 individuals considered insufficiently active, while group 2 (G2) was made up of 29 subjects classified as sufficiently active. No subject was considered very active. Considering the level of professional qualification, 17 G1 subjects (63%) were nursing technicians and 10 (37%) were nursing assistants. In G2, 26 (89.7%) were nursing technicians, 2 (6.9%) were nurses and 1 (3.4%) was nursing assistant. With regard to working shift, 12 G1 participants (44.5%) worked in the morning, 6 (22.2%) in the afternoon and 9 (33.3%) in the evening. In G2, 10 (34.5%) worked in the morning, 12 (41.4%) in the afternoon and 7 (24.1%) in the evening.

With regard to workload, in G1, 19 (70.4%) worked 42h/week, 7 (25.9%) 84h/week and 1 (3.7%) 82h/week. In G2, 24 (82.8%) worked 42h/week, 3 (10.4%) 84h/week, 1 (3.4%) 82h/week and 1 (3.4%) 74h/week. Groups were homogeneous in gender ( $p>0.05$ ) being G1 made up of 26 (96.3%) females and 1 (3.7%) male, while G2 was made up of 26 (89.7%) females and 3 (10.3%) males.

Table 1 shows demographic and anthropometric variables. There has been no significant difference between groups for height and body mass index (BMI). Age and BMI were lower for G2. As to low back pain, after fixing the group, there has been significant difference in G1, with predominance of individuals with low back pain. In G2 there has been no difference between presence and absence of low back pain. There has also been difference between groups with regard to the incidence of low back pain, being the number of positive cases

higher in G1 and the number of negative cases higher in G2. With regard to low back pain duration, there has been no difference between groups [G1: 36.0 (12.0 – 96.0); G2: 36.0 (3.0 – 48.0) months;  $p>0.05$ ].

**Table 1.** Demographic and anthropometric variables according to the level of physical activity

Variables	G1 (n=27)	G2 (n=29)	p value
Age (years)	47.6 ± 10.8	40.1 ± 7.3	0.003
Height (m)	1.58 ± 0.07	1.61 ± 0.07	0.064
Body mass (kg)	76.8 ± 12.0	73.1 ± 11	0.228
BMI (kg/m <sup>2</sup> )	30.9 ± 4.6	28.2 ± 4.0	0.020

G1 = group of insufficiently active individuals; G2 = group of sufficiently active individuals; BMI = body mass index; data in mean ± standard deviation; Student *t* test.

**Table 2.** Proportion of low back pain cases according to the level of physical activity

Low back pain	G1 (n=27)	G2 (n=29)
Absence	3 (11.1%) Aa	16 (55.2%) Ab
Presence	24 (88.9%) Bb	13 (44.8%) Aa

G1 = group of insufficiently active individuals; G2 = group of sufficiently active individuals; Goodman test; A, B: for vertical comparisons; a, b: for horizontal comparisons; different letters mean significant difference ( $p<0.05$ ).

Table 3 shows data on time of physical activity practiced per week, musculoskeletal risk factors for low back pain, low back pain intensity and functional capacity index, according to group. G2 had longer total physical activity time per week as compared to G1. In addition, pain intensity and functional incapacity index were higher in G1 as compared to G2. With regard to musculoskeletal risk factors for low back pain, the number of repetitions performed during maximum repetition test for abdominal muscles was higher for G2 as compared to G1. However, there has been no significant difference between groups for values of the sit and reach and Thomas tests for lower limbs.

With regard to sit and reach test, individuals were classified by the level of flexibility and both groups had values compatible just with classifications “below average” and “poor”. In G1, 3 individuals (11.1%) were considered below average and 24 (88.9%) with poor performance. In G2, 4 individuals (13.8%) were considered below average and 25 (86.2%) with poor performance. At Goodman test, when fixed the group, the number of individuals with poor performance in the sit and reach test was significantly higher than the number of individuals with performance below average in both groups. However, there has been no difference in the number of cases of hip flexors shortening (Table 4).

**Table 3.** Physical activity practiced per week, low back pain intensity, functional incapacity index and musculoskeletal risk factors for low back pain, according to the level of physical activity.

Variables	G1 (n= 27)	G2 (n=29)	p value	
Time of physical activity (min/week)	60 (0 – 232.5)	720 (247.5 – 1320)	<0.001	
Incapacity index (Roland Morris)	9 (4.25 – 13.75)	0 (0 – 11.25)	0.010	
Pain (visual analog scale)	6 (5 – 8)	0 (0 – 7)	0.005	
Abdominal test (number of repetitions)	24 (15.75 – 28.75)	31 (22.5 – 37)	0.037	
Sit and reach (cm)	15.8 ± 5.2	18.1 ± 6.0	0.121	
Thomas test RLL (levels)	MA	12 (10 – 14)	12 (8 – 5)	1.000
	BA	100 (96 – 112.5)	114 (101 – 118)	0.058
Thomas test LLL (levels)	MA	12 (8.5 – 15.75)	10 (8 – 12.75)	0.225
	BA	102 (98 – 113.5)	102 (98 – 112.5)	0.934

Data in mean ± standard deviation of median (percentile 25-75%); Student *t* or Mann-Whitney test. G1 = group of insufficiently active individuals; G2 = group of sufficiently active individuals; RLL = right lower limb; LLL = left lower limb; MA = monoarticular; BA = biarticular.

**Table 4.** Number of cases of hip flexors shortening according to the level of physical activity

Modified Thomas test	Condition	Groups		
		G1 (n=27)	G2 (n=29)	
RLL	Monoarticular	Absence	4 (14.8%) Aa	3 (10.3%) Aa
		Presence	23 (85.2%) Ba	26 (89.7%) Ba
	Biarticular	Absence	1 (3.7%) Aa	2 (6.9%) Aa
		Presence	26 (96.3%) Ba	27 (93.1%) Ba
LLL	Monoarticular	Absence	4 (14.8%) Aa	4 (13.8%) Aa
		Presence	23 (85.2%) Ba	25 (86.2%) Ba
	Biarticular	Absence	2 (7.4%) Aa	2 (6.9%) Aa
		Presence	25 (92.6%) Ba	27 (93.1%) Ba

G1 = group of insufficiently active individuals; G2 = group of sufficiently active individuals; RLL = right lower limb; LLL = left lower limb; Goodman test; A, B = for vertical comparisons; a = for horizontal comparisons; different letters mean significant difference ( $p<0.05$ ).

## DISCUSSION

CMSD is a technical support sector, primarily made up of nursing professionals, which works around-the-clock to supply the demand of different hospital sectors<sup>4</sup>. Among CMSD-related ergonomic risks there are accelerated working rhythm, information flow, job organization, upright or static posture for long periods, repetitive upper limbs movements and hard work<sup>11</sup>.

The exposure of people to extrinsic and intrinsic risk factors promotes acute body response, characterized by fatigue, discomfort and pain for prolonged periods. In addition, there may be adaptation mechanisms or the development of chronic effects, peaking with Work-Related Musculoskeletal Disorders (WRMD), such as low back pain<sup>1-3</sup>. Although being considered multifactorial, low back pain etiology is frequently associated to sedentary life, reflecting the combination of deficient musculoskeletal fitness and lumbar region overload<sup>1</sup>. In our study, the incidence of low back pain was higher in the insufficiently active group. Adequate fitness levels may contribute to maintain body posture during routine functions with lower energy waste, without exceeding tolerable musculoskeletal limit.

Physical activity also attenuates major risk factors involved with low back pain syndrome, such as muscle weakness, especially in the abdominal region, and poor joint flexibility of dorsum and lower limbs<sup>12</sup>. Petersen & Marziale<sup>13</sup> have observed lower frequency of low back pain in nurses practicing sports. Interestingly in our study, not only low back pain but also pain intensity was lower in the sufficiently active group. In the biochemical context, trunk muscles weakness is a major risk factor for low back pain. Especially abdominal muscles play a critical role in spine and pelvic girdle stabilization. When there is abdominal weakness, there is hip instability, allowing the psoas muscle to anteriorly traction lumbar vertebrae, leading to pelvic anteversion and increased lumbar lordosis<sup>9,12,14</sup>. It is worth reminding that the sufficiently active group had better abdominal muscles fitness. Macedo, Debiagi & Andrade<sup>14</sup> have also observed association between low back pain and poor abdominal muscle resistance in young females.

Conversely, the level of physical activity has not influenced muscle flexibility. Previous studies have also not shown relationship between flexibility abnormalities and low back pain<sup>3,15</sup>. Nevertheless, Puppini et al.<sup>15</sup> have shown important relationship between muscle shortening and nonspecific chronic low back pain. Polito, Maranhão Neto & Lira<sup>12</sup> have evaluated fitness components of 328 individuals aged from 18 to 81 years and just muscle flexibility was associated to the prevalence of low back pain.

It is possible that part of the differences found between some studies is due to the way flexibility was evaluated. Although being easy to apply with high reproducibility, sit and reach test is considered an indirect and linear test characterized for expressing results in a distance scale. Linear tests have as weakness the incapacity of giving a global vision of individu-

al's flexibility and the possible interference of anthropometric variables on tests results<sup>12</sup>.

As to demographic and anthropometric variables, sufficiently active individuals had younger age and lower BMI. Chronological age is associated to physical activity decline, thus increasing the risk for low back pain<sup>1,10</sup>. In addition, it is well established that aging is associated to degenerative changes in lumbar spine structures, which may cause pain, decreased flexibility and muscle weakness<sup>10</sup>. Overweight may be considered independent low back pain factor because it increases abdominal circumference worsening pain and may associate it to lumbar spine changes. According to Heuch et al.<sup>2</sup> low back pain is associated to BMI and pain intensity increases as the level of obesity progresses. In addition, CMSD workers carry heavy objects every day during work, which may lead to anterior gravity center shift, generating pelvic anteversion and consequently increased lumbar lordosis.

## CONCLUSION

Among nurses working in a hospital CMSD, the level of physical activity influences the incidence of low back pain, pain intensity and functional incapacity. In addition, sufficiently active individuals have better abdominal muscles resistance.

## REFERENCES

- Patrick N, Emanski E, Knaub MA. Acute and chronic low back pain. *Med Clin North Am.* 2016;100(1):169-81.
- Heuch I, Heuch I, Hagen K, Zwart JA. Body mass index as a risk factor for developing chronic low back pain. *Spine.* 2013;38(2):133-9.
- Davis KG, Kotowski SE. Prevalence of musculoskeletal disorders for nurses in hospitals, long-term care facilities, and home health care: a comprehensive review. *Hum Factors.* 2015;57(5):754-92.
- Sobeco, Nacional. Práticas Recomendadas. Sociedade Brasileira de Enfermeiros de Centro Cirúrgico Recuperação Anestésica e Centro de Material de Esterilização. 4<sup>a</sup> ed. São Paulo, 2007.
- Matsudo S, Araújo T, Matsudo V, Andrade D, Andrade E, Oliveira L, et al. Questionário Internacional de Atividade Física (IPAQ): estudo de validade e reprodutibilidade no Brasil. *Rev Atividade Física & Saúde.* 2001;6(2):5-18.
- Chou R, Qaseem A, Snow V, Casey D, Cross JRT, Shekelle P, et al. Diagnosis and treatment of low back pain: a joint clinical practice Guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med.* 2007;147(7):478-91.
- Dohnert MB, Bauer JP, Pavão TS. Study of the effectiveness of interferential current as compared to transcutaneous electrical nerve stimulation in reducing chronic low back pain. *Rev Dor.* 2015;16(1):27-31.
- Canadian Standardized Test of Fitness (CSTF). Operations manual. Ottawa: Minister of State. 3<sup>rd</sup> ed. 1986.
- Sena DA, Ferreira FM, Melo RH, Taciro C, Carregaro RL, Oliveira Júnior SA. Análise da flexibilidade segmentar e prevalência de lesões no futebol segundo faixa etária. *Fisioter Pesqui.* 2013;20(4):343-8.
- Schoenell MCW, Tiggemann CL, Cadore EL, Tartaruga MP, Kruegel LFM. Correlação e reprodutibilidade de testes abdominais em mulheres jovens. *Rev Bras Ciênc Esporte.* 2013;35(3):561-74.
- Ouquinhos CM, Machado ME. Enfermagem no processo de esterilização de materiais. *Texto Contexto Enferm.* 2013;22(3):695-703.
- Polito MD, Maranhão Neto GA, Lira VA. Componentes da aptidão física e sua influência sobre a prevalência de lombalgia. *Rev Bras Ci Mov.* 2003;11(2):35-40.
- Petersen Rde S, Marziale MH. [Low back pain characterized by muscle resistance and occupational factors associated with nursing]. *Rev Lat Am Enfermagem.* 2014;22(3):386-93. Portuguese.
- Macedo CS, Debiagi PC, Andrade FM. Efeito do isostretching na resistência muscular de abdominais, glúteo máximo e extensores de tronco, incapacidade e dor em pacientes com lombalgia. *Fisioter Mov.* 2010;23(1):113-20.
- Puppini MA, Marques AP, Silva AG, Futuro Neto HA. Alongamento muscular na dor lombar crônica inespecífica: uma estratégia do método GDS. *Fisioter Pesq.* 2011;18(2):116-21.

# Low-level lasertherapy associated to occlusal splint to treat temporomandibular disorder: controlled clinical trial

*Laserterapia de baixa intensidade associada ao uso de placa oclusal no tratamento de disfunção temporomandibular: estudo clínico controlado*

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** Most widely used treatment modality for temporomandibular disorders is the occlusal splint. Low-level lasertherapy has been used as therapeutic agent, however as isolated treatment. So, this study aimed at evaluating the effect of the association of low-level lasertherapy and occlusal splint to treat temporomandibular disorders.

**METHODS:** Participated in the study 25 selected patients according to the Research Diagnostic Criteria for Temporomandibular Disorders protocol. Control group (CG) was made up of 12 asymptomatic volunteers. Two groups were randomly formed: “splint-laser” (SLG), being treated with occlusal splint and associated low-level lasertherapy; “splint” (SG), treated with occlusal splint only. Jaw movements, pain at palpation and self-perception of signs and symptoms were investigated before and after treatment.

**RESULTS:** There has been significant decrease in pain at palpation and reported pain according to self-perception of signs and symptoms for both groups, however more significant for SLG. There has been increased amplitude of jaw movements with significant difference after treatment for both groups.

**CONCLUSION:** The association of low-level lasertherapy and occlusal splint to treat temporomandibular disorders has promoted more marked pain decrease as compared to occlusal splint alone. Placebo effect should not be discarded and should be tested in future studies.

**Keywords:** Low-level lasertherapy, Occlusal splints, Temporomandibular joint disorders.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A modalidade de tratamento mais empregada para disfunção temporomandibular é a placa oclusal. A laserterapia de baixa intensidade tem sido empregada como agente terapêutico, porém como tratamento isolado. Assim, o objetivo deste estudo foi analisar o efeito da associação da laserterapia de baixa intensidade ao uso da placa oclusal como tratamento para disfunção temporomandibular.

**MÉTODOS:** Participaram do estudo 25 pacientes selecionados de acordo com o protocolo *Research Diagnostic Criteria for Temporomandibular Disorders*. O grupo controle (GC) foi formado por 12 voluntários assintomáticos. Dois grupos foram formados por sorteio: “placa-laser” (GPL), que recebeu tratamento com placa oclusal e laserterapia de baixa intensidade associada; “placa” (GP), que recebeu tratamento apenas com placa oclusal. Os movimentos mandibulares, a dor à palpção e autopercepção dos sinais e sintomas, foram investigados antes e após os tratamentos.

**RESULTADOS:** Houve diminuição significativa da dor à palpção e da dor relatada de acordo com a autopercepção dos sinais e sintomas para ambos os grupos tratados, porém de forma mais acentuada para o GPL. Houve aumento da amplitude dos movimentos mandibulares com diferença significativa após os tratamentos para ambos os grupos.

**CONCLUSÃO:** A associação da laserterapia de baixa intensidade ao tratamento da disfunção temporomandibular com placa oclusal promoveu diminuição mais acentuada do sintoma doloroso dolorosa quando comparado ao tratamento apenas com placa oclusal. O efeito placebo não deve ser descartado e deverá ser testado em estudos futuros

**Descritores:** Placas oclusais, Terapia a laser de baixa intensidade, Transtornos da articulação temporomandibular.

## INTRODUCTION

Both acute and chronic pain are still a major reason for looking for medical and dental treatment and are a major challenge for professionals dealing with orofacial pain (OFP)<sup>1,2</sup>. Temporomandibular disorders (TMD) are among most common OFP. TMD may be understood as a set of clinical changes involving the stomatognathic system, where pain is the primary reason for looking for treatment. It is classified as musculoskeletal pain, OFP subtype especially characterized by spontaneous pain in orofacial muscles and/

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or temporomandibular joints (TMJ) which worsens during stomatognathic functions<sup>3-5</sup>. Currently, its etiology involves predisposing, perpetuating and worsening factors which should be taken into consideration in the diagnosis to establish a treatment approach which is in general multidisciplinary, according to the needs of each case<sup>1,5,6</sup>.

Occlusal splint is the most common modality to treat TMD, with positive results widely shown in the literature, both for aspects related to painful sensitivity and those related to biomechanics and neuromuscular system<sup>7,8</sup>.

Low-level laser (LLL) has been used as alternative therapy for pain relief in muscle and joint TMD presentations for inducing analgesic, anti-inflammatory and biomodulator effect of physiologic cell functions<sup>6,9-11</sup>.

Studies have shown that LLL is efficient as therapeutic agent for decreasing pain and increasing jaw movement amplitude<sup>6,9-12</sup>. In light of the above, this study aimed at evaluating the effect of the association of low-level lasertherapy with the use of Functional Anatomic Research Center (FARC) occlusal splint, on pain perceived by TMD patients, as compared to the use of occlusal splint alone.

## METHODS

This study was developed in the Faculdade de Odontologia de Ribeirão Preto, Universidade de São Paulo, and volunteers have signed the Free and Informed Consent Term (FICT).

Thirty subjects were selected in a tertiary clinic for TMD patients, of whom 25 have participated in the study till the end, in a total convenience sample of 20 females and 5 males, for having been carried out in compliance with the demand of assistance of the above-mentioned service.

Inclusion criteria were TMD diagnosis according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD)<sup>3</sup>. Subjects lacking teeth preventing the installation of the occlusal splint, those with central or peripheral neurologic disorders, history of head and neck tumors or trauma, presence of systemic inflammatory diseases and use of analgesics in the last month, and submitted to TMD treatment or others related to the stomatognathic system up to one year before were excluded. Systemic inflammatory diseases and use of analgesics for less than one month were controlled.

Control group (CG) was made up of 12 asymptomatic volunteers paired by age and gender to TMD subjects.

To every subject diagnosed with TMD, one of the following treatments was consecutively directed, forming two groups: 1) Splint group (SG): 15 subjects (12 females and 3 males) being treated with occlusal splint alone manufactured and adjusted by a dentist;

2) Splint-laser group (LSG): 10 subjects (8 females and 2 males) being treated with low level lasertherapy together with occlusal splint manufactured and adjusted by a dentist. This group has lost patients before treatment completion who were not included in results analyses: 2 by withdrawal

and 3 for being unable to come twice a week to comply with the laser application protocol.

Subjects were evaluated sitting on dental chair, in a room with adequate lighting, by a dentist (different from the professional in charge of the treatments), before (A1) and after (A2) treatments. Major complaint and the presence of oral parafunctional habits were investigated. Evaluation was based on RDC/TMD Axis I<sup>3</sup>. Jaw movement amplitude was measured with digital caliper rule (Mitutoyo, Co., Ltd., Suzhou, China). Pain at palpation was investigated based on the same protocol, adding trapezius (upper portion) and sternocleidomastoid (medial portion) muscles, routinely investigated in this service, and pain intensity was indicated by subjects in a numerical scale from zero to 10, where zero is no pain and 10 the worst imaginable pain. The choice of pain at palpation rather than pain at pressure threshold (PPT) was done due to its relation with pain intensity perception which we tried to investigate<sup>8,9,13</sup>.

To investigate subjects' perception of their signs and symptoms, they have answered the "Protocol to determine TMD signs and symptoms for Multiprofessional centers (ProTMDMulti)<sup>13</sup>. The first part is made up of questions admitting just positive and negative answers. The second part indicates how much each sign or symptom is severe in different daily situations, such as at emergence, chewing, speaking and at rest, using a numeric scale from zero to 10 where zero is total lack of sign or symptom and 10 most possible severity. Sum of scores attributed to each sign/symptom in the four investigated situations may vary from zero to 40, indicating higher severity as sum increases.

*Occlusal splint:* groups SG and SLG received occlusion splint model FARC, developed by the University of Milan, following the biomechanical model proposed by Ferrario & Sforza<sup>7</sup> (acrylic resin splint with 2 mm thickness and contacts of second premolar to second permanent molar, without anterior static or dynamic contacts). Usage orientation has followed the protocol of the University of Milan: daily and nightly in the first two weeks and then nightly for three more weeks, with previously proven positive results<sup>8</sup>.

*Low-level lasertherapy (LLL):* SLG patients were treated with LLL three times a week during the five weeks of treatment with the occlusal splint (total of 10 sessions). Equipment was THERA LASER (DMC, LTDA - São Carlos, São Paulo - Brazil), which emits radiation obtained as from stimulation of a semiconductor diode formed by Gallium-Aluminum Arsenide (AsGaAl) with wavelength of 830nm, in continuous emission. Protocol was the same as previously tested<sup>12</sup>: infrared laser, with wavelength of 780 nm, fixed power of 70 mW and doses of 105J/cm<sup>2</sup>. Exposure time was 60 seconds per painful point.

Each session involved laser application in five predetermined TMJ points and on the point of more severe pain of predetermined sites of masseter and anterior temporal muscles, as described: upper point of lateral pole of the jaw head; posterior point of lateral pole of the jaw head; point at the level of outer ear (external acoustic meatus), region

crossed by the auriculotemporal nerve; masseter muscle (3 most painful points identified by digital palpation being one at the origin, one at the body and one at muscle insertion); anterior temporal muscle (one most painful point, identified by digital palpation). Application modality on muscles and joint region was punctual and with direct contact of radiation emission tip with skin to prevent reflection phenomenon<sup>9-12,14</sup>.

**Biosafety:** used laser belongs to Class 3b according to ANSI classification, needing preventive care during its application, with the use of goggles for dentists and patients, and the compliance with official safety standards of the International Standard CEI IEC 825-1. Application sites were cleaned with 70°GL alcohol.

This study was approved by the Ethics Committee for Research with human beings (CAAE 0080.0.138.000-10).

**Statistical analysis**

Initial evaluation data (A1) and evaluation after five weeks of treatment with occlusal splint (A2) were considered for data analysis, both for SG and SLG. Control group was evaluated only once. For measurement interval data, of reason or ordinals presenting normal distribution, such as jaw movement data, ProTMDMulti and pain at palpation parametric tests were used. ANOVA test was used to compare among groups (CG x SG x SLG). T test for independent samples was used to compare differences between evaluations (A1-A2) of experimental groups (SG x SLG). This analysis was carried out to know the real gain of each group. For intragroup data analysis (A1 x A2), t test for paired samples was used.

**RESULTS**

Only one subject had isolated muscle TMD. Others had association with joint dysfunctions. When asked about major complaints leading them to look for treatment, the following reports were given: headaches (60%), facial pain (52%), TMJ pain (20%) and noises (16%), dental wear (12%), earache (8%) and neck ache (4%). Noxious oral habits were reported by all subjects, with more frequency by TMD subjects. Among reported habits, there were teeth clenching (vigil bruxism) (76%), sleep bruxism (64%), use of chewing gum (64%) and nail biting (56%). The same habits were reported

by asymptomatic subjects in the following ratio: 0%, 25%, 33.3% and 16.6%, respectively.

With regard to jaw movements, the comparison among groups (ANOVA) has shown that experimental groups were different initially (A1) for mouth opening, laterality and protrusion evaluations (p<0.05). After treatment (A2) there has been no statistical difference between SLG and SG in all movements (p>0.05); comparison of experimental groups with CG has shown difference for opening (CG x SG, p<0.05; CG x SLG, p<0.01) and right laterality (CG x SLG, p<0.05) in A1; in A2 there has been mouth opening difference only between SG and CG (p<0.05).

In comparing A1 and A2 (intragroups) (Student t test for paired data) there has been significant difference between both experimental groups (p<0.01). To better visualize jaw movement amplitude evolution between both proposed treatments, comparative analyses of “A1 – A2” subtraction between experimental groups (Student t – independent data) were carried out. Results have shown no difference (p>0.05) between groups with regard to jaw movement amplitude evolution, that is, both proposed treatments provided positive and satisfactory results for this item. Mean and standard deviation of jaw movements are shown in table 1.

For pain at palpation, comparison between groups (ANOVA) has shown significant difference in A1 between CG and SLG for TMJ and masseter, anterior temporal, sternocleidomastoid (medial portion) to the right (p<0.01), supra-hyoid to the left and trapezius (upper portion) to the right muscles (<0.05); between CG and SG for TMJ and masseter, anterior temporal, sternocleidomastoid (medial portion) (p<0.01), supra-hyoid and trapezius (upper portion) to the left (p<0.05). There has been no difference between SLG and SG in this phase.

However, scores attributed to pain at palpation after treatment (A2) by SLG was not different from that attributed by CG (p>0.05), even in muscles not submitted to lasertherapy; but were different in some sites as compared to SG (left masseter, right anterior temporal, TMJ – p<0.05). This latter has also shown differences in pain at palpation scores in specific sites, similarly to SLG, as compared to CG (left masseter, right anterior temporal – p<0.05, TMJ – p<0.01).

When comparing A1 and A2 (Student t – paired data) there has been pain at palpation improvement according to scores attributed by subjects, with significant difference in SLG for

**Table 1.** Mean and standard deviation of jaw opening, right laterality, left laterality and protrusion movements for control group and splint and splint-laser groups, both with temporomandibular disorders, before and after proposed treatments

	CG		SLG				SG			
	Mean	SD	A1		A2		A1		A2	
	Mean	SD								
Opening	56.38	5.65	43.59	6.43	53.17	6.17	47.13	6.16	50.13	6.16
Right laterality	8.35	1.75	6.03	2.22	9.84	1.67	7.76	1.91	8.35	1.75
Left laterality	8.55	1.17	6.62	2.52	10.85	1.55	8.13	2.76	9.34	2.76
Protrusion (mm)	7.76	1.63	7.29	1.16	9.98	1.68	6.17	2.49	8.1	2.49

CG = control group; SLG = splint-laser; SG = splint group; A1 = before treatment; A2 = after treatment.

masseter, anterior temporal, supra-hyoid, sternocleidomastoid (medial portion), trapezius (upper portion) and TMJ ( $p < 0.01$ ); and for SG there has been difference for masseter, anterior temporal, TMJ and right ( $p < 0.01$ ) and left ( $p < 0.05$ ) sternocleidomastoid muscles (medial portion).

Comparative analyses of "A1-A2" subtraction (Student  $t$  – independent data) between experimental groups have shown difference only in right masseter palpation, with lower scores attributed by SLG. Table 2 shows mean values and standard deviation of scores attributed by subjects to pain at palpation. According to ProTMDMulti part I questionnaire data, absolute frequency of TMD signs and symptoms for each group in initial and final evaluation were obtained, and decreased number of reports were observed in the final phase for both groups. These data are shown in table 3.

According to ProTMDMulti part II questionnaire data, severity of each sign or symptom was determined by the sum of scores attributed to the four questioned situations (emergence, chewing, speaking, at rest). Scores varied from zero to 40, being that the higher the value the more severe the TMD. Table 4 shows mean scores attributed to signs and symptoms evaluated by ProTMDMulti in each group, in the two evaluation moments (A1 and A2).

Comparison between groups (ANOVA) has shown that in the initial evaluation there has been significant difference only between experimental groups and control group for muscle pain, TMJ pain and noise, dental sensitivity ( $p < 0.01$ ) and neck pain ( $p < 0.05$ ). SG was different from CG also in aural plenitude ( $p < 0.05$ ). SLG and SG were not different at experiment onset ( $p > 0.05$ ), however at final evaluation SLG was not different from CG ( $p > 0.05$ ), but was different from SG for muscle pain, TMJ pain ( $p < 0.01$ ), neck pain and dental sensitivity ( $p < 0.05$ ) and this group was different from CG with regard to the same initial symptom ( $p < 0.05$ ).

In comparing A1 and A2 (Student  $t$  – paired data), SLG had significant difference for seven evaluated symptoms with ProTMDMulti: muscle pain, TMJ pain and noises, neck pain, dental sensitivity ( $p < 0.01$ ), tinnitus and aural plenitude ( $p < 0.05$ ). For SG there has been significant improvement in four reported symptoms: TMJ pain and noise ( $p < 0.01$ ), dental sensitivity and aural plenitude ( $p < 0.05$ ).

Comparative analyses of "A1 – A2" subtraction (Student  $t$  – independent data) have shown difference between experimental groups ( $p < 0.05$ ) for muscle pain, TMJ pain, neck pain,

**Table 3.** Absolute frequency of signs and symptoms in the three studied groups, according to answers to ProTMDMulti part I protocol, before and after proposed treatments

Signs and symptoms	A1		A2		
	CG	SG	SLG	SG	SLG
Muscle pain	0	15	10	8	2
Muscle fatigue	0	12	9	7	2
TMJ pain	0	15	7	9	2
TMJ noises	0	15	8	8	4
headache	3	15	9	7	2
Earache	0	9	5	4	0
Tinnitus	1	9	6	6	2
Aural plenitude	1	12	8	6	1
Difficulty					
Mouth opening	0	10	8	5	1
Mouth closing	0	5	4	2	0
Chewing	0	11	7	5	3
Yawning	0	9	9	5	6
Swallowing	0	6	3	2	0
Speaking	0	7	3	4	0

GC = control group; GSL = splint-laser; GS = splint group; A1 = before treatment; A2 = after treatment; TMJ = temporomandibular joint.

**Table 2.** Mean, standard deviation and comparison (Student  $t$  for paired data) of scores attributed by subjects to pain at palpation, for control group, splint-laser group and splint group, before and after proposed treatments

Palpation	CG		SLG				SG			
	Mean	SD	A1		A2		A1		A2	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD
RM	1.84	1.86	6.9	6.9	1.5**	1.5	6.06	2.31	3.26**	2.46
LM	1.46	1.80	6.8	2.69	1.6**	2.11	6.2	2.83	2.86**	2.26
RAT	0.84	0.98	7	2.82	1.6**	2.36	6	2.72	2.8**	2.17
LAT	0.30	0.48	4.2	3.79	1.93**	2.34	3.4	2.22	1.4**	1.77
SHR	0.46	1.19	3.2	3.48	0.1**	0.31	3.53	3.52	1.46	2.50
SHL	0.3	0.85	4.5	3.71	0.2**	0.42	3.13	2.69	2.06	2.96
ECM-R	2.46	2.29	6	2.78	2.1**	1.52	5.6	2.35	3.13**	2.5
ECM-L	2.30	2.09	5.06	2.90	1.7**	1.49	4.3	3.17	3.66*	2.94
Tr. R	2.15	2.11	5.4	3.27	2.6**	2.54	4.53	3.40	3.33	2.63
Tr. L	2.23	2.20	4.6	3.30	2.6**	2.36	5.88	3.39	4.13	3.11
ATM-R	1.46	1.26	7.1	2.59	1.8**	1.54	7.33	2.38	4.06**	2.34
ATM-L	1.15	1.46	7.4	2.63	1.9**	1.28	6.93	2.49	4**	2.77

CG = control group; SLG = splint-laser; SG = splint group; A1 = before treatment; A2 = after treatment; RM = right masseter; LM = left masseter; RAT = right anterior temporal; LAT = left anterior temporal; SHR = supra-hyoid to the right; SHL: supra-hyoid to the left; ECM-R = right sternocleidomastoid; ECM-L = left sternocleidomastoid; Tr. R = right trapezius; Tr. L = left trapezius; ATM-R = right temporomandibular joint; ATM-L = left temporomandibular joint. \*significant difference ( $p < 0.05$ ); \*\*significant difference ( $p < 0.01$ ).

**Table 4.** Mean and standard deviation of scores attributed by subjects to signs and symptoms investigated with ProTMDMulti protocol, for control group, splint-laser and splint groups before (A1) and after (A2) proposed treatments. ANOVA for analysis between groups; Student *t* for paired data for intragroup analysis

	CG		SLG				SG			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
ProTMDMulti										
Pain (mm)	0.8	1.7	17.7a	6.8	4.3c**	5.5	17.6a	10.4	10e	7.9
Pain TMJ	0	0	18a	7.3	3.1c**	4.5	22.3a	9.5	14.7e*	12.1
Neck pain	0.6	1.3	12.9b	9.2	3.2**	3.9	13.1b	12.7	13.6e	13.4
Earache	0	0	3.5	7.8	0.3	0.6	12.8	10.1	4.7	9.4
Tinnitus	2	6.3	9.8	11.5	0.7*	1	13.5	12.4	5.6	9.8
Plenitude	0.3	0.9	10.8	11.9	0.7*	1.1	13.5a	12.4	7.7e*	10.9
SDent	0.5	1.3	15.3a	8.7	1d**	1.7	15.3a	12.4	9.5e*	10.6
TMJ noise	0.6	0.9	16.4a	8.06	3.3	3.1	16.2a	7.3	7.7e*	7.3
Swallowing	0	0	3.5	7.08	0.1	0.3	8.2	13.4	6.1	11.5
Speaking	0	0	8.7	13.5	0.1	0.3	7	10.8	6.3	9.5

GC = control group; GSL = splint-laser; GS = splint group; A1 = before treatment; A2 = after treatment; TMJ = temporomandibular joint; SDent = dental sensitivity. a: significant difference ( $p < 0.01$ ) when comparing control group with SLG and SG groups in phase A1; b: significant difference ( $p < 0.05$ ) when comparing control group with SLG and SG groups in phase A1; c: significant difference ( $p < 0.01$ ) when comparing SLG and SG in phase A2; d: significant difference ( $p < 0.05$ ) when comparing SLG and SG in phase A2; e: significant difference ( $p < 0.05$ ) when comparing CG and SG in phase A2; \* significant difference between A1 and A2 ( $p < 0.05$ ); \*\* significant difference between A1 and A2 ( $p < 0.01$ ).

dental sensitivity and difficulty to swallow, that is, positive evolution of these symptoms was better evaluated by SLG subjects being that remaining symptoms had positive evolution according to perception of both groups, without significant difference ( $p > 0.05$ ).

## DISCUSSION

TMD is a term used for musculoskeletal facial pain conditions involving several signs and symptoms, being pain the primary motivator for looking for treatment<sup>3-5,15</sup>. This way, this study has based its analyses on painful perception of daily situations and on intensity of pain at palpation<sup>8,9,13</sup>. Methodology for sample structuring (by convenience) and its size (n) was similar to previous studies which have evaluated the effects of TMD therapies<sup>8,9,13</sup>, being the first study on the association of LLL to concomitant use of occlusal splint, performed during the clinical routine of a tertiary service to TMD patients. Major complaints reported by investigated subjects were similar to previous studies<sup>3,13</sup>, being that head and face pain were more frequent (60 and 52%, respectively), suggesting comorbidity between them. The presence of TMD seems to cause excitatory impact in some types of headaches, and vice-versa, especially in patients more susceptible to central sensitization phenomenon, as it is the case with chronic orofacial pain<sup>15</sup>. Parafunctional habits are risk factors for TMD and OFP, because they may overload teeth and masticatory system during maintained contractions<sup>16</sup>. Grinding teeth at sleep (sleep bruxism) was reported by 64% of studied sample and teeth tightening (vigil bruxism) was reported by 76% of cases. Relevance of parafunctional oral habits on TMD pathophysiology is variable according to individuals, but they have been associated to painful TMD in a previous study<sup>16</sup>. In this study, proposed method has not considered a correlation

analysis allowing predicting the influence of such habits on TMD symptoms of the studied sample, which may represent a limitation of the study. Clinically, it is up to the professional to analyze this relationship in each case to consider it during diagnosis, treatment plan and prognosis, as factor contributing to the presentation<sup>16,17</sup>.

Jaw mobility restriction is considered a major clinical TMD sign<sup>3,5</sup>. Although subjects before treatment had no limitations according to normality patterns, at the end there has been significant increase in movement amplitude for both treated groups, which has also been observed in previous study<sup>8</sup>, being SLG values higher than SG values. This has allowed the reflection that individual amplitude may be larger than the normality pattern and mask an individual movement restriction. And although a significant difference in mouth opening movement between CG and SG after treatment, there has been approximation between values found for treated groups and control group. This indicates the efficiency of both proposed treatments, where further painless jaw movements freedom is needed to recover stomatognathic system functionality<sup>8,9,13</sup>.

Biomodulator LLL effect might have favored muscle flexibility and pain remission, when offering effects which occlusal splint alone is unable to produce, complementing conventional treatment. Results suggest that the association of LLL to conventional treatment may more efficiently contribute to the handling of cases with jaw mobility difficulties, because its light promotes analgesia and has anti-inflammatory effect on muscles and joints<sup>6,14</sup>, that is, its action mechanisms are different from those of the occlusal splint, however complementing them. This hypothesis however would have been better tested with the presence of an additional group treated with occlusal splint and laser-placebo (just guide-light) which was not possible due to characteristics of the equipment used. It is known that expectation added to treatment experience

induces placebo effect<sup>18</sup>, which could have been the case with this study, because such effect was shown with LLL in previous studies<sup>10,11</sup>.

Due to the subjectivity of pain, its diagnosis, mostly done by its description, is in general not accurate with regard to different variables, such as individual threshold, perception, emotional aspects and individual discomfort, that is, each individual learns to attribute the term “pain” to their sensations by means of their personal experiences<sup>4,15</sup>. “ProTMDMulti” protocol was developed, tested and validated to investigate people’s perception of the presentation of their primary complaint<sup>13</sup>.

According to this protocol, it was possible to observe that subjects treated with LLL associated to splint had relief in 7 out of 10 investigated signs and symptoms, versus four in subjects conventionally treated with splint alone. In addition, comparison of subtraction of values found in the two evaluation moments of this study (A1-A2) has shown significant difference ( $p < 0.05$ ) between groups (SG x SLG) for muscle pain, TMJ pain, neck pain, dental sensitivity and difficulty to swallow, being these better evaluated by SLG subjects after treatment. It has also to be considered that subjects’ perception could have been influenced by the placebo effect, not tested in this study, induced by more marked pain decrease expectation in face of a more complete treatment with more frequent professional-patient contact, stimulating brain areas of pain modulating neurotransmitters release<sup>18</sup>.

Palpation of orofacial and cervical muscles was used as diagnostic method for muscle sensitivity changes, as well as to evaluate the effects of proposed treatments. Cervical region evaluation was suggested for often presenting TMD-related disorders<sup>19,20</sup>. As with the evaluation of signs and symptoms perception, pain at palpation after treatments has also improved for both TMD groups, but more markedly for SLG, especially in sites submitted to LLL. This might be the result of LLL analgesic and anti-inflammatory effects<sup>6,10,14</sup>, in addition to its placebo effect, thus potentiating the effect of the occlusal splint treatment. Not directly treated cervical muscles (sternocleidomastoid – medial portion – and trapezius – upper portion) had also significant decrease in sensitivity to palpation (Table 2), possibly due to the influence of the orofacial region with which they have relation, or due to the placebo effect<sup>6,10,11,14,18-20</sup>.

Finally, the association of therapies for TMD, involving occlusal splint and LLL, has shown better effect in decreasing pain and increasing jaw movement amplitude as compared to occlusal splint alone, confirming that it is an easy to apply method, accessible to the clinician and of low cost to patients. However, the necessary availability of time twice a week was one limitation of this study, considering the number of subjects not concluding the treatment. Future studies involving the association of these therapies with larger samples will be necessary to confirm statistical results, which should be considered with care in this study. In addition, controlling aspects which could have influenced results, such as parafunctional habits, LLL placebo effect, specific joint and muscle

TMD diagnosis, as well as their randomized distribution in different groups shall help the reliable understanding of the tested association of treatments.

## CONCLUSION

The protocol of therapies association proposed in this study has shown more positive results as compared to isolated conventional treatment, suggesting that complementary therapy with low-level laser potentiates its effects when simultaneously applied.

## REFERENCES

- Zakrzewska JM. Multi-dimensionality of chronic pain of the oral cavity and face. *J Headache Pain*. 2013;25;14(1):37.
- Awamleh L, Pun H, Lee JC, Avivi-Arber L. Decreased face primary motor cortex (face-M1) excitability induced by noxious stimulation of the rat molar tooth pulp is dependent on the functional integrity of face-M1 astrocytes. *Exp Brain Res*. 2015;233(4):1261-72.
- Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. *J Craniomandib Disord*. 1992;6(4):301-55.
- Progianti PS, Pattussi MP, Lawrence HP, Goya S, Grossi PK, Grossi ML. Prevalence of temporomandibular disorders in an adult Brazilian Community Population using the Research Diagnostic Criteria (Axes I and II) for temporomandibular disorders (The Maringá Study). *Int J Prosthodont*. 2015;28(6):600-9.
- Maixner W, Diatchenko L, Dubner R, Fillingim RB, Greenspan JD, Knott C, et al. Orofacial pain prospective evaluation and risk assessment study-the OPPERA study. *J Pain*. 2011;12(11 Suppl):T4-11.e1- 2.
- Herpich CM, Amaral AP, Leal-Junior EC, Tosato J de P, Gomes CA, Arruda E, et al. Analysis of laser therapy and assessment methods in the rehabilitation of temporomandibular disorder: a systematic review of the literature. *J Phys Ther Sci*. 2015;27(1):295-301.
- Ferrario VF, Sforza C. Biomechanical model of the human mandible in unilateral clench: distribution of temporomandibular joint reaction forces between working and balancing sides. *J Prosthet Dent*. 1994;72(2):169-76.
- Vieira e Silva CA, da Silva MA, Melchior M de O, de Felício CM, Sforza C, Tartaglia GM. Treatment for TMD with occlusal splint and electromyographic control: application of the FARC protocol in a Brazilian population. *Cranio*. 2012;30(3):218-26.
- Melchior MO, Venezian GC, Machado BC, Borges RF, Mazzetto MO. Does low intensity laser therapy reduce pain and change orofacial myofunctional conditions? *Cranio*. 2013;31(2):133-9.
- Moraes Maia ML, Ribeiro MA, Maia LG, Stuginski-Barbosa J, Costa YM, Porporatti AL, et al. Evaluation of low-level laser therapy effectiveness on the pain and masticatory performance of patients with myofascial pain. *Lasers Med Sci*. 2014;29(1):29-35.
- Chen J, Huang Z, Ge M, Gao M. Efficacy of low-level laser therapy in the treatment of TMDs: a meta-analysis of 14 randomised controlled trials. *J Oral Rehabil*. 2015;42(4):291-9.
- da Silva MA, Botelho AL, Turim CV, da Silva AM. Low level laser therapy as an adjunctive technique in the management of temporomandibular disorders. *Cranio*. 2012;30(4):264-71.
- de Felício CM, Melchior Mde O, Da Silva MA. Clinical validity of the protocol for multi-professional centers for the determination of signs and symptoms of temporomandibular disorders. Part II. *Cranio*. 2009;27(1):62-7.
- Sancakli E, Gökçen-Röhlüg B, Balık A, Öngül D, Kipirdi S, Keskin H. Early results of low-level laser application for masticatory muscle pain: a double-blind randomized clinical study. *BMC Oral Health*. 2015;15(1):131-6.
- Speciali JG, Dach F. Temporomandibular dysfunction and headache disorder. *Headache*. 2015; 55(Suppl 1):72-83.
- Fernandes G, Franco-Micheloni AL, Siqueira JT, Gonçalves DA, Camparis CM. Parafunctional habits are associated cumulatively to painful temporomandibular disorders in adolescents. *Braz Oral Res*. 2016;30(1): e15.
- Takeuchi T, Arima T, Ernberg M, Yamaguchi T, Ohata N, Svensson P. Symptoms and physiological responses to prolonged, repeated, low-level tooth clenching in humans. *Headache*. 2015;55(3):381-94.
- Reichert P, Gerdes AB, Pauli P, Wieser MJ. Psychological placebo and nocebo effects on pain rely on expectation and previous experience. *J Pain*. 2016;17(2):203-14.
- Silveira A, Gadotti IC, Armijo-Olivo S, Biasotto-Gonzalez DA, Magee D. Jaw dysfunction is associated with neck disability and muscle tenderness in subjects with and without chronic temporomandibular disorders. *Biomed Res Int*. 2015;2015:512792.
- von Piekartz H, Pudelko A, Danzeisen M, Hall T, Ballenberger N. Do subjects with acute/subacute temporomandibular disorder have associated cervical impairments: a cross-sectional study. *Man Ther*. 2016;26:208-15.

# Could physical discomforts be related to weight gain and parity in last trimester pregnant women?

*Desconfortos físicos poderiam estar relacionados com o ganho de peso e paridade em gestantes no último trimestre?*

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** To identify and check the incidence of physical discomfort in third trimester pregnant women and relate it to parity, weight gain and regular practice of physical activities.

**METHODS:** Data were collected by means of interviews made up of identification, socioeconomic data and lifestyle. In addition to pain intensity by means of the 10-cm visual analog scale, we have also calculated weight gain estimates for pregnant women as from body mass index considering the pre-gestational period. Physical discomforts were listed and answered “yes” or “no” with regard to their presence. Statistical analysis was carried out by simple frequency, percentages, Shapiro-Wilk, Chi-square and Student *t* tests. Statistical program was Stata 9.2 and significance level was 5%.

**RESULTS:** Participated in the study 64 low risk pregnant women under pre-natal follow up. Most frequent symptom was fatigue, reported by 79.6%, followed by low back pain by 68.7%, uterine contraction pain and heartburn, each one reported by 60.9% of respondents, insomnia 53.1%, cramps 50%, nausea 29.6%, pain on ribs and vomiting, each with 21.8%, sciatic pain 20.3%, cervical and abdominal pain 18.7% each, chest pain 17.1%, nightmare and itching, each with 1.6% and brachial plexus pain by 3.1%. There has been no relationship with parity and weight gain.

**CONCLUSION:** Discomforts reported had no relationship with parity, weight gain and regular practice of physical activities.

**Keywords:** Gestational age, Pain, Pregnant women, Women's health.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** Identificar e verificar a incidência de incômodos físicos em gestantes, no terceiro trimestre, e relacioná-los com paridade, ganho de peso e prática regular de atividade física.

**MÉTODOS:** A coleta de dados ocorreu com a utilização de um roteiro de entrevista composto de identificação, dados socioeconômicos, hábitos de vida. Além da intensidade de dor por meio da escala analógica visual de 10cm, calculou-se também a previsão do ganho de peso para gestantes a partir do índice de massa corporal considerando o período pré-gestacional. Os incômodos físicos foram listados e respondidos de forma afirmativa ou não quanto à presença deles. A análise estatística foi realizada por frequência simples, porcentagem, testes de Shapiro-Wilk, Qui-quadrado e *t* de Student. O programa estatístico utilizado foi o Stata 9.2 e o nível de significância foi de 5%.

**RESULTADOS:** Participaram do estudo 64 gestantes de baixo risco que realizavam pré-natal. O sintoma de maior frequência apresentado foi fadiga, relatada por 79,6%, seguido de dor lombar por 68,7%, dor de contração uterina e azia queixados por 60,9% das gestantes, cada um deles, insônia 53,1%, cãimbra 50%, náusea 29,6%, dor nas costelas e vômito 21,8% cada um, dor ciática 20,3%, dor cervical e dor abdominal 18,7% cada um, dor torácica 17,1%, pesadelo e prurido 15,6% cada um e dor na região do plexo braquial por 3,1%. Não houve relação com paridade ou ganho de peso.

**CONCLUSÃO:** Os desconfortos relatados não apresentaram relação com a paridade, com ganho de peso e prática regular de atividade física.

**Descritores:** Dor, Gestantes, Idade gestacional, Saúde da mulher.

## INTRODUCTION

Changes in woman's body during gestation meet maternal and fetal demands and, in some cases, may induce from mild discomforts to major daily life or professional activities limitations. The effect of increased estrogen and relaxin hormones, typical of gestation, associated to weight gain, makes joints more unstable, causes biomechanical changes, ligament laxity and musculoskeletal disorders<sup>1</sup>. It should be considered that progressive weight gain during gestation is more pronounced in the third trimester and may overload joints and intensify discomforts<sup>2,3</sup>. In the context of our study, this term refers to

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maternal body restrictions, caused by physiological adaptations (hormonal and biomechanical), resulting in changes in musculoskeletal, gastrointestinal and urogenital systems, in addition to impaired quality of sleep.

Regular practice of physical activities provides protecting effects against pregnant women discomforts and complications, however, adherence to physical exercises during gestation is still low. To change this scenario, it is necessary that health professionals encourage and explain to pregnant women the safety of this practice and its advantages<sup>4</sup>. Health professionals and pregnant women often consider discomforts as inherent to gestation and, as such, believe that preventive or relieving measures do not exist or are unnecessary or even inefficient<sup>5,6</sup>. In general, they are not aware of non-pharmacological methods for discomfort relief<sup>7</sup>. Currently, multidisciplinary programs to prepare to labor have become common and aim at physical and psychic balance for a healthy life.

Prenatal and Birth Humanization Program guidelines (PBHP)<sup>8,9</sup> suggest the inclusion of educative, psychological and fitness activities. The positive impact of adopting a healthy lifestyle during gestation improves perinatal results for babies and decreases the risk of premature birth, low weight at birth and the need to be admitted to the neonatal unit, in addition to decreasing the number of adverse perinatal results<sup>10</sup>. So, understanding major pregnant women's complaints is important to guide the development of clinical strategies and management of health services for this target audience, aiming at decreasing injuries and generating positive impact on quality of life of such women<sup>7</sup>. So, this study aimed at identifying the incidence of physical discomforts in third trimester pregnant women and relate them to parity, weight gain and regular practice of physical activities.

## METHODS

This is a cross-sectional and exploratory study. Sample was made up of 64 pregnant women in the third trimester, selected by convenience in the Gynecology and Obstetrics Sector of the Ambulatory *Maria da Glória, Hospital de Clínicas da Universidade Federal do Triângulo Mineiro (UFTM)*, during four consecutive months. Inclusion criteria were age equal to or above 18 years, prenatal medical follow-up, of normal risk and adequate cognitive level for the procedures of the study. Exclusion criteria were women with musculoskeletal complaints previous to gestation.

Pregnant women were invited to participate in the survey when arriving for medical consultation. After reading and signing the Free and Informed Consent Term (FICT), they were individually interviewed and then weight and height were measured. Interview was made up of identification of socioeconomic data, habits related to alcoholic beverage and smoking, weight previous to gestation and obstetric history. Information on presence, intensity and frequency of physical discomforts and regular practice of physical activity were collected by a semi-structured interview. This was guided by a tool developed as from extensive literature review, to address

most possible discomforts described in the literature and typical of the gestational period.

Physical discomforts commonly reported were listed and participants were asked to answer whether they were present or not. This strategy was adopted because many of such discomforts are considered common and not reported by pregnant women as discomfort if they do not induce major incapacity<sup>5,6</sup>. Intensity and frequency of existing discomforts were questioned and whether there was regular practice of physical activity.

Pain intensity was evaluated by the 10-cm visual analog scale (VAS). Regular practice of physical activity was defined as practicing for at least three times a week with approximate duration of 60 minutes<sup>11</sup>. A pilot study with 25 pregnant women was carried out to identify issues with "perceived answer difficulties", their suitability and training of interviewers. Data were collected by two previously trained university students to assure standardization. Weight gain estimate was calculated for pregnant women as from body mass index (BMI) considering the pre-gestational period. For women with low BMI, estimated weight gain for the gestational period was between 12.5 and 18.0 kg; for normal BMI between 11.5 and 16.0 kg; for high BMI estimated gain of 7.0 to 11.5 kg; and for obese BMI, estimated weight gain was up to 7kg<sup>12</sup>.

Since this is a non-probabilistic sample (by convenience), sample size was not calculated. Size was given by pregnant women accepting to participate in the study.

This study was approved by the Research Ethics Committee, UFTM, under protocol 2119.

## Statistical analysis

Simple frequency and percentages were used for statistical analysis. Inferential analysis was carried out with Chi-square test for categorical variables and Student *t* test for continuous variables, respecting data normality tested with Shapiro-Wilk test. Statistical program was Stata 9.2 and significance level was 5%.

## RESULTS

Sample was made up of 64 pregnant women with mean age of 26.4 years (minimum 18 and maximum 35 years), 56.2% (n=36) were mulattos, 84.3% (n=54) have reported stable union and 51.5% (n=33) had complete or incomplete high school. Most (89%) would not ingest alcoholic beverages or smoked and 57.8% (n=37) did not work outside home. With regard to parity, 37.5% (n=24) were primiparous and 62.5% (n=40) multiparous. As to pre-gestational BMI, 17% (n=11) were classified with low BMI, 44% (n=28) with normal BMI, 22% (n=14) with high BMI and 17% (n=11) with obese BMI. Weight gain was according to estimates in 39% (n=25), below estimates in 29.7% (n=19) and above estimates in 31.3% (n=20). The incidence of physical discomforts reported by participants, taking into account the number of complaints, is shown in table 1.

Distribution of physical discomforts reported by 50% or more of participants with regard to parity is shown in table 2, and with regard to weight gain, data are shown in table 3.

**Table 1.** Physical discomforts in the third trimester of gestation

Discomfort	Nº of pregnant	%
Fatigue	51	79.6
Low back pain	44	68.7
Uterine contraction pain	39	60.9
Heartburn	39	60.9
Insomnia	34	51.3
Cramps	32	50
Nausea	19	29.6
Ribs pain	14	21.8
Vomiting	14	21.8
Sciatic pain	13	20.3
Cervical pain	12	18.7
Abdominal pain	12	18.7
Chest pain	11	17.1
Nightmare	10	15.6
Itching	10	15.6
Brachial plexus pain	2	3.1

**Table 2.** Distribution of physical discomforts according to parity and p value

Discomfort	Primiparous n=24	Multiparous n=40	Total n=64	p value
Fatigue	19	32	51	0.4030
Low back pain	13	30	43	0.4350
Uterine contraction pain	16	23	39	0.4670
Heartburn	17	22	39	0.5170
Insomnia	13	21	34	0.8640
Cramps	11	20	31	0.3420

**Table 3.** Distribution of physical discomforts according to weight gain estimates and p value

Discomfort	Below n=19	Estimated n=25	Above n=20	Total n=64	p value
Fatigue	16	19	16	51	0.9890
Low back pain	14	13	16	43	0.3820
Uterine contraction pain	16	13	10	39	0.2440
Heartburn	13	12	14	39	0.1700
Insomnia	11	12	11	34	0.3710
Cramps	6	14	11	31	0.4950

Only 3.1% (n=2) of pregnant women practiced regular physical activity.

## DISCUSSION

Gestational period changes result from the interaction of hormonal, mechanical and metabolic factors<sup>13</sup> which may generate mild to total restriction physical discomforts. Studies<sup>3,5</sup> point that discomforts are intensified in the third gestational trimester and are often not evaluated or treated by professionals<sup>5,6</sup>. It is important to identify them and verify their frequency for the

development of programs aimed at handling such changes. According to the Brazilian Institute of Geography and Statistics (IBGE)<sup>14</sup>, mean age of pregnant women with education level above eight years is 27.8 years, which is in line with our study. As in other Brazilian studies<sup>9,15,16</sup>, there has been a higher percentage of mulattos, in stable union, who did not ingest alcoholic beverages, did not smoke and were multiparous. Fatigue, low back pain, uterine contraction pain, heartburn, insomnia and cramps were reported by more than 50% of participants. These results are similar to those of Nazik & Eryilmaz<sup>7</sup>.

Our study has considered fatigue as oppressive and sustained sensation of tiredness and incapacity to perform normal physical and mental activities<sup>17</sup>, which was presented by 79.6% of participants. Studies<sup>7</sup> investigating this same complaint have described incidence between 72.7% and 88.4% among third trimester pregnant women. It was also observed that in 86.3% of women reporting fatigue in this study, the frequency of such complaint was 4 to 7 days a week. This frequency is considered high, but no data were found in the literature to support such statement.

The high incidence of fatigue was not related to parity or weight gain. Studies have shown that anemia and sleep deprivation increase the chance of pregnant women having fatigue in 47 and 14%, respectively<sup>15</sup>. Factors inducing fatigue and sleep deprivation during gestation are not totally clear, however their relationship with higher indices of C-sections and development of depression is known<sup>18,19</sup>. Fatigue and stress are directly associated to fear of childbirth, so educational strategies to answer pregnant women's questions are favorable and may decrease the request for C-sections<sup>19</sup>.

The percentage of women complaining of insomnia was 51.3%. In a study carried out by Nazik & Eryilmaz<sup>7</sup>, insomnia rate was 63.7% in third trimester pregnant women. There has been weekly sleep deprivation frequency of 4 to 7 days without relationship with parity or weight gain. On the other hand, Tsai et al.<sup>20</sup> have suggested the association between sleep disturbances and BMI. Other studies have pointed that insomnia is a sleep disturbance reported during gestation which might be associated to discomforts which appear and/or are intensified at the end of gestation, such as heartburn, low back pain and cramps<sup>7,21</sup>.

The definition of low back pain is controversial in the literature due to its etiology. The more comprehensive definition proposed by Pitangui & Ferreira<sup>22</sup> was adopted, that is, a symptom affecting low back region. Authors in a study on gestational low back pain prevalence and characteristics have found incidence of 73%, being more frequent in the last trimester and in primiparous<sup>23</sup>. However there has been no relationship between low back pain and parity and weight gain, confirming Melhado & Soler results<sup>24</sup>.

Most pregnant women (83%) have reported weekly frequency of 4 to 7 days and, from these, 55.8% had moderate pain, similar to data found in North-American women<sup>25</sup>. Even with moderate low back pain, its high incidence and weekly frequency make it a limiting factor for daily life activities and sleep<sup>3,23</sup>, in addition to predisposing women to have it up to three years after labor and suffer of low back pain in other gestations<sup>23</sup>. Lack

of orientation on prevention and treatment may contribute for its worsening<sup>23</sup>. Pain relief factors are rest, massages and specific exercises, and worsening factors are domestic activities, remaining in the same position for a long time and postural defects<sup>23</sup>. There has been 60.9% incidence of uterine contraction pain, without relationship with parity or weight gain and which is result of physiological Braxton-Hicks contractions, which are intensified in the third trimester<sup>26</sup>. The scarcity of studies related to painful contractions during gestation has prevented the comparison of our results, since those found consider pain just during labor and delivery. However, one should contemplate this painful manifestation since it is manifested from 4 to 7 days a week (61.5%), being that in 56.4% with moderate intensity.

Gestational heartburn is caused by the reflux of stomach acid juices to the esophagus, due to the relaxing effect of hormones, increased by ascending pressure of the growing uterus<sup>27</sup>. It was reported by 60.9% of women, being 79.5% with weekly frequency of 4 to 7 days and 3% of cases with weekly frequency of 3 to 7 days<sup>28</sup>. A study<sup>7</sup> has described 81.8% of this symptom in the third gestational trimester. Heberlein et al.<sup>29</sup> have observed that participation in prenatal orientation groups had positive impact on dietary habits. So, it was considered pertinent the health education of women about adequate diet to minimize and/or prevent heartburn.

There has been no relationship with parity or weight gain. Cramps are painful muscle contractions especially in thigh and calf muscles during sleep and keeping affected region painful for a long time<sup>26</sup>. The incidence of this complaint was 50%, with weekly frequency of 4 to 7 days for most participants (61.3%), without relationship with parity or weight gain. No studies were found about the impact of cramps on pregnant women. Stretching and massages are prevention methods<sup>26</sup>. Weight gain in our study, within or below estimates, was not assurance of less cramps<sup>30</sup>.

Among the benefits of physical activity for pregnant women there are less physical discomforts, especially those of musculoskeletal origin<sup>31,32</sup> and improved general wellbeing<sup>6</sup>. From participants of our study, just 3.1% practiced physical activity, which might explain the higher incidence of symptoms. It is worth highlighting that those practicing physical activity have also presented those symptoms. It was impossible to perform data inferential analysis due to the low number of practitioners. Our results have shifted the focus of attention from musculoskeletal discomforts to other discomforts. Among symptoms affecting 50% or more of pregnant women there are fatigue, uterine contraction pain, heartburn, insomnia, cramps and low back pain. It is believed that providing knowledge about gestation as well as about possible management of discomforts inherent to the period, women might develop autonomy and safety to manage their symptoms, avoiding self-medication<sup>33</sup> and minimizing their negative influence on quality of life.

The practice of physical activity contributes to decrease pain, which may cause insomnia and even depression<sup>34</sup>, in addition to providing adequate muscle strength and stretching, good fitness, general wellbeing and helping labor. Physiotherapy, with techniques such as stretching, global postural re-education<sup>35</sup>,

Pilates<sup>36</sup>, aerobic and aquatic exercises<sup>37</sup> and acupuncture<sup>38</sup>, among other techniques, helps relieving discomforts. An interdisciplinary approach to assist pregnant women is critical. Only as from the interaction and awareness of professionals, all described symptoms shall be managed. Example is the action of physiotherapy with resources such as kinesiotherapy, electrotherapy, manual therapy, hydrotherapy, thermotherapy and educational practice, knowingly effective to prevent and manage musculoskeletal pain<sup>5,22,26,31,32</sup>. So, strategies to promote integral assistance to pregnant women should be developed.

## CONCLUSION

Symptoms such as fatigue, low back pain, uterine contraction pain, heartburn, insomnia and cramps reported by half the participants had no correlation with parity, weight gain and practice of physical activity.

## REFERENCES

1. Brito JL, Torquato IM, Trigueiro JV, Medeiros HA, Souza Neto VL, Albuquerque AM. Lombalgia: prevalência e repercussões na qualidade de vida de gestantes. *Rev Enferm UFSM*. 2014;4(2):254-64.
2. McNitt-Gray JL. Biomecânica relacionada ao exercício na gravidez. In: Artal R, Wiswell RA, Drinkwater BL. *O exercício na gravidez*. 2ª ed. São Paulo, 1999 apud De Carvalho YBR, Caromano FA. 2001.
3. Kalus SM, Kornman LH, Quinlivan JA. Managing back pain in pregnancy using a support garment: a randomised trial. *BJOG*. 2008;115(1):68-75.
4. Surita FG, Nascimento SL, Pinto e Silva JL. Exercício físico e gestação. *Rev Bras Ginecol Obstet*. 2014;36(12):531-4.
5. Ferreira CH, Nakano AM. [Conceptual bases supporting the obtention of knowledge back pain in pregnancy]. *Rev Lat Am Enfermagem*. 2001;9(3):95-100. Portuguese.
6. Lopes IB, Maia HF. Intervenção comunitária multiprofissional em um grupo de Gestantes num bairro de periferia da cidade de Salvador, Bahia. *Rev Baiana Saúde Pública*, 2006;30(2):224-37.
7. Nazik E, Eryilmaz G. Incidence of pregnancy-related discomforts and management approaches to relieve them among pregnant women. *J Clin Nurs*. 2014;23(11/12):1736-50.
8. Nascimento ER, Paiva MS, Rodrigues QP. Avaliação da cobertura e indicadores do programa de humanização do pré-natal e nascimento no município de Salvador, Bahia, Brasil. *Rev Bras Saude Matern Infant*. 2007;7(2):191-7.
9. Serruya SJ, Lago TG, Cecatti JG. Avaliação preliminar do programa de humanização no pré-natal e nascimento no Brasil. *Rev Bras Ginecol Obstet*. 2004;26(7):517-25.
10. Dunne C, Murphy DJ. Healthy lifestyle behaviours in pregnancy: A prospective cohort study in Ireland. *Br J Midwifery*. 2015;23(12):874-84.
11. Lorenzi DR, Danelon C, Saciloto B, Padilha Jr I. Fatores indicadores da sintomatologia climatérica. *Rev Bras Ginecol Obstet*. 2005;27(1):12-9.
12. Institute of Medicine. 1990. *Nutrition During Pregnancy*. Part I. Weight Gain. Washington, DC: Natl Acad Int J Cardiol. 2005;98:179-89.
13. Araújo NM, Salim NR, Gualda DM, Pereira da Silva LC. [Body and sexuality during pregnancy]. *Rev Esc Enferm USP*. 2012;46(3):552-8. Portuguese
14. Instituto Brasileiro de Geografia e Estatística (Brasil); Sala de imprensa, Síntese de indicadores sociais; 2010. Disponível em: [http://www.ibge.gov.br/home/presidencia/noticias/noticia\\_visualiza.php?id\\_noticia=1717&cid\\_pagina=1](http://www.ibge.gov.br/home/presidencia/noticias/noticia_visualiza.php?id_noticia=1717&cid_pagina=1).
15. Alves VM, Moura ZA, Palmeira IL, Lopes MV. Estudo de diagnóstico de enfermagem fadiga em gestantes atendidas numa unidade básica de atenção à saúde. *Acta Paul Enferm*. 2006;19(1):70-5.
16. Spindola T, Penna LH, Progiante JM. Perfil epidemiológico de mulheres atendidas na consulta do pré-natal de um hospital universitário. *Rev Esc Enferm USP*. 2006;40(3):381-8.
17. North American Nursing Diagnosis Association. *Diagnósticos de enfermagem da NANDA: definições e classificação 2003-2004*. Porto Alegre: Artmed; 2005.
18. Kamysheva E, Skouteris H, Wertheim EH, Paxton SJ, Milgrom J. A prospective investigation of the relationships among sleep quality, physical symptoms, and depressive symptoms during pregnancy. *J Affect Disord*. 2010;123(1-3):317-20.
19. Hall WA, Hauck YL, Carty EM, Hutton EK, Fenwick J, Stoll K. Childbirth fear, anxiety, fatigue and sleep deprivation in pregnant women. *J Obstet Gynecol Neonatal Nurs*. 2009;38(5):567-76.
20. Tsai SY, Lee CN, Wu WW, Landis CA. Sleep hygiene and sleep quality of third-trimester pregnant women. *Res Nurs Health*. 2016;39(1):57-65.
21. Facco FL, Kramer J, Ho KH, Zee PC, Grobman WA. Sleep disturbances in pregnancy. *Obstet Gynecol*. 2010;115(1):77-83.

22. Pitangui AC, Ferreira HM. Avaliação fisioterapêutica e tratamento da lombalgia gestacional. *Fisioter Mov*. 2008;21(2):135-42.
23. Santos MM, Gallo AP. Lombalgia gestacional: prevalência e características de um programa pré-natal. *Arq Bras Cien Saude*. 2010;35(3):174-9.
24. Melhado SJ, Soler ZA. A lombalgia na gravidez: análise entre gestantes no último trimestre da gestação. *Femina*. 2004;32(8):647-52.
25. Wang SM, Dezinno P, Maranets I, Berman MR, Caldwell-Andrews AA, Kain ZN. Low back pain during pregnancy: prevalence, risk factors, and outcomes. *Obstet Gynecol*. 2004;104(1):65-70.
26. Stephenson RG, O'Connor LJ. Fisioterapia aplicada à ginecologia e obstetrícia. 2ª ed. São Paulo: Manole; 2004.
27. Polden M, Mantle J. Fisioterapia em ginecologia e obstetrícia. São Paulo: Santos; 2002.
28. Skaggs CD, Prather H, Gross G, George JW, Thompson PA, Nelson DM. Back and pelvic pain in an underserved United States pregnant population: a preliminary descriptive survey. *J Manipulative Physiol Ther*. 2007;30(2):130-4.
29. Heberlein EC, Frongillo EA, Picklesimer AH, Covington-Kolb S. Effects of group prenatal care on food insecurity during late pregnancy and early postpartum. *Mater Child Health J*. 2016;20(5):1014-24.
30. Dall'Alba V, Fornari F, Krahe C, Callegari-Jacques SM, Silva de Barros SG. Heartyburn and regurgitation in pregnancy: the effect of fat ingestion. *Dig Dis Sci*. 2010;55(6):1610-4.
31. Landi AS, Bertolini SM, Guimarães PO. Protocolo de atividade física para gestantes: estudo de caso. *Cesumar*. 2004;6(1):63-70.
32. Lima FR, Oliveira N. Gravidez e exercício. *Rev Bras Reumatol*. 2005;45(3):188-90.
33. Imamura ST, Kaziyama HH, Imamura M. Lombalgia. In: Teixeira MJ, editor. *Dor: epidemiologia, fisiopatologia, avaliação e síndromes dolorosas e tratamento*. São Paulo: Moreira Júnior; 2001. 222-36p.
34. Novaes FS, Shimo AK, Lopes MH. [Low back pain during gestation]. *Rev. Lat Am Enfermagem*. 2006;14(4):620-4. Portuguese.
35. Gil VF, Osis M, Faúndes A. Lombalgia durante a gestação: eficácia do tratamento com Reeducação Postural Global (RPG). *Rev Fisioter Pesq*. 2011;18(2):164-70.
36. Machado CA. Efeitos de uma abordagem fisioterapêutica baseada no método Pilates, para pacientes com diagnóstico de lombalgia, durante a gestação. *Fisioter Bras*. 2006;7(5):345-50.
37. Granath AB, Hellgren MS, Gunnarsson RK. Water aerobics reduces sick leave due to low back pain during pregnancy. *J Obstet Gynecol Neonatal Nurs*. 2006;35(4):465-71.
38. Elden H, Ladfors L, Olsen MF, Ostgaard HC, Hagberg H. Effects of acupuncture and stabilizing exercises as adjunct to standard treatment in pregnant women with pelvic girdle pain: randomised single blind controlled trial. *BMJ*. 2005;330(7494):761.

# Self-perception of quality of life and identification of alexithymia in failed back surgery syndrome patients

## *Autopercepção da qualidade de vida e identificação da alexitimia em pacientes com síndrome da falha cirúrgica*

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** Failed back surgery syndrome is one of the most frequent nosological entities in a Pain Clinic and is characterized by the persistent maintenance of lumbar and/or lower limbs pain complaints in individuals already submitted to lumbar vertebral surgery. This study aimed at evaluating quality of life and at investigating the presence of alexithymia in a sample of individuals with failed back surgery syndrome, in addition to analyzing correlations between pain intensity and symptoms of anxiety and depression.

**METHODS:** This is a descriptive, exploratory, comparative, cross-sectional study with quantitative approach in a sample of individuals with failed back surgery syndrome (G1) (n=38) and a group with low back pain without surgical intervention (G2) (n=42) of a Teaching Hospital Pain Clinic. Participants were evaluated by the Brief Pain Inventory and the Toronto Alexithymia scale. Emotional factors, such as anxiety and depression, were evaluated by Beck scales and quality of life by the generic WHOQOL-BREF questionnaire.

**RESULTS:** There were mean alexithymia, anxiety and depression scores significantly higher for G1 and poorer quality of life in all domains as compared to G2. There were significant correla-

tions between alexithymia and depression ( $p<0.01$ ) and quality of life (except for the environment domain) and anxiety/depression ( $p<0.001$ ).

**CONCLUSION:** Results have highlighted the negative impact of frequently under-diagnosed psychological variables on quality of life. A better understanding of these emotional reactions may promote a more effective participation of health professionals.

**Keywords:** Alexithymia, Low back pain, Post-laminectomy syndrome, Quality of life, Reoperation.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A síndrome da falha cirúrgica é uma das mais frequentes entidades nosológicas em uma Clínica de Dor e caracteriza-se pela manutenção persistente de queixas algicas lombares e/ou nos membros inferiores em indivíduos já submetidos a cirurgia vertebral lombar. O objetivo deste estudo foi avaliar a qualidade de vida e investigar a presença de alexitimia em uma amostra de indivíduos com síndrome da falha cirúrgica, e analisar as correlações entre intensidade de dor e presença de sintomas de ansiedade e depressão.

**MÉTODOS:** Trata-se de um estudo descritivo, exploratório, comparativo, de corte transversal com abordagem quantitativa em uma amostra composta de indivíduos com diagnóstico de síndrome da falha cirúrgica (G1) (n=38) e um grupo com dor lombar e sem intervenção cirúrgica (G2) (n=42) pertencentes a uma Clínica da Dor de um hospital escola. Os participantes foram avaliados pelo Inventário Breve de Dor e a escala de Alexitimia de Toronto. Fatores emocionais como ansiedade e depressão foram avaliados pelas escalas Beck e, a qualidade de vida pelo questionário genérico WHOQOL-BREF.

**RESULTADOS:** Apontaram escores médios significativamente mais elevados de alexitimia, ansiedade e depressão no G1 e pior qualidade de vida em todos os domínios, se comparado ao G2. Correlações significativas entre alexitimia e depressão ( $p<0,01$ ) e qualidade de vida (exceto no domínio ambiente) e ansiedade/depressão ( $p<0,001$ ).

**CONCLUSÃO:** Os resultados destacam o impacto negativo que as variáveis psicológicas, frequentemente subdiagnosticadas, têm na qualidade vida. A melhor compreensão dessas reações emocionais pode promover uma atuação mais eficaz do profissional de saúde.

**Descritores:** Alexitimia, Dor lombar, Qualidade de vida, Reoperação, Síndrome pós-laminectomia.

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## INTRODUCTION

Post-laminectomy syndrome (PLS), also known as failed back surgery (FBS) includes a heterogeneous group of patients with chronic residual low back pain after surgical spinal treatment<sup>1</sup>.

This syndrome refers specifically to pain associated to symptoms not relieved after laminectomy; however, the term is often used to describe poor results after any type of spinal surgery<sup>2</sup>.

The high incidence of spinal surgeries failures has encouraged the search for risk factors justifying the result of such surgery in a certain patient. However, literature shows that there are few unequivocal predictors and they explain the relative low proportion of variation of results<sup>3</sup>.

In the last decade, many studies have tried to identify risk factors for poor surgical results due to their high incidence, however with focus on biological, demographic and work-related variables<sup>2</sup>. With regard to psychological and sociological factors, studies had several psychometric and practical problems during the choice and use of screening tools<sup>3</sup>.

So, few studies<sup>4,5</sup> suggest as strategy the identification of patients with long-lasting symptoms and high level of distress who might benefit from additional psychological treatment before and/or during surgical treatment.

Patients with low social functioning (measured with quality of life tools) have negative prognosis when reoperated<sup>5,6</sup>, in addition to major difficulties in expressing their emotions. They report their complaints using terms such as tension, nervousness, pain and irritation<sup>5,7</sup>.

Family and social factors should be addressed, thus explaining the diversity of clinical expressions and personal experiences<sup>6</sup>. In addition, PLS cannot be evaluated just by its impact on physical functioning, but rather by its interaction with other personal factors, such as professional activity, beliefs, anxiety, depression and alexithymia<sup>5,7</sup>.

Alexithymia is a multidimensional concept referred to cognitive-affective deficit related to the expression of emotions<sup>7</sup>. Some investigators have considered that the alexithymic component would be one psychological correlate in disorders where major symptom is chronic pain<sup>8</sup>. The usefulness of the application of this concept is directly linked to the most adequate therapeutic approach to the patient, since its use may lead to better understanding of patients with multiple somatic complaints which very often confound physicians, leading them to extensive and unnecessary consultations and evaluations<sup>6,8</sup>.

So, this study aimed at evaluating quality of life and at investigating difficulties of FBS patients in identifying and describing their feelings (alexithymia)

## METHODS

This is a descriptive, exploratory, comparative, cross-sectional study with quantitative approach. A convenience sample of consecutive cases was used. Participated in the study indi-

viduals of both genders divided in two groups, selected from a 10-month demand of outpatient services. Group 1 (G1) (n=38) with diagnosis of PLS (mean of 2.2 surgeries) and group 2 (G2) (n=42) with low back pain patients, without any surgical intervention, belonging to a Pain Clinic of a teaching hospital. All with enough cognitive level to understand the questions, who agreed to participate in the study and have signed the Free and Informed Consent Term (FICT). Patients with no clinical follow up in the Pain Clinic of the *Hospital de Base*, with metabolic, inflammatory or oncologic diseases or with radiological segmental instability were excluded.

Evaluations were applied by a previously trained investigator and, given reading difficulties of some participants, questions were read and marked by the interviewer according to participants' answers, to avoid filling or questions interpretation mistakes.

Pain was evaluated by the Brief Pain Inventory (BPI)<sup>9</sup>. This tool has 15 items, subdivided in two parts: the first evaluates pain intensity (8 items) and the second evaluates the interference of pain on life aspects (7 items): walking ability, sleep, work, relationship with other people and enjoying life, in a numerical scale from zero (no pain) to 10 (worst possible pain).

Quality of life (QL) was evaluated by the generic quality of life WHOQOL-BREF questionnaire<sup>10</sup>. This is a tool made up of 26 questions addressing one general domain and four specific domains (physical, psychological, social relations and environment). QL scores in WHOQOL-BREF domains vary from zero to 100, being that the higher the score for each domain, the better the QL.

With regard to difficulties to identify and describe feelings, Toronto Alexithymia Scale (TAS) was applied<sup>11</sup>. This tool measures the level of alexithymia according to four factors: F1 – ability to identify and describe feelings and separate feelings from body sensations; F2 – ability to fantasize or “day dream”; F3 – preference for focusing on external events rather than internal experiences; F4 – ability to communicate feelings to other people. It has 26 items answered on a Likert scale of five points, from totally disagree (1) to totally agree (5). Total scores vary from 26 to 130 and, according to studies carried out with the original version, when above 74 (inclusive) are interpreted as presence of alexithymia, while below 72 (inclusive), lack of alexithymia. And scores between 63 and 73 do not allow for conclusive evaluations. Studies with the original version suggest good internal consistency with alpha coefficients varying from 0.75 to 0.79. Scores within this spectrum were obtained with the Brazilian version<sup>12</sup>.

Emotional factors, such as anxiety and depression, were evaluated by the Beck scale. Our study has used the anxiety inventory (BAI)<sup>13</sup> and the depression inventory (BDI)<sup>13</sup>. BAI was proposed to measure common anxiety symptoms. It is made up of 21 items, with answer alternatives varying from nothing, to a little, moderate and severe. Recommended classification is minimum anxiety (0-7), mild (8-15), moderate (16-25) and severe anxiety (26-63). BDI has 21

categories of symptoms and activities with four alternatives each, in decreasing order of depression level. The 21 items refer to sadness, pessimism, feeling of failure, dissatisfaction, punishment, self-aversion, suicide ideas, cry, irritability, social retraction, indecision, changes in self-image, difficulty to work, insomnia, fatigability, loss of appetite and weight, somatic concerns and loss of libido. Total score allows the classification of depression intensity levels, which vary from minimum depression (0-9), to mild (10-16), moderate (17-29) and severe depression (30-63), and there are Brazilian psychometric studies.

This study was approved by the Institution's Ethics and Research Committee under number 2384/2012.

**Statistical analysis**

Descriptive statistics was used for data analysis, being that initially data exploratory analysis was carried out. Spearman correlation coefficient was applied to establish correlation among relevant variables.

**RESULTS**

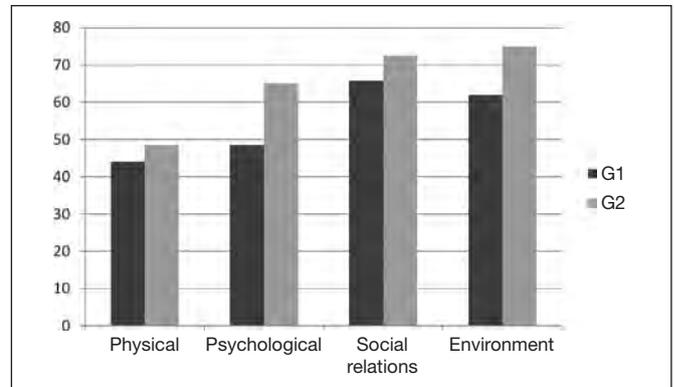
Both groups were mostly made up of females (67%), married (43%) and mean age of 42.3±5.8 years. With regard to socioeconomic classification there has been predominance of the low category (1/2 to 2 minimum wages). More than half were within this socioeconomic level (55.7%). As to current occupation, 47% (n=18) of G1 patients were inactive (health insurance) and in G2 38% were inactive (n=16). Other socio-demographic and clinical data are shown in table 1.

Pain, anxiety, depression and alexithymia evaluation results comparing both groups are shown in table 2. In all evaluated parameters, G1 had high scores in Beck questionnaires and intense pain perception and of its interference with their daily lives. As to QL, lower mean scores in both groups corresponded to physical and psychological domains and are represented in figure 1.

**Table 1.** Sample socio-demographic and clinical characteristics (mean±standard deviation or percentage number) (n=38)

Variables	Groups	n	Mean±SD	%
Education level (years)	G1	38	7±4.5	
	G2	42	8±3.8	
Pain duration (months)	G1	38	8±6.8	
	G2	42	9±8.7	
Labor situation				
Formal job			10.5(n=4)	
Health insurance			47(n=18)	
Retired	G1	38	28 (n=11)	
Informal job	G2	42	14.5 (n=5)	
Formal job			30.9(n=13)	
Health insurance			11.9(n=5)	
Retired			19.1(n=8)	
Informal job			38.1(n=16)	

G1 = diagnosis of failed back surgery; G2 = low back pain without surgical intervention.



**Figure 1.** Central trend and scores dispersion of WHOQOL-BREF domains in evaluated patients

G1 = diagnosis of failed back surgery; G2 = low back pain without surgical intervention.

**Table 2.** Pain, anxiety, depression and alexithymia evaluation scores of evaluated samples

Tools	G1 (n=38) Mean ± SD	G2 (n=42) Mean ± SD	p value
BPI			
Pain intensity	9.04±2.3	8.50±3.2	0.054
Interference of pain with general activities			
Mood	8.35±3.04	6.48±3.5	0.048*
Walking ability	7.32±2.50	4.50±1.7	0.036*
At sleep	9.35±1.98	5.80±2.8	0.045*
At work	8.50±2.35	5.60±2.5	0.048*
On personal relationships	5.65±3.25	4.75±1.5	0.065
On enjoying life	6.50±3.50	4.50±2.5	0.045*
BDI	24.9±12.6	18.6±5.4	0.045*
BAI	17.8±3.4	8.2±4.6	0.028*
TAS			
F1 (identify feeling)	36.5±7.0	28.5±8.5	0.036*
F2 (fantasize)	10.9±4.0	5.4±3.8	0.045*
F3 (communicate feeling)	14.8±3.2	9.6±5.4	0.038*
F4 (focus on work)	13.2±2.8	10.8±2.5	0.034*
Total	75.4±6.3	60.5±1.2	0.035*

\*Significance level – p<0.05; G1 = diagnosis of failed back surgery; G2 = low back pain without surgical intervention. BPI – brief pain inventory; BDI = depression inventory; BAI = anxiety inventory; TAS = Toronto alexithymia scale. According to mean TAS scores, there has been prevalence of alexithymia (<74) taking into account cutoff scores established by Yoshida<sup>10</sup>.

**Table 3.** Toronto alexithymia scale mean and standard deviation (±) values of evaluated patients

TAS	Mean±SD	Minimum	Maximum
F1	36.5±7.0	19	45
F2	10.9±4.0	6	17
F3	14.8±3.2	11	21
F4	13.2±2.8	9	20
Total	75.4±6.3	59	90

TAS = Toronto Alexithymia scale; F1 = ability to identify and describe feelings and separate feelings from body sensations; F2 = ability to fantasize or “day dream”; F3 = preference for focusing on external events rather than on internal experiences; F4 = ability to communicate feelings to other people.

## DISCUSSION

According to our results, there has been surgeries means similar to other studies<sup>14,15</sup>. The sample had also mean age of 42.3 years and high incidence of working incapacity, shown by a majority of individuals under health insurance, confirming the work of Steenstra et al.<sup>16</sup>. With regard to gender, males were majority, in agreement with Teixeira et al.<sup>17</sup>. There has been disagreement with Heyer et al.<sup>18</sup>. In our study, body weight was above anthropometric parameters. Several studies have identified increased weight as major risk factor to worsen pain, before or after surgery<sup>14,16</sup>.

With regard to depression, 39.4% of the sample had moderate level. Some studies have shown that depressed individuals with chronic pain have higher incapacity index as compared to those not depressed, and this negatively interferes with QL<sup>18</sup>. Impaired QL in physical and psychological domains is similar to a study by Beigin et al.<sup>19</sup> which shows that such dimensions may predict pain occurrence and expression after surgery. Anxiety, also moderate for most patients of our study, was followed by severe anxiety and, as example of this negative interference, there is amplification of physical symptoms and functional incapacity associated to pain and low adherence to diet or drugs<sup>17,20</sup>.

Alexithymia was prevalent in our study. Alexithymic people have literal thinking style, that is, unawareness of their own feelings in stress-generating situations, thus favoring somatization<sup>21,22</sup>.

A study by Lane, Sechrest and Riedel<sup>23</sup> has applied TAS-20 to 380 individuals stratified by age, gender, socioeconomic level and education years. It was observed that this tool has a trend to inform worse results for patients with advanced age, male gender, low socioeconomic level and less education years. So, one may conclude that our results have also been affected by the low socioeconomic level and the lower number of education years of the sample.

Saariaho et al.<sup>24</sup> have followed up for eight years chronic pain patients and have investigated the impact of alexithymia and depression. They have observed that alexithymic patients had worse pain and depression both in the beginning and during clinical follow up, relating them to male gender and alexithymia in the beginning of the study, but not to depression. Alexithymia and depression were closely related and this relation was reinforced during the follow up period.

Our results have shown the need for intervention programs developed by multidisciplinary teams to contribute for the emotional processing difficulties and consequently to improve quality of life.

## CONCLUSION

In general, failed back surgery has significant impact on patients' quality of life, facilitating the prevalence of alexithymia, depression and anxiety.

## REFERENCES

1. Matias AC, Antunes F. Qualidade de vida na síndrome de cirurgia lombar falhada. *Rev Soc Port Med Fis Rehabil.* 2012;21(1):32-6.
2. Boonstra AM, Reneman MF, Waaksma BR, Schiphorst Preuper HR, Stewart RE. Predictors of multidisciplinary treatment outcome in patients with chronic musculoskeletal pain. *Disabil Rehabil.* 2015;37(14):1242-50.
3. Mannion AF, Elfering A. Preditores do resultado cirúrgico e suas avaliações. *Coluna.* 2006;5(4):267-79.
4. Hussain A, Erdek M. Interventional pain management for failed back surgery syndrome. *Pain Pract.* 2014;14(1):64-78.
5. Vaisy M, Gizzi L, Petzke F, Consmüller T, Pfingsten M, Falla D. Measurement of lumbar spine functional movement in low back pain. *Clin J Pain.* 2015;31(10):876-85.
6. García RJ, Gastaldo AS, Campos TI, Sousa CV, Hornero MC, Tirado JA, et al. Factores relacionados con la cirugía fallida de hernia discal lombar. *Neurocirugía.* 2005;16:507-17.
7. Manca A, Eldabe S, Buchser E, Kumar K, Taylor RS. Relationship between health-related quality of life, pain, and functional disability in neuropathic pain patients with failed back surgery syndrome. *Value Health.* 2010 ;13(1):95-102.
8. Di Tella M, Castelli L. Alexithymia in chronic pain disorders. *Curr Rheumatol Rep.* 2016;18(7):41.
9. Cleeland C, Ryan K. Pain assessment: global use of the Brief Pain Inventory. *Ann Academy Med Singapore.* 1994;23(2):129-38.
10. Fleck M, Louzada S, Xavier M, Chachamovich E, Vieira G, Santos L, et al. [Application of the Portuguese version of the abbreviated instrument of quality life WHO-QOL-bref]. *Rev Saude Publica.* 2000;34(2):178-83. Portuguese.
11. Yoshida EM. Validade da versão em português da Toronto Alexithymia Scale-TAS em amostra clínica. *Psicol. Reflex Crit.* 2007;20(3):389-96.
12. Prazeres, N. Alexitimia: Uma forma de sobrevivência. *Rev Port Psicossom.* 2000;2(1):109-21.
13. Cunha JA. Manual da Versão em Português das Escalas Beck. São Paulo: Casa do Psicólogo; 2001.
14. Son BC, Kim DR, Lee SW, Chough CK. Factors associated with the success of trial spinal cord stimulation in patients with chronic pain from failed back surgery syndrome. *J Korean Neurosurg Soc.* 2013;54(6):501-6.
15. Gerrits MM, van Oppen P, van Marwijk HW, Penninx BW, van der Horst HE. Pain and the onset of depressive and anxiety disorders. *Pain.* 2014;155(1):53-9.
16. Steenstra IA, Verbeek JH, Prinsze FJ, Knol DL. Changes in the incidence of occupational disability as a result of back and neck pain in the Netherlands. *BMC Public Health.* 2006;18(6):190-3.
17. Teixeira MJ, Yeng LT, Garcia OG, Fonoff ET, Wellington SP, Araújo JO. Síndrome dolorosa pós-laminectomia: estudo descritivo da abordagem terapêutica em 56 pacientes. *Rev Assoc Med Bras.* 2011;57(3):286-91.
18. Heyer EJ, Sharma R, Winfree CJ, Mocco J, McMahon DJ, McCormick PA, et al. Severe pain confounds neuropsychological test performance. *J Clin Exp Neuropsychol.* 2008;22(5):633-9.
19. Beigin GA, Martins MRI Souza AV, Forni JEN. Impacto psicossocial e na qualidade de vida de pacientes com síndrome dolorosa após laminectomia. *Rev Dor.* 2015;16(1):32-6.
20. Leyfer OT, Ruberg JL, Woodruff-Borden J. Examination of the utility of the Beck Anxiety Inventory and its factors as a screener for anxiety disorders. *J Anxiety Disord.* 2006;20(4):444-58.
21. Celestin J, Edwards RR, Jamison RN. Pretreatment psychosocial variables as predictors of outcomes following lumbar surgery and spinal cord stimulation: a systematic review and literature synthesis. *Pain Med.* 2009;10(4):639-53.
22. Maciel MJ, Yoshida EM. Avaliação de alexitimia, neuroticismo e depressão em dependentes de álcool. *Aval Psicol.* 2006;5(1):43-54.
23. Lane RD, Sechrest L, Riedel R. Socio-demographic correlates of alexithymia. *Compr Psychiatry.* 1998;39(6):377-85.
24. Saariaho AS, Saariaho TH, Mattila AK, Joukamaa MI, Karukivi M. The role of alexithymia: an 8-year follow-up study of chronic pain patients. *Compr Psychiatry.* 2016;69:145-54.

# Postoperative pain and analgesia in patients submitted to unruptured brain aneurysm clamping

*Dor pós-operatória e analgesia em pacientes submetidos à pinçamento de aneurisma cerebral não roto*

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** Adequate postoperative pain evaluation and management are priorities for quality assistance, especially after neurological surgeries. This study aimed at evaluating postoperative pain of neurosurgical patients submitted to unruptured brain aneurysm clamping.

**METHODS:** Prospective and descriptive study carried out in a charity hospital of the city of Aracaju, Sergipe, Brazil. Sample was made up of 28 patients submitted to elective craniotomy for unruptured brain aneurysm clamping. Mann-Whitney, Kruskal-Wallis and Dunn-Bonferroni tests were used for inferential analysis. Significance level was 5% throughout the study.

**RESULTS:** Most patients (78.6%) were females, 64.0% had postoperative pain. There has been significant difference in the number of days with postoperative pain among patients with associated comorbidities ( $p=0.04$ ) and previous surgery ( $p=0.01$ ). Most patients had moderate and throbbing headache. There were no adequate pain records and most frequent analgesics were simple analgesics. Opioids prescription was incipient.

**CONCLUSION:** Systematic pain evaluation should be part of multiprofessional assistance, in compliance with international and national pain institutions recommendations.

**Keywords:** Analgesia, Aneurysm, Nursing, Pain, Pain measurement.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** Avaliação e manuseio adequados da dor pós-operatória são prioridades para uma assistência de qualidade, sobretudo em cirurgias neurológicas. O objetivo deste estudo foi avaliar a dor pós-operatória de pacientes neurocirúrgicos submetidos a pinçamento de aneurisma não roto.

**MÉTODOS:** Estudo prospectivo e descritivo realizado em um hospital beneficente do município de Aracaju, Sergipe, Brasil. A casuística foi constituída por 28 pacientes submetidos a craniotomia eletiva para tratamento de aneurisma cerebral não roto por meio de pinçamento. Na análise inferencial foram utilizados os testes de Mann-Whitney, Kruskal-Wallis e Dunn-Bonferroni. Foi adotado nível de significância de 5% em todo o estudo.

**RESULTADOS:** A maioria dos pacientes (78,6%) era do sexo feminino, 64,0% apresentaram dor no pós-operatório. Houve diferença significativa quanto ao número de dias com dor pós-operatória entre os pacientes que tinham comorbidades associadas ( $p=0,04$ ) e cirurgia anterior ( $p=0,01$ ). A maior parte dos pacientes apresentou cefaleia de intensidade moderada e pulsátil. Não houve registro adequado da dor nos prontuários, os analgésicos mais utilizados foram analgésicos simples e a prescrição de opioides foi incipiente.

**CONCLUSÃO:** A avaliação do fenômeno doloroso de forma sistemática deve fazer parte da assistência multiprofissional, conforme as recomendações de instituições nacionais e internacionais da dor.

**Descritores:** Analgesia, Aneurisma, Dor, Enfermagem, Mensuração da dor.

## INTRODUCTION

Pain is a subjective and multidimensional experience affecting most patients submitted to surgical procedures, especially in the postoperative period of aneurysm clamping<sup>1</sup>. It is a health area challenge because it causes physical and emotional distress resulting in physiologic impact adverse to several systems, with repercussion on patients' recovery and general well-being. Although being considered the fifth vital sign, it is still a poorly explored parameter in some health institutions<sup>2-4</sup>. Effective pain control is patient's right which should be assured to prevent postoperative complications and prolonged hospital stay<sup>3,5</sup>. In this sense, effective pain management exists when measurement and evaluation are continuously and systematically performed.

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Nurses, as leaders, should play their role in controlling pain by means of evaluation and orientation to their teams about important aspects of adequate management, in addition to discussing with the multidisciplinary team when the analgesic treatment is not based on patient's evaluation and on national and international guidelines<sup>1,6</sup>.

Although there are different scientific evidences related to the effective management of postoperative pain, surgical patients still suffer with inadequate analgesic regimens<sup>7</sup>. Multimodal analgesic therapy has its efficacy recognized for decreasing doses and adverse effects of certain drugs, especially opioids<sup>8</sup>. On the other hand, the practice of oligoanalgesia is still frequent after craniotomy<sup>9</sup>.

The study is justified by the need for looking for pain control strategies for patients submitted to aneurysm clamping, respecting the premises of the International Association for the Study of Pain (IASP) and Single Health System (SUS) recommendations.

Our study aimed at evaluating postoperative pain of neurosurgical patients submitted to aneurysm clamping analyzing the variables: location, intensity, duration, aggravating and mitigating factors, as well as at verifying pain records made by the health team on patients' medical charts in the postoperative period and the prevalence of pain during the first post-craniotomy week.

**METHODS**

This is a prospective, descriptive and exploratory study with quantitative approach, carried out from September 2014 to May 2015, in the intensive care unit and neurosurgery sector of a charity hospital of the city of Aracaju, Sergipe, Brazil.

Sample was made of 28 patients submitted to unruptured aneurysm clamping. After checking the number of patients submitted to craniotomy for aneurysm clamping between September 2013 and March 2014, it was observed that 32 craniotomies were performed for brain aneurysm. After this stage, sample size was calculated<sup>10</sup> and has determined the minimum number of 27 patients as shown in the following model (Figure 1).

Participated in the study patients above 18 years of age, submitted to elective craniotomy due to unruptured brain aneu-

rysm, with Glasgow comma scale score (GCS) equal 15. Evolution to death at any follow-up moment was considered exclusion criteria. Included patients were evaluated in the first seven postoperative days and/or until hospital discharge.

Data collection form had data on patients' socio-demographic and clinical profile. Additionally, there was information about pain presence, location and intensity after surgery, specific questions on postoperative headache characteristics, administered analgesia, pain recording by professionals, in addition to pain numeric visual scale (NVS).

Data were collected by means of patients' medical charts selection. After this stage, documental analysis was performed followed by interviews. Patients were evaluated from the first to the seventh postoperative day and/or until hospital discharge, in cases when patients were discharged before the seventh day.

Pain NVS was used to evaluate pain intensity. Patients were asked to inform pain site, to identify its intensity on the scale and to mention pain aggravating and mitigating factors, as well as headache characteristics.

Pain intensity was evaluated once a day, before and one hour after analgesic administration (routinely prescribed by institution's assistant physician). Patients not receiving analgesia and/or not referring pain were also evaluated one hour after the first evaluation and questioned about the presence of pain.

The study complied with recommendations of Resolution 466/2012, National Health Council, and all patients have signed the Free and Informed Consent Term (FICT).

This study was approved by the Ethics Committee, Universidade Federal de Sergipe (CAAE: 32813114.8.0000.5546).

**Statistical analysis**

For descriptive analysis, variables were expressed by means of simple frequency and percentage (when categorical) or mean and standard deviation (when continuous or ordinal). Mann-Whitney test (for two independent measures), Kruskal-Wallis test (three or more independent variables) and Dunn-Bonferroni test (multiple comparisons) were used for inferential analysis. Significance level of 5% was adopted to the whole study and software was R Core Team 2015.

**RESULTS**

Participated in the study 28 patients submitted to aneurysm clamping, who were interviewed until the third postoperative day (POD). Along follow-up, 10 patients were discharged, remaining 18 patients evaluated until the seventh POD.

Most patients were females (78.6%), aged ≥ 45 yeas (67.9%), married (53.6%) and without pathologic background (67.9%). Headache has prevailed in all patients. The number of days with postoperative pain was significantly different among patients with associated comorbidities and those being submitted to surgery. Mean hospitalization time in the intensive care unit was 2.8 days (Table 1).

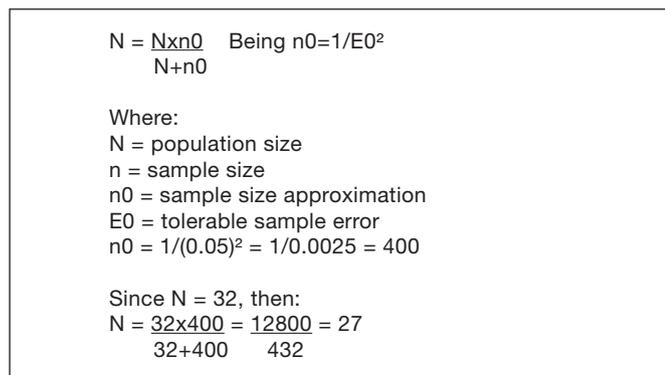


Figure 1. Description of sample size calculation

**Table 1.** Socio-demographic data and number of days related to the presence of pain in the postoperative period of aneurysm clamping. Aracaju, SE, Brazil, 2015

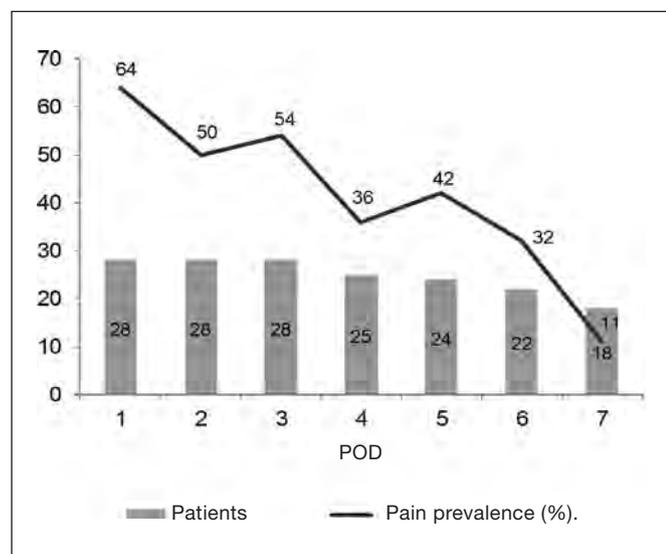
Variables	n	%	Pain			
			Number days Mean (SD)	p value	% days Mean (SD)	p value
<b>Gender</b>						
Male	6	21.4	2.5 (1.8)	0.81*	36 (26)	0.57*
Female	22	78.6	2.7 (1.6)		44 (23)	
<b>Age</b>						
<45	9	32.1	2.8 (2.0)	0.81*	42 (28)	0.85*
>=45	19	67.9	2.6 (1.5)		43 (22)	
<b>Pathologic background</b>						
Diabetes and hypertension	3	10.7	4.7 (0.6) <sup>¶</sup>	0.04**	71 (13) <sup>¶</sup>	0.04**
Hypertension	6	21.4	1.8 (1.2) <sup>¶¶</sup>		30 (16) <sup>¶¶</sup>	
No background	19	67.9	2.6 (1.7) <sup>¶¶¶</sup>		42 (24) <sup>¶¶¶</sup>	
<b>Previous surgery</b>						
Yes	13	46.4	1.9 (1.8)	0.02*	31 (25)	0.01*
No	15	53.6	3.3 (1.2)		52 (17)	

\*Mann-Whitney test, \*\* Kruskal-Wallis Test and <sup>¶,¶¶</sup>Subgroups different from 5% for Dunn-Bonferroni test.

Among respondents, 64.0% had postoperative pain. Prevalence of headache was higher in the first POD and lower in the seventh (Figure 2).

Most patients had moderate, pulsing headache located in the frontotemporal (48.0%) and temporal (20.0%) regions. Major symptoms associated to this pain were nausea, vomiting and sleep disturbances (Table 2).

There has been postoperative pain in most follow-up days, however there has been no adequate pain recording on medical charts. Physicians were professionals more adequately recording pain, as compared to nurses. Simple analgesics were most widely used, with incipient prescription of opioids. Prescriptions “as needed” suffered a variation from 3.5% in the first POD to 64.0% in the seventh POD (Tables 3 and 4).



**Figure 2.** Prevalence of postoperative pain after aneurysm clamping. Aracaju, SE, Brazil, 2015  
POD = postoperative days.

**Table 2.** Presence of postoperative headache according to location, characteristics, intensity, aggravating factors and associated symptoms. Aracaju, SE, Brazil, 2015

Variables	n (%)
<b>Location</b>	
Frontotemporal	36 (47)
Frontal	15 (20)
Temporofrontal	8 (11)
Unilateral	8 (11)
Occipital	4 (5)
Holocranial	2 (3)
Fronto-orbital	2 (3)
<b>Characteristics</b>	
Pulsing	51 (68)
Continuous	3 (4)
Stabbing	2 (3)
Pressing	17 (22)
Tension	2 (3)
<b>Pain intensity</b>	
Mild	30 (40)
Moderate	41 (55)
Severe	4 (5)
<b>Aggravating factors</b>	
Balancing head	32 (55)
Neck movements	20 (35)
Eye movement or palpation	2 (4)
Physical effort	1 (2)
None	2 (4)
<b>Associated symptoms</b>	
Nausea	14 (19)
Vomiting	3 (4)
Sleep disturbances	5 (7)
Photophobia	2 (3)
Sweating	2 (3)
Postural vertigo	2 (3)
Tearing	1 (1)
Increased temperature	1 (1)
None	51 (59)

**Table 3.** Pain presence and recording in the postoperative period of aneurysm clamping. Aracaju, SE, Brazil, 2015

Variables	Pain presence and recording n (%)						
	1 <sup>st</sup> POD	2 <sup>nd</sup> POD	3 <sup>rd</sup> POD	4 <sup>th</sup> POD	5 <sup>th</sup> POD	6 <sup>th</sup> POD	7 <sup>th</sup> POD
Pain							
Yes	18 (64)	14 (50)	15 (54)	9 (36)	10 (42)	7 (32)	2 (11)
Professional recording							
Nursing team	4 (50)	5 (71)	5 (71)	4 (100)	7 (100)	1 (50)	1 (100)
Physician	4 (50)	3 (43)	3 (43)	0 (0)	0 (0)	1 (50)	1 (100)

**Table 4.** Pain intensity and administered analgesics in the postoperative period of aneurysm clamping. Aracaju, SE, Brazil, 2015

Administered drug	Pain intensity Mean (SD)						
	1 <sup>st</sup> POD	2 <sup>nd</sup> POD	3 <sup>rd</sup> POD	4 <sup>th</sup> POD	5 <sup>th</sup> POD	6 <sup>th</sup> POD	7 <sup>th</sup> POD
Simple analgesics	3.7 (2.5)	2.5 (1.9)	2.2 (2.6)	1 (1.6)	2.3 (3.9)	3 (2.2)	0 (0)
NSAIDs	4.1 (2.0)	2.3 (4.0)	0.8 (1.5)	0 (0)	1.3 (2.3)	9 (0)	2 (0)
Weak opioid	1.8 (2.0)	2.5 (3.3)	1.5 (3)	0.8 (1.3)	1.3 (2.3)	0 (0)	0 (0)
Strong opioid	0 (0.0)	0 (0)	0 (0)	3 (0)	0 (0)	0 (0)	0 (0)
Simple analgesics + NSAIDs	0 (0.0)	1 (1.7)	2.4 (2.2)	2.6 (2.8)	2.9 (3.1)	1.1 (1.8)	0.3 (0.9)

NSAIDs = non-steroid anti-inflammatory drugs.

## DISCUSSION

Adequate analgesia and pain relief are patients' unalienable rights, since after aneurysm clamping pain is one of the most prevalent symptoms. So, adequate pain management is critical for postoperative recovery and early return to daily life activities.

Nursing professionals play a critical role in relieving pain of such patients because they are directly related to care throughout the daily assistance cycle, being responsible for helping the choice of analgesics to be administered, when they accurately evaluate pain intensity referred by patients.

Results of our study have shown predominance of females. Such data confirm studies aiming at investigating pain prevalence, intensity and recording in the first week after surgery<sup>11,12</sup>. Possible explanation for such results might be associated to gender differences in terms of risk factors for cardiovascular diseases. Changes going on during females' life cycle, related to hormonal modifications, might have contributed for the development of vascular changes, peaking with the formation of aneurysms.

Mean patients' age was 47.6 years. Studies with patients submitted to craniotomy had similar results<sup>9-11,13</sup>. Chronic, non-communicable diseases are more frequent in the fourth decade of life. It is believed that the preventive access to health attention network, with early diagnosis and timely definite treatment has prevented neurological complications, sequelae and health conditions impairment, thus favoring less hospitalization days for such patients.

Most prevalent pain was moderate headache, being compatible with that described by other authors<sup>14-16</sup>. Another study has shown that after surgical aneurysm treatment, there is higher risk for developing headache<sup>17</sup>. Postoperative headache

is a common symptom in post-craniotomy patients, which requires a multidisciplinary approach aiming at decreasing neurological sequelae, hospitalization time and costs. In addition, it may provide better quality of care and satisfaction for patients and their relatives.

Pulsing headache was the most prevalent presentation, with predominance of frontal and frontotemporal regions. A study investigating pos-craniotomy headache has observed that among most frequent characteristics there are those starting in the first postoperative day, located at the same side and place of the surgical incision, and improving along the week<sup>18</sup>. Another study analyzing the incidence of acute post-craniotomy pain has described pulsing headache as prevalent and has shown that pain intensity and location depend on surgical approach<sup>19</sup>. In our study, supratentorial surgeries have prevailed. It is believed that pain location in the frontotemporal region is related to this type of approach and surgical incision location.

Moderate pain was the most prevalent, which requires the use of weak opioids associated to first class opioids, as recommended by the World Health Organization (WHO) analgesic ladder. However, there has been inconsistency in the use of these drugs, which is in disagreement with IASP and WHO premises<sup>20,21</sup>. Similar data were obtained in other studies, where the use of analgesics not providing adequate pain management has prevailed<sup>8,9,15,16</sup>.

Pain persistence may induce different neurovegetative and neurologic changes and decrease oxygen supply to tissues. So, it is necessary to adequately manage it to decrease such noxious effects. Inadequately treated acute pain may evolve to chronicity becoming a disease impairing daily life activities and needing a multidisciplinary approach to improve patients' quality of life. Major pain-associated symptoms were nausea and vomiting. Similar results were found in recent studies aiming at eva-

luating the incidence of nausea and vomiting in the postoperative period of craniotomy<sup>22</sup>. Vomiting impairs patients' neurosurgical recovery because there is intracranial pressure increase, with risks of brain hemorrhages as well as hydroelectrolytic imbalance. So, health professionals should use systematic strategies to prevent such symptoms.

Another pain-associated symptom was sleep pattern changes<sup>23</sup>. This disorder is related to fatigue, depression and mental health disorders and may negatively reflect on patients' prognosis. So, adequate sleep may improve clinical recovery, decrease anxiety and excessive daily sleepiness.

Although there has been pain throughout the postoperative period, medical chart records were incipient. Recent studies have also observed this fact<sup>3,11,24</sup>. Physicians were professionals who adequately recorded pain. As opposed, just one nurse has recorded pain. Documentation of health activities should be part of professional routine, taking into account ethical-medical support assurance. This data is worrisome because lack of records suggests precarious pain evaluation, thus unsatisfactory management.

Nurses should adequately evaluate and record pain, because when they have accurate measurements, they are able to identify divergences with regard to established analgesic therapy, and to question the implementation of adequate analgesia<sup>25</sup>. Prescription "as needed" (A/N) was present in many medical records. This prescription delegates to nurses the responsibility of managing patients' pain, because when there are several analgesics prescribed under this condition, the choice of the analgesic to be administered, in many situations, is performed by the nursing team<sup>25</sup>.

Systematic pain evaluation was not present in the study, since nursing team records just reported presence or absence of pain and simple analgesics were the prevailing option even in cases of moderate to severe pain<sup>25</sup>.

Due to the magnitude of the painful phenomenon, it is necessary that health professionals be continuously updated to provide their team an effective ongoing education aiming at quality assistance<sup>15,26</sup>.

## CONCLUSION

Most participants were females, with associated comorbidities such as hypertension and diabetes. Most prevalent pain was moderate and pulsing headache. Simple analgesics were more commonly used and there has been underreporting of pain.

## REFERENCES

- Ribeiro Mdo C, Pereira CU, Sallum AM, Alves JA, Albuquerque MF, Fujishima PA. Knowledge of doctors and nurses on pain in patients undergoing craniotomy. *Rev Lat Am Enfermagem*. 2012;20(6):1057-63. English, Portuguese, Spanish.
- Zorowitz RD, Smout RJ, Gassaway JA, Horn SD. Usage of pain medications during stroke rehabilitation: the Post-Stroke Rehabilitation Outcomes Projects (PSROP). *Top Stroke Rehabil*. 2005;12(4):37-49.
- Ribeiro MC, Pereira CU, Sallum AM, Martins-Filho PR, Nunes MS, Carvalho MB. Dor pós-operatória em pacientes submetidos à craniotomia. *Rev Dor*. 2012;13(3):229-34.
- Saha P, Chattopadhyay S, Rudra A, Roy S. Pain after craniotomy: a time for reappraisal? *Indian J Pain*. 2013;2(1):4-6.
- Molnár L, Simon E, Nemes R, Fulesdi B, Molnár CJ. Postcraniotomy headache. *J Anesth*. 2014;28(1):102-11.
- Barbosa TP, Beccaria LM, Beccaria RM, Pereira AM. Evaluation of postoperative pain experience in intensive care unit patients. *Rev Bras Ter Intensiva*. 2011;23(4):470-7.
- Fanelli G, Berti M, Baciarello M. Updating postoperative pain management: from multimodal to context-sensitive treatment. *Minerva Anestesiol*. 2008;74(9):489-500.
- Gotschalk A, Yaster M. The perioperative management of pain from intracranial surgery. *Neurocrit Care*. 2009;10(1):387-402.
- Rahimi SY, Alleyne CH, Vernier E, Witcher MR, Vender JR. Postoperative pain management with tramadol after craniotomy: evaluation and cost analysis. *J Neurosurg*. 2010;112(2):268-72.
- Barbetta PA. *Estatística aplicada às ciências sociais*. 6ª ed. Florianópolis: Editora da UFSC; 2006.
- de Oliveira Ribeiro Mdo C, Pereira CU, Sallum AM, Martins-Filho PR, Santana JM, da Silva Nunes M, et al. Immediate post-craniotomy headache. *Cephalalgia*. 2013;33(11):897-905.
- Smitherman TA, Burch R, Sheikh H, Loder E. The prevalence, impact and treatment of migraine and severe headaches in the United States: a review of statistics from national surveillance studies. *Headache*. 2013;53(3):427-36.
- Kim YD, Park JH, Yang S, Kim S, Hong JTK, Sung JH, et al. Pain assessment in brain tumor patients after elective. *Brain Tumor Res Treat*. 2013;1(1):24-7.
- Ribeiro MC, Pereira CU, Sallum AM, Lopes JR, Alves JA, Carvalho MB. Las consecuencias del dolor en pacientes sometidos a craneotomía electiva. *Rev Chil Neurocir*. 2012;38(2):105-9.
- Fernández-Galinski DL, Gordo F, López GS, Pulido C, Real J. Conocimientos y actitudes de pacientes y personal sanitario frente al dolor postoperatorio. *Rev Soc Esp Dolor*. 2007;14(1):3-8.
- Durioux M, Himmelseher S. Pain control after craniotomy: off balance on the tightrope? *J Neurosurg*. 2007;106(2):207-9.
- Magalhães JE, Azevedo-Filho HR, Rocha-Filho PA. The risk of headache attributed to surgical treatment of intracranial aneurysms: a cohort study. *Headache*. 2013;53(10):1613-23.
- Rocha-Filho PA. Post craniotomy headache: a clinical view with a focus on the persistent form. *Headache*. 2015;55(5):733-8.
- Gray LC, Matta BF. Acute and chronic following craniotomy: a review. *Anaesthesia*. 2005;60(7):693-704.
- International Association for Study of Pain (IASP). Consensus development conference statement: the integrated approach to the management of pain. *Accid Emerg Med*. 1994;6(3):491-2.
- World Health Organization (WHO). *Cancer pain relief: with a guide to opioid availability*. 2nd ed. WHO Library: Geneva; 1996.
- Ryu JH, Lee JE, Lim YJ, Hong DM, Park HP, Han JJ, et al. A prospective, randomized, double-blind, and multicenter trial of prophylactic effects of ramosetron on postoperative nausea and vomiting (PONV) after craniotomy: comparison with ondansetron. *BMC Anesthesiology*. 2014;63(1):1-8.
- Finan PH, Goodin BR, Smith MT. The association of sleep and pain: an update and a path forward. *J Pain*. 2013;14(12):1539-52.
- Kiekkas P, Gardeli P, Bakalis N, Stefanopoulos N, Adamopoulou K, Avdulla C, et al. Predictors of nurses' knowledge and attitudes toward postoperative pain in Greece. *Pain Manag Nurs*. 2015;16(1):2-10.
- Peón AU, Diccini S. [Postoperative pain in craniotomy]. *Rev Lat Am Enfermagem*. 2005;13(4):489-95. Portuguese.
- Oliveira RM, Leitão IM, Silva LM, Almeida PC, Oliveira SK, Pinheiro MB. Dor e analgesia pós-operatória: análise dos registros em prontuários. *Rev Dor*. 2013;14(4):251-5.

# Specialists' perception and opinion about self-medication of patients with temporomandibular disorders and orofacial pain

*Percepção e opinião de especialistas sobre a automedicação realizada por pacientes com disfunções temporomandibulares e dor orofacial*

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** Temporomandibular disorders are considered the primary cause of chronic orofacial pain. Many patients consider self-medication a fast and adequate means to solve the pain problem and do not look for professional assistance. In spite of the considerable clinical implication of self-medication for temporomandibular disorders, the subject is poorly discussed in the literature. This study aimed at evaluating, by means of focus group, the opinion and perception of temporomandibular disorders/orofacial pain specialists about self-medication associated to temporomandibular disorders.

**METHODS:** Focal group is a qualitative methodology technique which, by means of participants interaction, aims at collecting data as from a discussion focused on specific topics. By means of speech, subjects freely express their knowledge, beliefs, attitudes and perceptions contributing to deepen the knowledge about a core subject. Participated in the study five temporomandibular disorders/orofacial pain specialists and a moderator who led the discussion. The following topics were addressed: temporomandibular disorders, orofacial pain, used drugs, opinions/attitudes with regard to self-medication, assistance/management of temporomandibular disorders. Speeches were recorded in audio and video for further data analysis.

**RESULTS:** Self-medication associated to temporomandibular disorders was pointed by specialists as extremely frequent and noxious to the disease, being highlighted excessive analgesic consumption and more frequent self-medication for muscular presentations.

**CONCLUSION:** The clinical impact of self-medication to treat temporomandibular disorders was emphasized, highlighting the influence of the practice in worsening and even chronicity of the disorder.

**Keywords:** Focus group, Self-medication, Temporomandibular disorders.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** As disfunções temporomandibulares são consideradas a principal causa de dor crônica na região orofacial. Muitos pacientes consideram a automedicação um meio rápido e suficiente para resolver o problema da dor e não procuram um profissional. Apesar da considerável implicação clínica da prática da automedicação em disfunções temporomandibulares, o assunto é pouco discutido na literatura da área. O objetivo deste estudo foi avaliar por meio da técnica do grupo focal, a opinião e percepção de especialistas em disfunções temporomandibulares/dor orofacial sobre a automedicação associada às disfunções temporomandibulares.

**MÉTODOS:** O grupo focal é uma técnica de metodologia qualitativa que, por meio da interação entre participantes, objetiva colher dados a partir de uma discussão focada em tópicos específicos. Por intermédio da fala, os sujeitos expressam seus conhecimentos, crenças, atitudes e percepções de forma livre, contribuindo para o entendimento aprofundado a respeito de um tema central. Participaram da dinâmica cinco especialistas em disfunções temporomandibulares/dor orofacial e um moderador que conduziu a discussão. Os seguintes tópicos foram abordados: disfunções temporomandibulares, dor orofacial, fármacos utilizados, opinião/attitudes com relação à automedicação, atendimento/tratamento das disfunções temporomandibulares. As falas foram registradas através da gravação de áudio e vídeo para que posteriormente pudesse ser feita a análise dos dados.

**RESULTADOS:** A automedicação associada às disfunções temporomandibulares foi apontada pelos especialistas como extremamente frequente e prejudicial ao quadro, sendo destacado o consumo excessivo de analgésicos e maior ocorrência da prática nos quadros musculares.

**CONCLUSÃO:** Enfatizou-se o impacto clínico da automedicação no tratamento das disfunções temporomandibulares, destacando-se a influência da prática no agravamento e até mesmo na cronificação do distúrbio.

**Descritores:** Automedicação, Disfunções temporomandibulares, Grupo focal.

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## INTRODUCTION

The collective term temporomandibular disorders (TMD) defines a set of clinical manifestations which may affect the masticatory system, causing pain and/or dysfunction of its muscle and/or joint structures<sup>1,2</sup>. TMD are the primary cause of chronic facial pain<sup>1,3</sup>.

Many TMD-associated diagnoses have pain as major complaint<sup>4,5</sup>, and quality of life (QL) of TMD patients may be related to orofacial pain control<sup>6</sup>.

According to the World Health Organization (WHO) self-medication is defined as obtaining and consuming drugs without professional orientation. For most TMD patients, this practice may be justified by constant pain which may impair important functions such as chewing and speaking, thus worsening quality of life of patients with the disease<sup>7,8</sup>. According to a systematic review to evaluate the prevalence of self-medication among Brazilian adults, its prevalence in three studies with recall period of 15 days (from a total of five studies with high methodological quality) was 35%<sup>9</sup>.

A study by Dias et al.<sup>10</sup> evaluating self-medication associated to TMD has shown that from 115 interviewed patients being treated for TMD, 71.3% had already consumed drugs without prescription, for pain or function limitation. Headache was major complaint associated to self-medication, being pointed by 39.53% of patients, and most consumed drugs were analgesics, being used by 58.13% of patients who self-medicated<sup>10</sup>.

Patients with TMD pain, especially chronic pain, have history of further looking for healthcare, continuous use of drugs and different therapies. Many TMD symptoms are periodic or cyclic, which may lead patients to drug abuse, with consequent physical or psychological dependence due to lack of dose control. Incorrect and abusive use of drugs is a concern with regard to TMD pharmacological treatment<sup>6,7</sup>. According to Hersh, Balasubramaniam & Pinto<sup>11</sup>, pharmacological therapy for TMD should only be used in strictly necessary cases.

Notwithstanding considerable clinical implication of the practice of self-medication in TMD, the subject is poorly

discussed in the literature. Because evaluation methods of its excessive consumption by TMD patients are poorly explored, this study aimed at evaluating by means of a focus group the opinion and perception of TMD/OFP specialists about the subject, to establish and check issues still no explained by the literature.

## METHODS

The objective was, through the focus group technique, to discuss and evaluate the opinion of TMD/OFP specialists about the practice of self-medication by patients diagnosed with TMD.

Qualitative research has several methodological possibilities which allow data collection and analysis. Among these possibilities, focus groups represent a group collection technique promoting broad discussions on a specific subject or focus<sup>12</sup>. Focus group is a qualitative methodology technique aiming at collecting data as from discussion focused on specific and directive topics by means of the interaction among participants. Speaking, participants express themselves freely, contributing to the deep understanding of a central subject and to develop hypotheses for further studies<sup>13-16</sup>. Its objective is to focus the survey and formulate more precise questions; add more information on knowledge unique to a group with regard to beliefs, attitudes and perceptions, or develop hypotheses for further studies<sup>15</sup>.

An extensive literature review was carried out to develop the focus group, and from this stage topics regarding the studied subject were generated to be discussed as from four dimensions (Table 1).

To make up the focus group, it is necessary that participants have at least one major common characteristic and that selection criteria are determined by the objective of the study, characterizing as an intentional sample. It is suggested that the number of participants be from six to 15. When the aim is to generate the highest possible number of ideas, it is better to choose a larger group; when the intention is to reach the expression depth of each participant, a small group would be more indicated<sup>12</sup>.

**Table 1.** Topics discussed on focus group according to dimensions

TMD/OFP	Drugs/types of drugs	Opinion/attitudes with regard to self-medication	Assistance/treatment of TMD
Clinical TMD situations which may trigger self-medication	Drugs used by TMD patients	Perception/opinion of TMD patient with regard to self-medication	Understanding of TMD/OFP specialty by health professionals
History reported by TMD patients who self-medicate	Improved symptoms with the use of drugs	Knowledge of TMD (characteristics, diagnoses)	Understanding of TMD/OFP specialty by patients
Difference between muscle/joint TMD with regard to self-medication	Drug effects/use (dose, frequency)	Confidence on self-medication/confidence on knowledge of the situation/drug	Treatment by other professionals
Relationship of self-medication and acute or chronic TMD cases	Adverse effects	Media influence on self-medication	Relationship of self-medication and access to professionals (public and private)

TMD/OFP = temporomandibular disorder, orofacial pain.

Following described requirements, in our study the focus group was made up of 5 TMD/OFP specialists and a participant called moderator, with experience in this type of dynamics and graduated in the Education area, who was in charge of conducting the group.

The moderator asks several open questions about the subject according to topics belonging to described dimensions (Table 1) to conduct the discussion, and has the function of providing a favorable atmosphere. To obtain reliable data, investigators just watch the dynamic and cannot interfere with the speech to avoid influencing participants and prevent dynamics to be conducted based on their already established opinion on the subjects<sup>15</sup>.

Dynamics was recorded in audio and video to be then integrally and literally transcribed, aiming at maintaining most possible fidelity of expressions, terms and contents expressed by participants<sup>16</sup>. Investigators have to be qualified for active and neutral listening about the interpretation task, which should be done with a distant eye, without allowing the interference of personal beliefs and pre-judgments which might impair reliability of investigation results<sup>17</sup>.

Our qualitative study was approved by the Ethics and Research with Human Beings Committee, Universidade Federal de Juiz de Fora opinion 202/771 (2013).

## RESULTS

After focus group dynamics, recording content was analyzed by the chief investigator by means of audio and video resources to evaluate the opinion of participants about self-medication practiced by TMD patients. Speeches were integrally and literally transcribed to get reliable data.

To present results, speeches answering survey questions were selected. To maintain anonymity of participants, they were identified by the letter P and numbers from 1 to 5. Example: Participant 1 = P1.

Since this is a qualitative survey, focus group results are presented in the format of discussion, carried out according to the four dimensions topics (Table 1) which have oriented the dynamic, comparing them with literature findings.

TMD/OFP specialists quotations were described according to the order of the four dimensions: TMD/OFP, drugs/types of drugs, opinion/attitude with regard to self-medication, TMD assistance/treatment, and according to the context of the discussion and of the topics of each dimension.

## DISCUSSION

In the first focus group moment, the first dimension was discussed, regarding TMD symptoms associated to self-medication. Headaches and muscle TMD were classified as major symptoms involved with drug consumption on their own, being some aspects stressed by participants:

P5: "... headache is one of clinical situations more likely to self-medication..."

P2: "...the fact that headache is a common, prevalent symptom makes self-medication more frequent for this cause".

P2: "... muscle pain and tension headache are major causes leading TMD patients to self-medicate".

According to some studies, headache is one of the most frequently reported symptoms by TMD patients<sup>17-22</sup>. Figueiredo et al.<sup>23</sup>, studying the prevalence of signs and symptoms in TMD patients, have observed that joint noise (95%), arthralgia (82.5%) and headache (77.5) were the most common. Lauriti et al.<sup>20</sup> have observed that headache is a symptom more closely associated to TMD. It has been suggested that TMD and headache may be associated, acting reciprocally as aggravating or perpetuating factors<sup>24</sup>.

It is known that muscle TMD are clinical conditions related to pain in masticatory muscles, often found in the clinical practice, even in association with other diagnoses such as headache and arthralgia<sup>7</sup>. Literature points that muscle TMD are the most prevalent, which might be associated to higher drug consumption in this type of diagnosis, as reported by participants<sup>25</sup>. It was also possible to observe in different studies that increased masseter muscle tension is directly related to daily stress, which may contribute for higher occurrence of muscle presentations<sup>26</sup>.

Temporomandibular arthralgia was the second major symptom, reported by 16.3% of the sample. Joint noises were most reported symptoms, by 23.7% of participants<sup>18</sup>. Masticatory muscles pain was reported by 15.4% of participants. With regard to other clinical TMD situations which could be associated to self-medication, functional incapacities and locking were considered by some specialists as poorly associated to self-medication:

P5: "... mandibular locking makes patients believe that their disease has worsened, thus with the need for professional intervention, for such, it is not related to self-medication, as exclusively painful presentations".

P3: "...when patients lock, they believe they are worse and go to physician or dentist, then we have less reports of self-medication because patients are scared".

For P5, however, some patients have reported trying to first solve functional incapacity without looking for a professional.

P5: "... there are people trying to solve alone, even with function limitation".

Acute and chronic TMD stages were also discussed in the first dimension, with regard to TMD-associated symptoms.

P1: "... both acute and chronic cases may lead patients to self-medication..."

P2: "... in acute cases, there is virtually always self-medication, in general with analgesics, and in chronic cases it may occur when pain is not effectively treated and patients continuously self-medicate to relieve pain. TMD may become chronic due to self-medication and prescription of drugs which are not indicated".

According to the literature and as pointed by specialists, TMD with acute symptoms may evolve to chronic symptoms if not early treated or if treatment fails, being self-medication a practice which may favor this evolution. So,

persistent TMD pain may become chronic pain with most characteristics of chronicity of other disorders, further central nervous system involvement and difficulties to treat<sup>6,8,27</sup>. The second dimension addressed by the focus group was consumption and type of drugs used by patients who self-medicate for TMD pain.

P2: "...the history of analgesic consumption is more frequent with regard to self-medication, history of wrong drug is larger, list of drugs..."

P5: "... patients start feeling pain, take analgesics and end up choosing those making them feel better".

P5: "... the fact that symptoms do not improve with self-medication makes patients increase consumption and even drug dose".

P2: "... media is focused on analgesics..."

Johansson, Cahlin, Samuelsson & Dahlström<sup>28</sup> have found higher use of drugs (51%) in this group of patients with diagnoses associated to TMD as compared to control group (36%). Studies have shown that analgesics are taken once a week or more by 22% to 25% of adolescents, and one out of four are absent from school once a month due to TMD pain<sup>29,30</sup>. Most commonly used in abuse by patients are analgesics and tranquilizers. Their continuous use tends to lead to more frequent pain cycles and less efficacy. In addition, no drug alone may be efficient for the whole TMD spectrum and their incorrect and abusive use is a concern for the pharmacological TMD treatment<sup>6,31</sup>. Analgesics, in general underestimated by population with regard to risks inherent to their uncontrolled administration, may generate dependence, digestive bleeding and even mask the baseline disease which, in turn, may progress<sup>32</sup>.

In a qualitative study on approaches related to self-medication of adults, by means of focus group technique, respondents have reported using by their own, especially analgesic drugs<sup>33</sup>.

When asked about the effect of self-medication reported by patients, most specialists have highlighted that patients have no significant improvement with self-medication, being this opinion represented by the speech of P4.

P4: "... patients report that most of the times self-medication is not enough to relieve TMD pain..."

Other aspect discussed in the second dimension was the use of old prescriptions.

P2: "... patients take the drug again by recurrence and not necessarily look for a professional..."

P1: "... patients remain with the same prescription for two or three years..."

Corrêa, Galato & Alano<sup>32</sup> have stressed the issue of reusing old prescriptions. According to the authors, even if at first it may be a more economic option, it may generate the irrational use of drugs.

According to the specialists, due to multiple TMD diagnoses, at a first moment patients may present a certain diagnosis and in a second situation this diagnosis might be different, which directly influences the choice and efficacy of the drug.

In the third dimension, perception of specialists about patients' opinion with regard to confidence and knowledge about self-medication was discussed.

P3: "... in some cases, patients rely more on pharmacists than on physicians or dentists".

P2: "... people feel safe because they have the feeling that they know the pain they feel, but they do not necessarily know. This idea is motivation for self-medication".

P2: "... there are patients who believe they are self-sufficient, have the false knowledge that they know everything about the drug or are afraid of looking for a professional by fear of diagnosis..."

P2: "... major self-medication problem is feeling safe and end up going beyond limits..."

According to Ferraz, Grunewald & Rocha<sup>33</sup>, it is worrying the confidence population has on self-medication. For Nascimento<sup>34</sup>, drugs advertisement by mass communication means is a frequent stimulus for self-medication. According to Corrêa, Galato & Alano<sup>32</sup>, in a study on self-medication, practice was abandoned by individuals only after generating unsatisfactory results

The influence of communication media on knowledge and confidence on self-medication was also discussed in this dimension:

P5: "... media contributes for people looking for the drug..."

P1: "... Internet may give the false sensation of understanding pain and the drug..."

For Corrêa, Galato & Alano<sup>32</sup>, communication media have influenced respondents with regard to self-medication. However, for some, information is not sufficient to justify the choice of drugs to be used for any health disorder.

Vitor et al.<sup>35</sup> have also observed that most respondents about self-medication were not influenced by communication media, showing mistrust on received information. As opposed, Lyra et al.<sup>36</sup> have observed that elderly consume drugs influenced by advertising and do not take into consideration risks associated to pharmacological therapy.

According to Santos<sup>37</sup>, massive advertising and easy access to drugs in pharmacies give the impression that products are risk-free and this way there may be undesirable results, such as adverse effects.

At the final focus group moment, the fourth dimension regarding assistance and treatment of patients with TMD was discussed. Specialists have stressed the following aspects involved with the fourth dimension, which were compared to the literature.

P2: "... TMD patients, by lack of orientation, end up first looking for orthodontist or bucomaxillofacial surgeon. The fact that TMD/OFP be a recent specialty may contribute for this situation..."

P3: "... dentists themselves often do not refer patients to TMD specialists, either for lack of knowledge, for believing that clinician dentists may solve the problem or by fear of losing the patient".

P2: "... some patients take antibiotics for tension headache..."

P4: "... the fact that the specialty is new and that the public sector has no professionals of the area, certainly increases the practice of self-medication..."

Bove, Guimarães & Smith<sup>6</sup> have pointed out that most TMD patients evaluated in the study by the authors have reported experience with other diseases and self-medication. Many of them lived with pain for many years and when looking for medical or dental assistance, what they got was one more analgesic prescription and referral to other specialties.

Due to the complexity associated to chronic pain presentations, including the use of large amounts of different drugs, professionals should be very careful when treating TMD patients. Professionals who routinely treat acute conditions from dental origin, should be careful when dealing with individuals with complex TMD presentations, being necessary the referral to health professionals with further knowledge of complaints presented by this population<sup>38</sup>.

For the dentist to rationalize drug prescription, it is necessary to understand its importance and the real role of drugs in the process, prevention and treatment, as well as to know recommendations about correct selection, indication, pharmacological interactions, noxious effects and drugs control<sup>39</sup>.

According to Okeson<sup>4</sup>, since many TMD symptoms are periodic or cyclic, there is the trend to prescribe drugs on "as needed" basis, being that this type of control encourages patients to abuse and may lead to physical or psychological dependence. Because there are many drugs not requiring medical prescription, people tend to use them in the dose and hour they believe convenient.

For TMD, drugs should be prescribed in regular intervals for a specific period. At the end of this period, it is expected that treatment has promoted symptoms relief, not being necessary to extend the use of the drug. Pharmacological TMD treatment should be based on the same clinical principles applied to other conditions and requires deep knowledge of the etiology of the problem<sup>40</sup>.

With regard to socioeconomic factors, the following issue was highlighted:

P4: "... low or high income patients consume drugs by their own, the practice is not related to this issue. Maybe low income patients consume more due to the difficulty to access treatment..."

For Souza, Silva e Silva Neto<sup>41</sup>, among causes of indiscriminate drug use by the population is the difficult access of low income population to healthcare services.

Sartoretto, Bella Bona e Dal Bello<sup>42</sup> have reported that in some studies, the relationship between TMD and economic factors was not found. This may suggest that self-medication is also present regardless of socioeconomic factors, as pointed by the dynamics and the literature.

For being increasingly frequent the presence of TMD patients in the daily clinic, professional requirements increase not only by the knowledge of the disease and its implications, but also by the adequate management of such individuals, which should be done under a multidisciplinary approach<sup>38</sup>.

Self-medication associated to TMD was pointed by specialists as extremely common and noxious, being stressed excessive analge-

sic consumption and more common practice for muscular and headache presentations. Participants of the dynamics have emphasized the clinical impact of self-medication to treat TMD, stressing that the practice may contribute for worsening and even chronicity of the disease due to lack of professional follow up. It was also stressed the influence of media in drug consumption and the difficulty to access TMD/OFP specialists.

## CONCLUSION

The strategy of the qualitative interview in focus group modality was adequate to the objective of the activity, raising relevant issues to be discussed in the literature and analyzed in future clinical trials.

## REFERENCES

1. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. *J Craniomandib Disord.* 1992;6(4):301-55.
2. Mendoza LH, Celestino EC, Marco OV. Resonancia magnética de la articulación temporomandibular. *Radiología.* 2008;50(5):377-85.
3. Stegenga B. Nomenclature and classification of temporomandibular joint disorders. *J Oral Rehabil.* 2010;37(10):760-5.
4. Okeson JP. Tratamento das Disfunções temporomandibulares e Oclusão. São Paulo: Artes Médicas; 2013.
5. Dworkin SF. Psychological and psychosocial assessment. In: Laskin DM, Greene CS, Hylander WL, (editors). *Temporomandibular disorders: an evidence-based approach to diagnosis and treatment.* Chigago: Quintessence; 2006.
6. Bove SR, Guimarães AS, Smith RL. [Characterization of patients in a temporomandibular dysfunction and orofacial pain outpatient clinic]. *Rev Lat Am Enfermagem.* 2005;13(5):686-91. Portuguese.
7. Siqueira JTT, Teixeira MJ. Dor Orofacial: diagnóstico, terapêutica e qualidade de vida. Curitiba: Maio; 2001.
8. Lopes MG, Koch Filho HR, Ferreira IR, Bueno RE, Moysés ST. Focus groups: a strategy for health research. *RSBO.* 2010;7(2):166-72.
9. Domingues PH, Galvão TF, Andrade KR, Sá PT, Silva MT, Pereira MG [Prevalence of self-medication in the adult population of Brazil: a systematic review]. *Rev Saude Publica.* 2015;49(36):1-8.
10. Dias IM, Guedes LA, Cordeiro PC, Leite IC, Leite FP. Self-medication in patients with temporomandibular disorders. *Braz Dent Sci.* 2014;17(4):82-9.
11. Hersh VE, Balasubramaniam R, Pinto A. Pharmacologic management of temporomandibular disorders. *Oral Maxillofac Surg Clin North Am.* 2008;20(2):197-210.
12. Backes DS, Colomé JS, Erdmann RH, Lunardi VL. Grupo focal como técnica de coleta e análise de dados em pesquisas qualitativas. *O Mundo da Saúde.* 2011;35(4):438-42.
13. Silverman D. Interpretação de dados qualitativos: métodos para análise de entrevistas, textos e interações. Porto Alegre: Artmed; 2009.
14. Warren C. Qualitative interviewing. In: Gubrium JF, Holstein JA, (editors). *Handbook of interview research: context and method.* Thousand Oaks, Califórnia: Sage; 2002.
15. Iervolino AS, Pelicioni MC. [The use of focal groups as qualitative method in health promotion]. *Rev Esc Enferm USP.* 2001;35(2):115-21. Portuguese.
16. Schraiber LB. Pesquisa qualitativa em saúde: reflexos metodológicos do relato oral e da produção de narrativas em estudo sobre profissão médica. *Rev Saúde Pública.* 1995;29(1):63-74.
17. Gonçalves DA, Bigal ME, Jales LC, Camparis CM, Speciali JG. Headache and symptoms of temporomandibular disorder: an epidemiological study. *Headache.* 2010;50(2):231-41.
18. Gonçalves DA, Dal Fabbro AL, Campos JA, Bigal ME, Speciali JG. Symptoms of temporomandibular disorders in the population: an epidemiological study. *J Orofac Pain.* 2010;24(3):270-8.
19. Hoffmann RG, Kotchen JM, Kotchen TA, Cowley T, Dasgupta M, Cowley AW Jr. Temporomandibular disorders and associated clinical comorbidities. *Clin J Pain.* 2011;27(3):268-74.
20. Lauriti L, Motta LJ, Silva PF, Leal de Godoy CH, Alfaya TA, Fernandes KP, et al. Are Occlusal characteristics, headache, parafunctional habits and clicking sounds associated with the signs and symptoms of temporomandibular disorder in adolescents? *J Phys Ther Sci.* 2013;25(10):1331-4.
21. Siqueira JT, Ching LH, Nasri C, Siqueira SR, Teixeira MJ, Heir G, et al. Clinical study of patients with persistent orofacial pain. *Arq Neuropsiquiatr.* 2004;62(4):988-96.
22. Graff-Radford SB. Temporomandibular disorders and headache. *Dent Clin North Am.* 2007;51(1):129-44.

23. Figueiredo VM, Cavalcanti AL, de Farias AB, Lira AB, Nascimento SR. Prevalência de sinais, sintomas e fatores associados em portadores de disfunção temporomandibular. *Acta Sci Health Sci*. 2009;31(2):159-63.
24. Scrivani SJ, Keith DA, Kaban LB. Temporomandibular disorders. *N Engl J Med*. 2008;359(25):2693-705.
25. Cestari K, Camparis CM. Fatores psicológicos: sua importância no diagnóstico das disfunções temporomandibulares. *J Bras Ocl ATM Dor Orof*. 2002;2(5):54-60.
26. Sobreira CR, Zampier MR. Revisão de literatura terapia farmacológica nas disfunções temporomandibulares. *Rev Univ Fed Alfenas*. 1999;5(1):239-45.
27. Manfredini D, Borella L, Favero L, Ferronato G, Guarda-Nardini L. Chronic pain severity and depression/somatization levels in TMD patients. *Int J Prosthodont*. 2010;23(6):529-34.
28. Johansson Cahlin B, Samuelsson N, Dahlström L. Utilization of pharmaceuticals among patients with temporomandibular disorders: a controlled study. *Acta Odontol Scand*. 2006;64(3):187-92.
29. Hirsch C, John MT, Schaller HG, Türp JC. Pain-related impairment and health care utilization in children and adolescents: a comparison of orofacial pain with abdominal pain, back pain, and headache. *Quintessence Int*. 2006;37(5):381-90.
30. Jedel E, Carlsson J, Stener-Victorin E. Health-related quality of life in child patients with temporomandibular disorder pain. *E J Pain*. 2007;11(5):557-63.
31. Chehuen Neto JA, Sirimaco MT, Choi CM, Barreto AU, Souza JB. Automedicação entre estudantes da Faculdade de Medicina da Universidade Federal de Juiz de Fora. *HU Rev*. 2006;32(3):59-64.
32. Corrêa TS, Galato D, Alano GM. Condutas relacionadas à automedicação de adultos: um estudo qualitativo baseado na técnica de grupo focal. *Rev Bras Farm*. 2012;93(3):315-20.
33. Ferraz ST, Grunewald T, Rocha FR. Comportamento de uma amostra da população urbana de Juiz de Fora - MG perante a automedicação. *HU Rev*. 2008;34 (3):185-90.
34. Nascimento MC. Medicamentos ou apoio à saúde? Rio de Janeiro: Vieira e Lent; 2003.
35. Vitor RS, Lopes CP, Menezes HS, Kerkhoff CE. [Pattern of drug consumption without medical prescription in the city of Porto Alegre, RS]. *Cien Saude Colet*. 2008;13(Suppl):737-43. Portuguese.
36. de Lyra DP Jr, Neves AS, Cerqueira KS, Marcellini PS, Marques TC, de Barros JA. [The influence of the advertising in the medication use in a group of elderly attended in a primary health care unit in Aracaju (Sergipe, Brasil)]. *Cien Saude Colet*. 2010;15(Suppl 3):3497-505. Portuguese.
37. Santos AM. Desafios e oportunidades do farmacêutico na promoção da saúde. *Infarma*. 2005;17(5/6):73-8.
38. Klasser GD, de Leeuw R. Medication use in a female orofacial pain population. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2007;103(4):487-96.
39. Melo GM. Terapia farmacológica em disfunções temporomandibulares: uma breve revisão. *Rev Dentíst*. 2011;10(2):35-40.
40. Brandão Filho RA, Ramacciotti TC, Fregni F, Sena EP. Tratamento farmacológico da disfunção temporomandibular muscular: uma revisão sistemática. *R Ci Med Biol*. 2012;11(2):249-54.
41. Souza HW, Silva JL, Silva Neto MS. A importância do profissional farmacêutico no combate à automedicação no Brasil. *Rev Eletr Farm*. 2008;5(1):67-72.
42. Sartoretto C, Bella Bona S, Dal Bello YA. Evidências científicas para o diagnóstico e tratamento da DTM e a relação com a oclusão e a ortodontia. *RFO UFP*. 2012;17(3):352-9.

# Pain evaluation at the post-anesthetic care unit of a tertiary hospital

## *Avaliação da dor na sala de recuperação pós-anestésica em hospital terciário*

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** Pain is a major manifestation of patients in immediate postoperative period, being an individual and subjective complaint affecting patients' quality of life. This study aimed at evaluating the use of analgesics in the immediate postoperative period of patients assisted in a post-anesthetic care unit.

**METHODS:** Data were collected in the period from March to April 2016. This is a cross-sectional, quantitative study, carried out in the post-anesthetic care unit of a Level IV Hospital of Rio Grande do Sul. Short-form McGill pain questionnaire was used for socio-demographic and clinical characterization of patients.

**RESULTS:** Participated in the study 336 patients, most (68.8%) female and elderly. Body mass index (BMI) was higher than 25, indicating overweight or obesity. Perioperative opioid analgesics were used by 266 patients. There has been statistical association between no postoperative pain and the use of any opioid. Most frequent class of drugs used in the perioperative period were opioid analgesics, especially fentanyl and remifentanyl for surgeries with general anesthesia, and morphine (0.2mg) for spinal anesthesia.

**CONCLUSION:** This study aimed at bringing subsidies on the need for adequate drugs associated to the anesthetic technique to maintain patients in better physiological conditions, with longer painless periods and less adverse effects, thus promoting more adequate quality of life during this critical period.

**Keywords:** Analgesia, Hospitalized patients, Pain, Postoperative pain.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A dor ocorre como uma das principais manifestações nos pacientes em pós-operatório imediato, sendo uma queixa individual e subjetiva que impacta a qualidade de vida dos pacientes. O objetivo deste estudo foi avaliar o uso de analgésicos no pós-operatório imediato de pacientes assistidos em uma sala de recuperação pós-anestésica.

**MÉTODOS:** Os dados foram coletados no período de março a abril de 2016. Trata-se de um estudo transversal, de abordagem quantitativa, realizado na sala de recuperação pós-anestésica de um Hospital de Nível IV do Rio Grande do Sul. Foi utilizado o formulário de caracterização sócio-demográfica e clínica dos pacientes, questionário McGill - forma reduzida.

**RESULTADOS:** Foram entrevistados 336 pacientes, a maioria (68,8%) era do sexo feminino e idosos. O índice de massa corporal para 69,6% foi superior a 25, indicativo de sobrepeso ou obesidade. Duzentos e sessenta e seis pacientes fizeram uso de algum analgésico opioide no perioperatório. Verificou-se a associação estatística entre não apresentar dor no pós-operatório e fazer uso de qualquer opioide. Entre os fármacos a classe mais utilizada durante o perioperatório foi analgésico opioides, destacando-se o uso de fentanil e remifentanil, para cirurgias com anestesia geral, e morfina (0,2mg) para anestésias subaracnóideas.

**CONCLUSÃO:** Este estudo buscou trazer subsídios sobre a necessidade de fármacos adequados associados à técnica anestésica, para que o paciente se mantenha com melhores condições fisiológicas, com mais tempo sem dor e com menos efeitos adversos, proporcionando assim qualidade de vida mais apropriada para esse período crítico.

**Descritores:** Analgesia, Dor, Dor pós-operatória, Pacientes internados.

### INTRODUCTION

Pain is a major manifestation in the immediate postoperative period, is different among individuals and influences patients' quality of life (QL), being considered the most common reason for human distress and incapacity. Pain is a multidimensional experience which involves sensory, affective, autonomic and behavioral aspects<sup>1</sup>.

Moreira et al.<sup>2</sup> have reported that pain is frequent in patients submitted to surgical procedures and in the immediate postoperative period. So, analgesia should start before surgery to favor fast patients' response and early recovery of organic functions, since pain may induce postoperative complications. According to Miranda et al.<sup>3</sup> pain may

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cause functional and organic damages, which impair the recovery of vital signs, respiratory, thermal and circulatory capacity.

So, the anesthetic technique applied to patients interferes with postoperative pain<sup>4</sup>. According to Vaz & Vaz<sup>5</sup>, analgesia should be adapted according to pain intensity, characteristics and nature, as well as to surgery type and size. In addition, other factors, such as anxiety, socio-cultural origin, psycho-behavioral factors and type of anesthesia might influence analgesia quality.

Barbosa et al.<sup>6</sup> have indicated a technique which is being used and has shown to be effective, which is the multimodal analgesia which, according to the World Health Organization (WHO), is the association of different analgesics, thus favoring the use of lower doses, according to patients' need and profile, thus preventing adverse effects.

The adequate choice of the drug is critical to effectively manage postoperative pain. Non-steroid anti-inflammatory drugs (NSAIDs) and opioid analgesics are the most widely used drugs for postoperative pain<sup>7</sup>.

There are studies which have proved pain evaluation by different methods such as Daminelli, Sakae & Bianchini's<sup>8</sup>, which has evaluated postoperative analgesia effectiveness.

This study aimed at evaluating the use of analgesics in the immediate postoperative period of patients assisted in a post-anesthetic care unit (PACU), according to the type of surgery.

## METHODS

This is a cross-sectional and quantitative study carried out in a PACU of a Level IV Hospital of Rio Grande do Sul from March to April 2016. For sample calculation, the number of monthly surgeries carried out in the hospital the year before the study was used. Monthly mean was 463 surgeries with confidence level of 95% and sample error of 5%. Sample was made up of 302 patients with 10% for sample safety margin. Participated in the study 336 patients in the immediate postoperative period assisted in the PACU.

A form developed for patients' socio-demographic and clinical characterization and brief McGill questionnaire were used<sup>9</sup>. This form encompasses socio-demographic variables: gender, weight (kg), height and age. Clinical and surgical data involve the use of opioids, anesthetic drugs by different routes, muscle relaxant, other opioid and non-opioid analgesics and adverse effects of these drugs.

McGill questionnaire is widely accepted as trustworthy, valid, sensitive and accurate. Pain is evaluated according to present pain intensity (PPI) at patients PACU admission and discharge, being this based on words selected by patients to describe their own pain. Pain numeric scale (PNS) is where patients grade their pain in numeric intervals from zero to 10, being zero (no pain); 1 to 3 (mild pain); 4 to 6 (moderate pain); 7 to 9 (severe pain); and 10 (worst imaginable pain).

Pain was evaluated in two moments, with McGill scale. First evaluated period was at PACU admission, by means of PPI

evaluation, and the second period was at PACU discharge, moment when they were referred to the ward. Questionnaire was applied by previously trained interviewers, during their PACU stay.

Drugs were classified according to the third level of the Anatomical Therapeutic Chemical (ATC)<sup>10</sup>.

This study was approved by the Research Ethics Committee, UNIJUÍ, Opinion 1.426.751 of 02/26/2016.

## Statistical analysis

Analytic statistics, helped by statistical software SPSS version 18.0 were used for data analysis. Opioid analgesics, inhalational anesthetics, intravenous drugs, muscle relaxants and other analgesics were associated to admission PPI and discharge PPI.

ANOVA, followed by Student *t* test, was used for independent samples. PPI was equal zero for patients reporting no pain and higher than zero for patients referring pain of different intensities.

## RESULTS

Participated in the study 336 patients, most (68.8%) females and 75.9% elderly. BMI was calculated and it was observed that 69.6% had score above 25, indicating overweight or obesity. Complete data are shown in table 1.

**Table 1.** Socio-demographic characterization of patients in immediate postoperative period collected from March to April 2016 (n=336)

Characteristics	n	%
Gender		
Male	105	31.3
Female	231	68.8
Age (years)		
≥ 60	255	75.9
< 59	81	24.1
Body mass index		
≥ 25	234	69.6
< 24.9	102	30.4
Total	336	100

Most frequent surgeries were open surgeries (77.6%) with general anesthesia (45.2%), followed by spinal and/or spinal with lumbar block (40.4%). As to surgical specialties, most frequent were oncologic (26.5), traumatic (17.6%), general (15.8%), obstetric (17.3%), urologic, gynecologic and vascular surgeries (9.8%), presented in a previous study with a group of patients followed up in the PACU.

Table 2 shows drugs used during surgery. It was observed that most widely used opioid analgesics was fentanyl (68.1%). Dipirone was used by 69% as analgesic during surgery. With regard to inhalational anesthetics, both isoflurane and sevoflurane were rarely used. With regard to intravenous agents, propofol was used by 69% of patients

and atracurium was used by most patients (34.5%). Thiopental was not used.

**Table 2.** Use of opioid analgesics, anesthetics and muscle relaxants during surgery (n=336)

Drug classes	Yes n (%)	No n (%)
<b>Opioid analgesics</b>		
Alfentanil	52 (15.3)	284 (84.7)
Fentanyl	230 (68.1)	106 (31.9)
Remifentanil	88 (26)	248 (74)
Sufentanil	6 (1.5)	330 (98.5)
Morphine (0.2mg)	121 (36.2)	215 (63.8)
Morphine (10 mg)	37 (11)	299 (89)
Nalbuphine	18 (5.6)	302 (94.4)
<b>Non-opioid analgesics</b>		
Ketoprofen	214 (63.7)	122 (36.3)
Dipirone	232 (69)	104 (31)
<b>Inhalational anesthetics</b>		
Isoflurane	19 (5.7)	317 (94.3)
Sevoflurane	23 (6)	313 (94)
<b>Intravenous anesthetics</b>		
Ketamine	9 (2.7)	327 (97.3)
Propofol	232 (69)	104 (31)
Thiopental	-	336 (100)
<b>Muscle relaxant</b>		
Atracurium	116 (34.5)	220 (65.5)
Pancuronium	-	336 (100)
Rocuronium	45 (13.2)	291 (86.8)
Suxamethion	2 (0.3)	334 (99.7)

Table 3 shows drugs used in the postoperative period in the PACU. It was observed that 8.9% of PACU patients used tramadol as opioid analgesic. With regard to analgesics, it was observed that 26.5% of patients have used dipirone. In some cases, drugs were prescribed in associations, such as tramadol and ketoprofen, dipirone and ketoprofen or even tramadol with dipirone. A total of 42.8% of patients have used some type of analgesic.

**Table 3.** Use of opioid and non-opioid analgesics in the immediate postoperative period of post-anesthetic care unit patients (n=336)

Use	Yes n (%)	No n (%)
<b>Opioid analgesics</b>		
Morphine*	5 (1.5)	331 (98.5)
Tramadol	30 (8.9)	306 (91.1)
<b>Non-opioid analgesics</b>		
Ketoprofen	20 (5.9)	316 (94)
Dipirone	89 (26.5)	247 (73.5)

\*10 mg morphine diluted in sterile distilled water.

Table 4 shows drugs used during surgery and in the PACU, comparing PACU admission and discharge PPI. It was observed that 266 patients have used some opioid analgesic during surgery and from these 144 patients have referred no pain and 122 patients have referred pain>zero. From patients using some opioid during surgery, 135 remained painless until PACU discharge and results were statistically significant at patients admission (p=0.000) and discharge (p=0.000). With regard to fentanyl, it was observed that 122 patients have used it during surgery and had no pain at admission and 115 remained pain-free, being these results statistically significant. When comparing the types of morphine, it was observed that those using intravenous 0.2 mg morphine have referred less pain, being that 90 patients have reported pain zero at admission and 75 have remained painless at PACU discharge, with statistical significance (p=0.000) in both moments. With regard to propofol, 117 patients were admitted with no pain, however during recovery 121 patients have developed pain>zero.

**Table 4.** Comparison of the use of drugs during surgery and in the post-anesthetic care unit and pain intensity at patients' admission and discharge (n=336)

	PPI Admission			PPI Discharge		
	0	> 0	P	0	> 0	P
<b>Opioid<sup>a</sup></b>						
Yes	144	122	.000*	135	131	.001*
No	55	15		43	27	
<b>Alfentanil</b>						
Yes	24	25	.001*	23	30	.030
No	175	112		155	128	
<b>Fentanyl</b>						
Yes	122	106	.000*	115	113	.001*
No	76	32		63	45	
<b>Remifentanil</b>						
Yes	35	52	.000*	35	52	.000*
No	164	87		143	106	
<b>Sufentanil</b>						
Yes	3	2	.969	4	1	.015*
No	196	135		174	157	
<b>Morphine (10 mg)</b>						
Sim	13	21	.000*	10	24	.000*
Não	178	124		162	140	
<b>Morphine (0,2 mg)</b>						
Yes	90	28	.000*	75	43	.000*
No	104	114		100	118	
<b>Isoflurane</b>						
Yes	6	9	.002*	5	11	.002*
No	191	130		0	149	
<b>Sevoflurane</b>						
Yes	7	13	.000*	6	14	.000*
No	190	126		170	146	

Continue...

**Table 4.** Comparison of the use of drugs during surgery and in the post-anesthetic care unit and pain intensity at patients' admission and discharge (n=336) – continuation

	PPI Admission			PPI Discharge		
	0	> 0	P	0	> 0	P
<b>Propofol</b>						
Yes	117	113	.000*	109	121	.005*
No	81	25		68	38	
<b>Atracurium</b>						
Yes	53	62	.000*	48	67	.000*
No	145	77		129	92	
<b>Rocuronium</b>						
Yes	17	27	.000*	19	25	.005*
No	181	114		158	134	
<b>Suxamethion</b>						
Yes	-	1	.015*	-	1	.033
No	198	137		177	158	
<b>Dipirone</b>						
Yes	129	93	#	111	111	.007*
No	61	53		57	57	
<b>Ketoprofen</b>						
Yes	115	84	#	107	92	.252
No	75	62		61	76	
<b>Nalbuphine</b>						
Yes	10	8	#	8	10	.160
No	180	138		160	158	
<b>Ketamine</b>						
Yes	-	2	#	1	1	.926
No	180	154		157	177	

<sup>a</sup>use of any opioid during surgery; \*statistically significant, t test for dependent samples; # test not performed because patient has only used such drugs after post-anesthetic care unit admission; PPI = present pain intensity.

There has been statistical association between no postoperative pain in patients using: any opioid, among them: fentanyl (p=0.001), remifentanyl (p=0.000), sufentanyl (p=0.015), 0.2 mg morphine (p=0.000) and 10 mg morphine (p=0.000). There has been no association between variables and alfentanyl (p=0.030) or muscle relaxant suxamethion (p=0.033) and analgesics such as ketoprofen (p=0.252), nalbuphine (p=0.160) and ketamine (p=0.926). This study has not evaluated pain previous to surgery, being this a limitation.

## DISCUSSION

In our study, most patients were females, aged above 60 years and BMI above 25. Similar data to a study carried out in surgical units between August and September 2006, with patients submitted to general anesthesia, where females (66.8%) and patients aged above 60 years have prevailed<sup>11</sup>. Nora<sup>12</sup> has also reported that gender, age, weight, height and BMI are critically important for the choice of anesthetic type and technique.

Considering the type of surgery, it was observed that patients submitted to oncologic, traumatic and vascular surgeries have reported more pain, with statistically significant difference.

Most widely used class in this study was opioid analgesics, especially fentanyl and remifentanyl for surgeries with general anesthesia, and 0.2 mg morphine for the association with spinal and/or lumbar block anesthesia. Vaz & Vaz<sup>5</sup> have reported that spinal opioids individually applied may promote optimal analgesia and, if combined to local anesthetics, dose decrease cause less adverse effects.

Daminelli, Sakae & Bianchini<sup>8</sup> have evaluated the effectiveness of postoperative analgesia in a hospital of Santa Catarina from July to October 2006 and have reported the predominance of simple analgesics such as dipirone and NSAIDs such as ketoprofen, being superior to the prescription of opioids. These data are similar to our study were dipirone and ketoprofen consumption has predominated.

Palombo & Medeiros<sup>13</sup> have reported that to minimize postoperative pain it would be desirable the prescription of analgesics with fixed time, which could prevent plasma level unbalance of administered drugs, also preventing patients of suffering pain peaks. However, this was not evaluated in our study. Custódio et al.<sup>14</sup> have described that there is not just one way or method to manage pain, because different pain types and intensities may appear in the postoperative period, depending on the type, size and drugs used during surgery.

However, it would be important that hospitals kept a standardization of drugs, anesthetic techniques and therapies, according to the types of surgeries, be them open or closed, because these variations result in different pain intensities due to damage caused during surgery. In these cases, clinical protocols would minimize postoperative pain. The lack of protocols in health institutions for pain control impairs the prescription of analgesics and the classification of patients' pain intensity<sup>15</sup>.

In our study, most reported symptoms by patients as adverse effects were nausea, vomiting and sleepiness, especially in surgeries with general anesthesia or sedation. These adverse effects are in general attributed to opioids, being them the most widely used drugs in surgeries under general anesthesia. According to Vaz & Vaz<sup>5</sup>, opioid-induced nausea and vomiting are related to their central and peripheral action, stimulating chemoreceptor zone and provoking gastric stasis, respectively. Opioids may induce sleepiness and the author also reports that preventive analgesia contributes a lot for a better postoperative period, with less pain intensity and adverse effects. On the other hand, according to some authors, inhalational anesthetics and propofol in the intraoperative period do not seem to influence postoperative pain intensity. There has been just one statistical difference between propofol and desflurane (p=0.04) and remaining comparisons were not significant (p<sup>3</sup>0.07). There have been no statistically significant differences between fentanyl and morphine in two evaluated groups (p=0.21 and 0.24)<sup>16</sup>. In our study, propofol, isoflurane and sevoflurane were statistically different in controlling pain.

This is justified because these are anesthetic drugs more frequently used in our study, the use of which has always been associated to an opioid analgesic.

With regard to fear of professionals to administer opioid analgesics, Nascimento et al.<sup>15</sup> have evaluated difficulties in administering them, reported by a nursing team. In 2008, in a large Teaching Hospital of Paraná, it was observed that 58.4% of professionals have administered the drug when patients referred mild pain, followed by 39% when pain was moderate and 2.6% have started its administration after severe pain report. Among reported difficulties for its administration, 65% of professionals have reported lack of analgesic prescription, 76% fear of dependence and/or withdrawal syndrome, which occurs after abrupt opioid withdrawal.

## CONCLUSION

Our results have shown that analgesics such as tramadol and dipirone were prescribed and the most frequently used to minimize pain reported by patients in the post-anesthetic care unit.

## REFERENCES

1. Silva JA, Ribeiro Filho NP. A dor como um problema psicofísico. *Rev Dor.* 2011;12(2):138-51.
2. Moreira L, Truppel YM, Kozovits FG, Santos VA, Atet V. Analgesia no pós-cirúrgico: panorama do controle da dor. *Rev Dor.* 2013;14(2):106-10.
3. Miranda AF, Silva LF, Caetano JA, Sousa AC, Almeida PC. Avaliação da intensidade da dor e sinais vitais no pós-operatório de cirurgia cardíaca. *Rev Esc Enferm USP.* 2011;45(2):327-33.
4. Santos AC, Braga FS, Braga AF, Souza GA, Moraes SS, Zeferino LC. Efeitos adversos no pós-operatório de cirurgias ginecológicas e mamárias. *Rev Assoc Med Bras.* 2006;52(4):203-7.
5. Vaz JL, Vaz MS. Fisiopatologia da dor pós-operatória. *Educação Médica Continuada do Colégio Brasileiro de Cirurgiões.* 2005;1(2):1-12. Disponível em: [https://cbc.org.br/wp-content/uploads/2013/05/V.1\\_n.2\\_Dor\\_cirurgica\\_Fisiopatologia\\_II.pdf](https://cbc.org.br/wp-content/uploads/2013/05/V.1_n.2_Dor_cirurgica_Fisiopatologia_II.pdf).
6. Barbosa MH, Correa TB, Araujo NF, Silva JAJ, Cardoso RJ, Cunha DF. Dor, alterações fisiológicas e analgesia nos pacientes submetidos a cirurgias de médio porte. *Rev Eletr Enferm.* 2014;16(1):1-9.
7. Bassanezi BS, Oliveira Filho AG. Analgesia pós-operatória. *Rev Col Bras Cir.* 2006;33(2):116-22.
8. Daminelli C, Sakae TM, Bianchini N. Avaliação da efetividade da analgesia pós-operatória em hospital no sul de Santa Catarina de julho a outubro de 2006. *ACM Arq. Catarin.* 2008;37(1):18-24.
9. Melzack R. The short-form McGill pain questionnaire. *Pain.* 1987;30(2):191-7.
10. [http://www.whooc.no/atc\\_ddd\\_index/](http://www.whooc.no/atc_ddd_index/).
11. Couceiro TC, Valença MM, Lima LC, Menezes TC, Raposo MC. Prevalência e influência do sexo, idade e tipo de operação na dor pós-operatória. *Rev Bras Anestesiol.* 2009;59(3):314-20.
12. Nora FS. Anestesia venosa total em regime de infusão alvo-controlada: uma análise evolutiva. *Rev Bras Anestesiol.* 2008;58(2):179-92.
13. Palombo PA, Medeiros VC. Controle da dor aguda no pós-operatório imediato. *Rev Enferm Unisa.* 2001;2(1):57-62.
14. Custódio G, Zappellini CE, Trevisol DJ, Trevisol FS. Uso de analgésicos no pós-operatório para tratamento de dor em hospital do Sul do Brasil. *Arq Catarinenses Med.* 2008;27(4):75-9.
15. Nascimento LA, Santos MR, Aroni P, Martins MB, Kreling MC. Manejo da dor e dificuldades relatadas pela equipe de enfermagem na administração de opioides. *Rev Eletr Enferm.* 2013;13(4):714-720. Disponível em: <https://www.fen.ufg.br/revista/v13/n4/pdf/v13n4a16.pdf>.
16. Ortiz J, Chang LC, Tolpin DA, Minard CG, Scott BG, Rivers JM. Estudo randômico controlado que compara os efeitos da anestesia com propofol, isoflurano, desflurano e sevoflurano sobre a dor pós-colecistectomia videolaparoscópica. *Rev Bras Anestesiol.* 2014;64(3):145-51.

# Quality of life and mood state of chronic pain patients

## *Qualidade de vida e estado de humor em pacientes com dores crônicas*

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** Noticing the presence of persistent somatic complaints of people looking for the physiotherapy department, with persistent pain as major symptom, and the possible association between pain complaint and psychological and social factors, mood changes and interference with quality of life, this study aimed at evaluating quality of life and mood state of chronic pain patients.

**METHODS:** Quantitative and descriptive survey carried out in three basic health units of the city of Catarina/CE. The following questionnaires were applied: SF-36 (quality of life), McGill (pain evaluation) and Profile of Mood States (mood state).

**RESULTS:** Participated in the study 24 individuals with chronic musculoskeletal pain complains, mean age of 37.29 years and 83.3% of the female gender. Just 33.3% of the sample had complete high school, and 83.3% had musculoskeletal pain three or more times a week. Physical and emotional aspects measured by SF-36 had mean scores of 23.12 and 30.92, respectively. Lowest McGill scores were found in the mixed (2.12) and evaluative (2.29) scores. For POMS, the sum of negative values (72.04) was higher than the item vigor (18.96).

**CONCLUSION:** There have been evidences of interference with quality of life and mood state in chronic pain patients.

**Keywords:** Chronic pain, Mood disorders, Quality of life.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** Percebendo a presença de queixas somáticas persistentes nas pessoas que procuravam o serviço de fisioterapia, apresentando dor persistente como principal sintoma e a possível associação entre a queixa de dor e fatores psicológicos e sociais, alterações de humor e interferência na qualidade de vida, o presente estudo objetivou avaliar a qualidade de vida e o estado de humor de pessoas com dores crônicas.

**MÉTODOS:** Estudo quantitativo, descritivo e *survey*, realizado em três unidades básicas de saúde no município de Catarina/CE. Para tanto, foram aplicados os questionários: SF-36 (qualidade de vida), McGill (avaliação da dor) e o Perfil dos Estados de Humor (estado de humor).

**RESULTADOS:** Foram selecionados 24 indivíduos com queixas de dores crônicas musculoesqueléticas com média de idade de 37,29 anos e 83,3% do sexo feminino. Apenas 33,3% da amostra apresentou segundo grau completo, e 83,3% apresentavam dores musculoesqueléticas 3 ou mais vezes por semana. No SF-36 os aspectos físicos e emocionais atingiram a menor média de escores 23,12 e 30,92, respectivamente. Já no McGill os menores valores foram no escore misto (2,12) e avaliativo (2,29). Por fim, no POMS a soma dos valores negativos (72,04) foi superior ao quesito vigor (18,96).

**CONCLUSÃO:** Evidenciou-se que há interferência na qualidade de vida e no estado de humor em pacientes com dores crônicas.

**Descritores:** Dor crônica, Qualidade de vida, Transtornos do humor.

### INTRODUCTION

Chronic pain affects approximately 30% to 40% of the population, with mean prevalence of 35.5%, being a major cause of medical leaves, retirement and low productivity, thus generating severe public health problem<sup>1,2</sup>.

Chronic pain may be described as continuous, recurrent, of uncertain etiology, lasting at least three months, causing functional impairment and incapacities<sup>3</sup>. Psychological influences have been emphasized as relevant during pain complaints, being able to trigger depression and anxiety disorders, which may happen as punctual episodes or be something constant and routine in patients' lives, being worsened by tension and concern with regard to pain<sup>4</sup>.

Andrade et al.<sup>5</sup> have stressed that mood is a standard complex of behaviors, physical status, feelings and thoughts which may change according to the events. Psychological conditions such as anger and depression, psychosomatic conditions such as tiredness and tension, are variables able to define mood state.

This study aimed at evaluating quality of life (QL) and mood state of chronic pain patients.

### METHODS

Survey-type study with quantitative and descriptive approach. Survey was carried out in three basic health units

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part of the territory of Multiprofessional Residence in Family and Community Health of the city of Catarina-CE.

Sample was of convenience and made up by all subjects of the three health territories reporting musculoskeletal pain and who looked for the basic unit as free demand. Inclusion criteria were age between 25 and 50 years, regardless of gender, education level, marital status and income; with routine musculoskeletal pain (approximately one or more times a week for at least three months); not being submitted to pain-specific physiotherapeutic treatment. Exclusion criteria were individuals with heart and lung diseases, cancer, victims of stroke or nervous injuries and motor deficits.

Data were collected in the basic health unit of each territory from December/2015 to January/2016, using one weekly shift. Three validated questionnaires were applied: Profile of Mood States (POMS) developed in 1971 by McNair, Lorr & Droppleman<sup>6</sup>. This questionnaire was developed in a psychotherapy laboratory in Washington to measure changes in affective symptoms and mood states<sup>6</sup>. It has 65 alternatives divided in six subcategories: tension, depression, anger/hostility, vigor, fatigue and confusion. POMS is calculated by subtracting from the variable Vigor (Positive) the sum of variables tension, depression, anger, fatigue and confusion (Negative)<sup>7</sup>.

McGill pain questionnaire (Br-MPQ) validated for the Portuguese language by Pimenta & Teixeira<sup>8</sup> in 1966. McGill pain questionnaire, created by Melzack<sup>9</sup> in 1975, was adapted for the Portuguese language as clinical and research tool for pain evaluation<sup>8</sup>. Questionnaire is subdivided in four categories: sensory, affective, evaluative and mixed, and 20 subcategories. Analysis is performed by adding words associated to categories<sup>10</sup>. And finally QL questionnaire (SF-36) validated for Brazil by Ciconelli et al.<sup>11</sup> in 1999. SF-36 is a tool to measure QL. It is made up of 36 items subdivided in eight scales with a final score from zero to 100 where 100 means best health status and zero the worst health status<sup>11</sup>. It is analyzed by means of its own formula and is divided in eight domains: functional capacity, limitations by physical aspects, pain, general health status, vitality, social aspects, limitations by emotional aspects and mental health<sup>12</sup>.

All questionnaires were applied by the same qualified investigator who would fill questionnaires by directly asking respondents.

This study was approved by the Research Ethics Committee, Escola de Saúde Pública (Opinion: 1.403.536, CAAE: 52505716.0.0000.5037).

### Statistical analysis

Data were analyzed according to ethical principles and in compliance with descriptive statistical procedures (mean, standard deviation, minimum, maximum and percentage) and interferences (Student *t* and Kolmogorov-Smirnov tests), Chi-square and Binomial test according to normality, by means of the Statistical Package for the Social Sciences, version 20. Significance level was 0.05% (5%).

## RESULTS

Total sample was made up of 30 people, of whom 24 were qualified to participate in the survey for meeting inclusion criteria. Volunteers were users of the single health system being assisted in the basic unit of the territory, had mean age of 37.29±8.27 years, 83.3% (n=20) were females, 66.7% (n=16) had not finished high school, and 83.3% (n=20) had musculoskeletal pain for at least three times a week (Table 1).

QL was evaluated with the SF-36 questionnaire where scores of each domain may vary from zero to 100, being zero=worst and 100=best. Physical aspects domains (23.12±24.84), pain (32.37±10.31), general health status (37.58±9.29) and emotional aspects (30.92±35.87) had mean scores below 50 (Table 2).

Pain was evaluated with the McGill questionnaire, which has four descriptors where the numeric index is the number of words chosen by the patient, being that just one word may be chosen for each subgroup, in a maximum total of 20. Pain index is the sum of the values of each descriptor<sup>13</sup>. Pain reported by participants had the following mean scores: sensory (3.16±1.74), affective (3.21±1.91), evaluative (2.29±1.52), mixed (2.12±1.45) and total (10.80±5.00) (Table 3).

Mood state in patients with chronic musculoskeletal pain complaints was evaluated with POMS and has shown higher mean values in the following subcategories: tension (17.37±5.43), depression (12.21±7.26) and fatigue (9.75±4.23), however with vigor value of 18.96±6.14 (Table 4).

**Table 1.** Socio-demographic aspects of studied sample (n=24)

Variables	n	%	p value
Age (years)	12	50	0.04*
30 ●– 35	3	12.5	
36 ●– 40	4	16.7	
41 ●– 45	5	20.8	
46 ●– 50			
Gender	4	16.7	< 0.01**
Male	20	83.3	
Female			
Marital status	9	37.5	< 0.01*
Single	14	58.3	
Married	1	4.2	
Widow (er)			
Education	16	66.7	0.15**
Basic	8	33.3	
High school			
Pain prevalence (weekly)	4	16.7	< 0.01**
1 ●– 2 times	20	83.3	
3 times			

\* Chi-square test; \*\* Binominal test.

**Table 2.** Values of the quality of life questionnaire (SF-36)

SF-36	Mean±SD	Median	Min. o Max.	25-75	p value
Functional capacity	46.87±20.47	25	20 o 90	30-62.5	< 0.01*
Physical aspects	23.12±24.84	45	0 o 80	0-37.5	0.12**
Pain	32.37±10.31	31	20 o 51	21-41	0.41**
General health status	37.58±9.29	38.5	20 o 52	31-42	< 0.01*
Vitality	46.46±11.37	45	30 o 65	40-55	< 0.01*
Social aspects	56.21±20.81	50	12 o 100	50-68.5	< 0.01*
Emotional aspects	30.92±35.87	16.5	0 o 100	0-66	0.02**
Mental health	52.42±18.42	56	24 o 80	42-65	0.28**

SD = Standard deviation, min. = minimum value, max. = maximum value, 25-75 = interquartile interval. \* Student *t* test; \*\* Kolmogorov-Smirnov test.

**Table 3.** Scores of McGill pain evaluation questionnaire

McGill	Mean±SD	Minimum o Maximum	p value*
Sensory	3.16±1.74	0 o 6	< 0.01
Affective	3.21±1.91	0 o 6	< 0.01
Evaluative	2.29±1.52	0 o 5	< 0.01
Mixed	2.12±1.45	0 o 5	< 0.01
Total (Pain Index)	10.80±5.00	1 o 19	< 0.01

SD = Standard deviation, minimum = minimum value, maximum = maximum value. \* Student *t* test.

**Table 4.** Profile of Mood States questionnaire (POMS) values

POMS	Mean±SD	Minimum o Maximum	p value
Tension	17.37±5.43	4 o 28	< 0.01*
Depression	12.21±7.26	2 o 27	0.19**
Anger	9.29±6.80	2 o 24	0.16**
Vigor	18.96±6.14	3 o 29	< 0.01*
Fatigue	9.75±4.23	3 o 17	< 0.01*
Confusion	4.46±3.66	0 o 14	0.49**
Negative factors	72.04±17.08	31 o 71	< 0.01*
Total	53.08±18.64	15 o 51	< 0.01*

SD = Standard deviation, minimum = minimum value, maximum = maximum value. Negative factors = sum of all factors except vigor. \* Student *t* test; \*\* Kolmogorov-Smirnov test.

## DISCUSSION

Most participants of this study were females, married, with complete basic education and high prevalence of weekly pains interfering with QL, especially in physical and emotional aspects and pain. As to mood evaluation, higher values were found in the sum of negative factors (tension, depression, anger, fatigue and confusion) as compared to vigor, especially items tension and depression.

QL is a term reported for the first time in 1964 by President of the United States Lyndon Johnson, who stated that objectives are not measured by bank accounts but rather by QL provided to people. This QL concept goes beyond the control of symptoms, increased life expectation and decrease or mortality control<sup>14</sup>.

Castro et al.<sup>15</sup> have studied QL in 400 patients with chronic pain and mean age of 45.6 years, and have related anxiety, depression and pain to worst QL variables results. Queiroz et al.<sup>16</sup> have evaluated QL in 31 chronic pain patients assisted in a multiprofessional clinic and have observed that highest scores were found in functional capacity (47.09) and mental health (40.00), with lowest values for limitation by physical aspects and pain. Finally, Queiroz et al.<sup>16</sup> have concluded that chronic pain directly interferes with daily life activities, changing physical capacity, leading to different feelings and changing relationships with other people. These data are in line with our study.

Additionally, it was observed that some volunteers have reported scores equal zero in physical and emotional aspects domains, which proves the direct influence of pain on QL of these people. The concept of QL has an independent development, not well limited, with different lines of thought. By the biological view: health status, functional status; by the psychological view: wellbeing, satisfaction, happiness. With regard to health, it is defined as the level of health of individuals or populations, subjectively evaluated, being the way by which patients perceive their health status and non-medical requirements of their lives<sup>17</sup>.

With regard to pain, Silva et al.<sup>18</sup> have highlighted that chronic pain is a routine indicator for basic attention, being present in 30% o 40% of Brazilian population, being necessary the use of strategies to fight such indicator. Our study has presented low mean of pain scores, in line with Carbonario<sup>19</sup>, who has evaluated the effects of a physiotherapeutic program in patients with fibromyalgia, by means of McGill questionnaire, where sample had high scores in sensory (17.84) and affective (6.61) domains and lower scores in the evaluative domain, with pain index equal to 33.35, much higher than our study; however, SF-36 pain domain had values similar to our study: pain (35.76), vitality (34.23), mental health (33.71) and emotional aspects (23.07).

In this perspective, Santos et al.<sup>20</sup> had difficulties with the elderly with regard to location and depth descriptors, temporal pattern and pain description, also mentioning that difficulty of understanding such aspects is more related to education level and cognitive aspects than to the age group of the studied population, fact which was not observed in

our study because there has been no significant difference in education level of the sample.

It was possible to observe that subcategory vigor had higher mean as compared to other subcategories; however the sum of negative factors (tension, depression, anger, fatigue and confusion) has gone beyond the variable vigor, showing that mood state was impaired in the studied sample. Negative subitem with the highest mean was tension, and may be related to the painful process, as stated by Vandenberghe & Ferro<sup>21</sup> when calling the attention to the physiological process associated to pain and tension, since pain increases muscle fibers tension as defense mechanism to protect the body. So, tension is generated as condition to prevent worsening the injury and to reestablish the affected part. They also state that prolonged tension increase the production of algic substances.

Confirming presented data, Brandt et al.<sup>22</sup> have studied the mood profile of fibromyalgia females, showing higher negative variables such as tension (7.7), depression (6.5), fatigue (8.9) and mental confusion (5.8). In addition, Steffens et al.<sup>23</sup> have reported that mood is depressed in females with fibromyalgia, with decreased vigor (5.44) associated to increased tension (9.78), depression (9.56), anger (7.33), fatigue (10.0) and mental confusion (8.56), in line with our study.

## CONCLUSION

This study has shown the emotional relation of tension and depression in chronic pain patients. It was easy to notice that physical, emotional and general health status aspects were impaired in individuals with chronic pain.

## REFERENCES

- Poletto P, Gil-Coury H, Walsh I, Mattiello-Rosa S. Correlação entre métodos de auto-relato e testes provocativos de avaliação da dor em indivíduos portadores de distúrbios osteomusculares relacionados ao trabalho. *Rev Bras Fisioter.* 2004;8(3):223-9.
- Ruviaro L, Filippin L. Prevalência de dor crônica em uma Unidade Básica de Saúde de cidade de médio porte. *Rev Dor.* 2012;13(2):128-31.
- Dellaroza MS, Furuya RK, Cabrera MA, Matsuo T, Trelha C, Yamada KN, et al. [Characterization of chronic pain and analgesic approaches among community-dwelling elderly]. *Rev Assoc Med Bras.* 2008;54(1):36-41. Portuguese.
- Castro MM, Quarantini L, Batista-Neves S, Kraychete DC, Daltró C, Miranda-Scippa A. [Validity of the hospital anxiety and depression scale in patients with chronic pain]. *Rev Bras Anesthesiol.* 2006;56(5):470-7. Portuguese.
- Andrade A, Sanches SO, Gonçalves, VP, Scopel EJ, Szeszeni DS. Percepção da dor estados de humor em atletas lesionados. *Rev Iberoamericana Psicol Ejercicio Desp.* 2006;1(1):115-26.
- Mcnaur D, Loor M, Droppleman L. *Manual for The Profile of Mood States.* San Diego, California: EdITS/Educational and Industrial Testing Service; 1971.
- Thurm BE. Efeitos da dor crônica em atletas de alto rendimento, em relação ao esquema corporal, agilidade psicomotora e estados de humor. *Rev Bras Cineantropom Desemp Hum.* 2008;10(2):206-14.
- Pimenta C, Teixeira M. Questionário de dor McGill: Proposta de adaptação para a língua portuguesa. *Rev Esc Enfermagem USP.* 1996;30(3):473-83.
- Melzack R. The McGill pain questionnaire: major properties and scoring methods. *Pain* 1975;1(3):277-99.
- Mascarenhas CHM, Santos LS. Avaliação da dor e da capacidade funcional em indivíduos com lombalgia crônica. *J Health Sci Inst.* 2011;29(3):205-8.
- Ciconelli RM, Ferraz M B, Santos W, Meinão I, Quaresma MR. Tradução para a língua portuguesa e validação do questionário genérico de avaliação de qualidade de vida SF-36 (Brasil SF-36). *Rev Bras Reumatol.* 1999;39(3):143-50.
- Campolina AG, Dini OS, Ciconelli RM. Impacto da doença crônica na qualidade de vida de idosos da comunidade de São Paulo. *Ciênc Saúde Coletiva.* 2011;10(6):2919-25.
- Martinez J, Grassi D, Marques L. Análise da aplicabilidade de três instrumentos de avaliação de dor em distintas unidades de atendimento: ambulatório, enfermaria e urgência. *Rev Bras Reumatol.* 2011;51(4):299-308.
- Fleck MP, Leal OF, Louzada S, Xavier M, Chachamovich E, Vieira G, et al. Desenvolvimento da versão em português do instrumento de avaliação de qualidade de vida da OMS (WHOQOL-100). *Rev Bras Psiquiatr.* 1999;21(1):19-28.
- Castro M, Querantini L, Daltron C, Pires-Caldas M, Koenen KC, et al. Comorbidade de sintomas ansiosos e depressivos em pacientes com dor crônica e o impacto sobre a qualidade de vida. *Rev Psiq Clín.* 2011;38(4):126-9.
- Queiroz MF, Barbosa MH, Lemos RC, Ribeiro SB, Ribeiro JB, Andrade EV, et al. Qualidade de vida de portadores de dor crônica atendidos em Clínica multiprofissional. *Rev Enferm Atenção Saúde.* 2012;1(1):30-43.
- Fleck MP A avaliação da qualidade de vida; guia para profissionais da saúde. Porto Alegre: Artmed; 2008.
- Silva FE, Dantas FR, Macena RH, Vasconcelos TB. Processo de implantação da estratégia vigilância à dor crônica osteomioarticular na atenção básica. *Relato de Caso. Rev Dor.* 2016;17(1):69-72.
- Carbonario F. Efeitos de um programa fisioterapêutico na melhora da sintomatologia e qualidade de vida de pacientes com fibromialgia. 2006. Dissertação (Mestrado em Movimento, Postura e Ação Humana) - Faculdade de Medicina, Universidade de São Paulo, São Paulo; 2006.
- Santos C, Pereira L, Resende M, Magno F, Aguiar V. Aplicação da versão brasileira do questionário de dor McGill em idosos com dor crônica. *Acta Fisiatr.* 2006;13(2):75-82.
- Vandenberghe L, Ferro CL. Terapia de grupo embasada em psicoterapia analítica funcional como abordagem terapêutica para dor crônica: possibilidades e perspectivas. *Psicologia: Teoria e Prática.* 2005;7(1):137-51.
- Brandt R, Fonseca A, Oliveira L, Steffens RA, Viana MS, Andrade A. Perfil de Humor de mulheres com fibromialgia. *J Bras Psiquiatr.* 2011;60(3):216-20.
- Steffens R, Liz C, Viana M, Brand, R, Oliveira LG, Andrade A. Praticar caminhada melhora a qualidade do sono e os estados de humor em mulheres com síndrome da fibromialgia. *Rev Dor.* 2011;12(4):327-31.

# Prevalence of carpal tunnel syndrome in workers dealing with bovine manual milking

*Prevalência da síndrome do túnel do carpo em trabalhadores que lidam com a ordenha manual de bovinos*

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** This study aimed at evaluating the prevalence of carpal tunnel syndrome among bovine manual milking workers in a city of the countryside of the State of Paraná.

**METHODS:** Sample (n=92) was selected as from medical physiotherapy prescriptions for patients diagnosed with such syndrome, in the period from 2008 to 2010.

**RESULTS:** Participated in the study 80 females with mean age of 47.7±11.3 years, and 12 males with mean age of 43.9±12.6 years. Among patients, 41 participants (44.6%) had performed manual milking in some period of life, being 36 females (39.1%) and 5 males (5.4%). Only females with carpal tunnel syndrome remained with manual milking as their primary occupation.

**CONCLUSION:** This study has shown high frequency of carpal tunnel syndrome among workers dealing with manual milking, and suggests the expansion of bovine milk production mechanization to prevent carpal tunnel aggressions.

**Keywords:** Carpal tunnel syndrome, Ergonomics, Labor safety, Median nerve neuropathy, Workers' health, Working environment.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** O objetivo deste estudo foi verificar a prevalência da síndrome do túnel do carpo na ordenha manual de bovinos em uma localidade do interior do Estado do Paraná.

**MÉTODOS:** A amostra (n=92) foi selecionada a partir de prescrições médicas de fisioterapia para pacientes com diagnóstico desta síndrome, ocorridas no período de 2008 a 2010.

**RESULTADOS:** Foram incluídas 80 mulheres com média de idade de 47,7±11,3 anos e 12 homens com média de idade de

43,9±12,6 anos. Entre os acometidos, 41 participantes (44,6%) realizaram a ordenha manual em algum momento da vida, sendo 36 mulheres (39,1%) e 5 homens (5,4%). Somente as mulheres com síndrome do túnel do carpo permaneciam com a ordenha manual na sua ocupação principal.

**CONCLUSÃO:** Este estudo mostrou elevada frequência de síndrome do túnel do carpo em trabalhadores que lidam com a ordenha manual e sugere a expansão da mecanização da produção do leite de gado bovino como medida preventiva às agressões no túnel do carpo.

**Descritores:** Ambiente de trabalho, Ergonomia, Neuropatia do nervo mediano, Saúde dos trabalhadores, Segurança ocupacional, Síndrome do túnel do carpo.

## INTRODUCTION

Carpal tunnel syndrome (CTS) was firstly described by British surgeon James Paget in 1854, after observing a disease affecting forearm, wrist and hand, causing hand paresthesia, pain and functional incapacity. The American Academy of Orthopaedic Surgeons has defined CTS as symptomatic compression neuropathy of the median nerve at the level of the wrist<sup>1</sup>.

CTS is the most frequent compressive neuropathy being responsible for 90% of occurrences<sup>2</sup>. Its incidence is estimated in 3.8% of world population. It is a condition of middle-age individuals with peak of prevalence around 55 to 60 years of age; it is more frequent among females as compared to males with prevalence rate of 9.2 and 6%, respectively<sup>3</sup>. It may affect the dominant hand, the non-dominant hand or both. Its etiology involves not totally explained mechanical, chemical and psychic mechanisms<sup>4</sup>.

The National Center for Health Statistics estimates that in the United States, per year, it is the disease most taking people away from work. Almost half the CTS cases result in 31 days or more of leave/year. Approximately one million American adults require medical treatment and approximately half the cases require surgical treatment at a cost of approximately 2 billion dollars/year<sup>5</sup>. In the United Kingdom, prevalence reaches 7% to 16% and surgical decompression rate is 43 to 74 cases for every 100 thousand inhabitants/year<sup>6</sup>.

In Brazil, CTS represents more than half the cases of Work-Related Musculoskeletal Disorders (WRMD). WRMD are responsible for approximately 70% of labor diseases needing social security benefits due to medical leave<sup>7</sup>. According to the Ministry of Labor and Social Security, there have been major increases, in

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the last two decades, in the granting of social security sickness insurance for compressive upper limb neuropathies. In 2014, it has benefited 22,298 beneficiaries<sup>8</sup>. This represents a considerable financial impact for the public system providing medical and social security assistance to CTS patients<sup>9</sup>. CTS is a widely recognized occupational complication involving manual work of prehension, strength or repetition<sup>7</sup>. The presence of one of these factors tends to increase the risk for CTS in up to five times<sup>10</sup>. Bovine manual milking (MM) is a typical example of repetitive and chronic effort frequently used by the agribusiness worker and positively associated to CTS<sup>4</sup>. MM is the oldest milk extraction system and is still present in small properties with small herds. It requires less expensive equipment and more personal effort. It requires repetitive wrist and hand movements in a pulsing rhythm of 40 to 50 cycles/minute, for a continuous period of 4 to 7 minutes for each animal, twice a day in average. A case-control study carried out in Turkey, by Suleyman et al.<sup>4</sup> has classified MM as occupational risk activity after obtaining from the milking group a relative risk 13 times higher for developing CTS as compared to controls. MM is common in families living in small rural properties in the largest dairy basin of Western Paraná and the second largest of the State. Within this perspective, our study aimed at investigating the prevalence of CTS among people involved with bovine MM.

**METHODS**

This cross-sectional study has used data of medical charts of patients of a Physiotherapy service linked to the complementary services network of the Single Health System of the city of Marechal Cândido Rondon, State of Paraná – Brazil. Data were selected by a single investigator among medical charts accumulated in the period from 2008 to 2010. Sample was established as from medical charts of patients with medical prescription for physiotherapeutic treatment for CTS. Medical charts with medical diagnosis of CTS submitted or not to surgical procedures, with any professional occupation, of patients of both genders aged 45 years or above, were selected, resulting in 107 valid occurrences. Fifteen patients were excluded: 4 with incomplete history and 11 with history of wrist trauma previous to neurocompression symptoms or for being diabetic. So, 92 medical charts were evaluated. To understand the MM history of patients, the following questions were asked during initial interview: a) Do you perform or have you performed MM in some stage of our life? (yes/no); b) For how long do you carry out or have carried out this occupation? (Answer accepted in years); c) In your routine, how many days a week do you perform or have performed MM? d) How long would daily milking take or has taken? (Answer accepted in minutes). Questionnaire is part of baseline evaluation of patients with wrist and hand compressive syndrome, carried out by the Physiotherapy department. This study was approved by the Ethics Committee for Research Involving Human Beings, Universidade Estadual do Oeste do Paraná (UNIOESTE), opinion 320 de 2009.

**Statistical analysis**

Data were analyzed with the Stata 11.0\* and Microsoft® Excel 10.0 programs. Statistical meaning was evaluated with Pearson Chi-square ( $\chi^2$ ) test. Results with significance probability (p) lower than 0.05 were considered with statistically significant difference.

**RESULTS**

Among 92 cases of CTS, 80 were females (87%) with mean age of 53±8.24 years (CI95% 46 – 62) and 12 were males (13%), with mean age of 55±9.8 years (CI95% 46 – 64). The practice of MM was present in some moment of life of 44.6% (n=41) patients with CTS, being more prevalent among females (87.8%; n=36) as compared to males (12.2%; n=5). Ranchers were the most affected professionals (68.3%; n=28). For the group with positive history of MM, male-female ratio was 1:16, with mean occupation along life during 22.67±8.49 years and 809.97±193.57 minutes/week. Distribution of frequency of major occupation and time dedicated to MM are detailed in tables 1 and 2. Among CTS patients, 65 individuals (71%) were submitted, by medical request, to electrophysiological exam (EMG). Some level of abnormality in median nerve ner-

**Table 1.** Distribution of frequency of patients of both genders, with carpal tunnel syndrome and positive history of bovine manual milking, according to major occupation. Marechal Cândido Rondon - PR, 2008 to 2010

Major occupation	Female total	Female w/ MM	Male total	Male w/ MM
Rancher	32	26	02	02
Bank clerk	03	00	01	00
Business	03	01	01	01
Cook	01	00	00	00
Home /housekeepers	15	03	00	00
Cleaning woman	02	00	00	00
Industry worker	08	03	03	01
Professor	03	00	01	00
Others	13	03	04	01
Total	80	36	12	05

MM = manual milking.

**Table 2.** Distribution of mean for age, milking time (year) and weekly milking duration (minutes) in carpal tunnel syndrome patients of both genders. Marechal Cândido Rondon - PR, 2008 to 2010

	Manual milking (male)	Manual milking (female)	$\chi^{2**}$
Age (years)	55.16±9.8	53.28 ±8.24	0.284
MM period (years)	28.16±9.13	19.67± 8.49	0.001
MM duration (minutes/week)*	847±180.37	809.97±193.57	0.452

\* Value obtained by the product of mean milking time of each animal by the mean number of milked animals and number of weekly milkings; \*\* Pearson Chi-square test.

vous conduction was detected in 48 exams (74%), being 42 in females (88%) and 6 in males (12%). From this total, 16 cases (17.4%) were treated with surgical decompression, being 14 in females and 2 in males. Dominant hand wrist was affected in approximately 85% of cases, as described in table 3.

**Table 3.** Frequency of lateral dominance of carpal tunnel syndrome in patients of both genders, according to bovine manual milking history. Marechal Cândido Rondon - PR, 2008 to 2010

	Females w/MM	Males w/MM	Males wo/MM	Females wo/MM	Total
Bilateral CTS	03	00	01	03	07
Dominant hand CTS *	31	05	05	36	77
Non-dominant hand CTS *	03	00	01	04	08
Total	37	05	07	43	92

\* Dominant hand is the hand people use to write.

## DISCUSSION

MM involves the continuous and forced use of fingers flexor muscles and is considered professional risk factor for CTS<sup>4</sup>. In our study, the prevalence of CTS was higher among females (87%) as compared to males, in line with results obtained by Campoamor et al.<sup>11</sup> in the region of Ribeirão Preto, SP, who identified increased prevalence of CTS among females of 88%.

Approximately half CTS patients had positive MM history, with male-female ratio of 1:7. This score is higher than correlated studies which have pointed to male-female ratio of 1:3-4<sup>4,6</sup>. In Marechal Cândido Rondon, sexual division on peasantry seems to divide the occupational function, starting from the assumption that females are more prone to subsistence or own consumption work as compared to males.

CTS in hands dealing with MM was diagnosed with the help of EMG in 52% of cases. There is no consensus whether CTS diagnosis should be done in clinical or electrophysiological basis. At clinical evaluation, some maneuvers may produce false-positive and false-negative results, being limited as clinical signs, while positive EMG should only be considered in face of the existence of symptoms<sup>12</sup>.

CTS was more prevalent among workers with repetitive and aggressive wrist use. A systematic review by Hagberg, Morgenstern & Kelsh<sup>13</sup> has shown prevalence variation of 0.6 to 61% in different professional groups, with higher risk factor for more forced manual occupations. This study has shown that most CTS patients (72%) continued with the same occupational activities, even with the presence of symptoms; other 28% have migrated to different occupation or function. Among workers remaining with MM, all were females. Females who have not migrated to the mechanical milk extraction mode remained exposed to worsening of disease and resulting physical and functional incapacities.

The affection of the dominant hand was more frequent for both genders (84%). For Toy, Simpson & Tintner<sup>14</sup>, dominant hand is that initially affected by later bilateral affections. Within this perspective, it seems coherent to assume that unilateral CTS patients, especially those preserving occupation, are exposed to increased risk of evolving to bilateral CTS.

Preventively, it is necessary that such workers are informed about such occupational risks. Labor safety should be a stressed item which cannot be compromised by any other justification. So, a valuable tool are public health system efforts to guide professionals, especially those acting on basic attention, with regard to health prevention, surveillance and assistance of workers to provide the characterization of relationships between diseases and occupations, which is critical to promote quality, resolute capacity and integrality of actions and services directed to the working population.

Kouyoumdjian & de Araujo<sup>15</sup> have observed that CTS symptoms in general do not appear in the beginning of the milking activity, since mean time between milking and onset of first CTS changes is 4.5 years. Within this perspective, it is suggested the development of randomized studies to establish the risk attributable to MM as triggering factor for CTS along time. The strength of our study is its focus on the objective of presenting a starting point for future prospectations toward the identification and application of preventive measures related to MM and the presence of CTS.

## CONCLUSION

This study has shown high prevalence of CTS in bovine MM. So, it seems feasible the counseling for milking mechanization, as well as a preventive measure for the presence and worsening of CTS. Finally, our results reaffirm the commitment of continuing reinforcing measures and actions needed to protect and promote health of all workers.

## REFERENCES

1. American Academy of Orthopaedic Surgeons Work Group Panel (AAOS). Clinical guidelines on diagnosis of carpal tunnel syndrome, [Internet] 2007. [citado 2014 ago 12]. Disponível em: [http://www.aaos.org/research/guidelines/CTS\\_guideline.pdf](http://www.aaos.org/research/guidelines/CTS_guideline.pdf).
2. Silva GA, Oliveira PA, Silva Júnior EA. Síndrome do túnel do carpo: definição, diagnóstico, tratamento e prevenção. Revisão de literatura. Revista CPAQV – Centro de Pesquisas Avançadas em Qualidade de Vida. 2014;6(2):2.
3. Atroshi I, Gummesson C, Johnsson R, Ornstein E, Ranstam J, Rosén I. Prevalence of carpal tunnel syndrome in a general population. JAMA. 1999;282(2):153-8.
4. Suleyman K, Ahmet T, Serkan K, Nilgun E, Hasan N, Rifat K, et al. Manual Milking: A risk factor for carpal tunnel syndrome. Biomed Res. 2009;20(1):35-42.
5. Pleis JR, Ward BW, Lucas JW. Summary Health statistics for U.S. adults: National Health Interview Survey, 2010. Hyattsville, MD: National Center for Health Statistics. Vital Health Stat. 2010;10(252):6-15.
6. Aroori S, Spence RA. Carpal tunnel syndrome. Ulster Med J. 2008;77(1):6-17.
7. Lech O, Hoefel MG, Severo A, Pitágoras T. Aspectos Clínicos dos Distúrbios Osteomusculares Relacionados ao Trabalho (DORT), 1ª ed. Belo Horizonte: Editora Ed Ergo; 1998. 86-90p.
8. Brasil. Ministério do Trabalho e da Previdência Social (MTPS). Secretaria de Políticas de Previdência Social. Departamento de Políticas de Saúde e Segurança Ocupacional. Coordenação-Geral de Monitoramento de Benefícios por Incapacidade. Concessão de auxílio doença relacionado a LER/DORT nos anos de 2006 a 2014. Brasília; 2016.

9. Brasil. Ministério da Saúde. Dor relacionada ao trabalho: lesões por esforços repetitivos (LER): distúrbios osteomusculares relacionados ao trabalho (DORT). Brasília: Editora do Ministério da Saúde; 2012.
10. Einhorn N, Eddy JP. Pitfalls of release of endoscopic carpal tunnel. *Orthop Clin North Am.* 1996;27(2):373-80.
11. Campoamor MM, Robazzi MLCC, Marziale MHP, Silveira CA, Alves LA, Dawson DM, Hallett M, Millender LH. *Entrapment neuropathies*, 2<sup>nd</sup> ed. Boston: Little, Brown and Company; 1990.
12. Rempel JT, Evanoff B, Amadio PC, de Krom M, Franklin G, Franzblau A, et al. Consensus criteria for the diagnosis of carpal tunnel syndrome in epidemiologic studies. *Am J Public Health.* 1998;88(10):1447-51.
13. Hagberg M, Morgenstern H, Kelsh M. Impact of occupations and job tasks on the prevalence of carpal tunnel syndrome. *Scand J Work Environ Health.* 1992;18(6):337-45.
14. Toy EC, Simpson E, Tintner R. *Casos Clínicos em Neurologia*. 2ª ed. Porto Alegre: AMGH Editora; 2014. 359-65p.
15. Kouyoumdjian JA, de Araújo RG. Carpal tunnel syndrome and manual milking: nerve conduction studies in 43 cases. *Arq Neuropsiquiatr.* 2006;64(3B):747-9.

# Pain level associated to socio-demographic and clinical variables in people living with human immunodeficiency virus and acquired immunodeficiency syndrome

*Nível de dor associado a variáveis sócio-demográficas e clínicas em pessoas que vivem com o vírus da imunodeficiência humana e a síndrome da imunodeficiência adquirida*

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** Pain is a common symptom in people living with acquired immunodeficiency syndrome, being widely underreported and not treated. For this reason, there is the need for studies discussing the subject in the attempt to explain factors involved in this process and to look for adequate and effective therapies. So, this study aimed at relating pain level in people living with human immunodeficiency virus to socio-demographic and clinical variables.

**METHODS:** This was a descriptive and cross-sectional study with 261 individuals living with the human immunodeficiency virus. Visual analog scale for pain intensity and semi-structured interview for anamnesis were applied.

**RESULTS:** A total of 47.5% of individuals was found reporting mild pain/no pain; 24.1% with moderate pain and 28.4% with severe pain. There has been significant relationship between pain and gender ( $p=0.02$ ), health status ( $p=0.001$ ), health perception with regard to feeling ill or not ( $p=0.001$ ) and infection stage ( $p=0.005$ ). Pain was characterized as shooting (69%), piercing (55%) and burning (41%), with significant relationship with regard to pain intensity ( $p<0.001$ ) and time ( $p<0.001$ ). When the logistic regression model was applied, the fact of being a female has represented a risk of 7.256 ( $p<0.001$ ) for moderate pain and of 5.329 ( $p<0.004$ ) for severe pain. With regard to age, age groups between 21 and 30 years (0.073;  $p<0.046$ ), 41 and 50 years (0.068;  $p<0.023$ ) and 51 and 60 years (0.063;  $p<0.030$ ) were protection factors for the presence of moderate pain. With regard to health status, this variable was a risk factor for the presence of moderate pain (8.13;  $p<0.038$ ) and severe pain (11.73;  $p<0.005$ ).

**CONCLUSION:** Pain was a prevalent symptom among people living with human immunodeficiency virus.

**Keywords:** Acquired immunodeficiency syndrome, Human immunodeficiency virus, Pain.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A dor é um sintoma comum em pessoas que vivem com a síndrome da imunodeficiência adquirida, sendo bastante subnotificada e não tratada. Por esse motivo, existe a necessidade de estudos que discutam a temática na tentativa de esclarecer os fatores envolvidos nesse processo e buscar tratamentos adequados e eficazes. Dentro dessa perspectiva, o objetivo deste estudo foi relacionar o nível de dor em pessoas que vivem com o vírus da imunodeficiência humana, com variáveis sócio-demográficas e clínicas.

**MÉTODOS:** Pesquisa descritiva com caráter transversal, com 261 indivíduos vivendo com o vírus da imunodeficiência humana. Foi aplicada a escala analógica visual para a intensidade da dor e entrevista semiestruturada como anamnese.

**RESULTADOS:** Foi encontrado um total de 47,5% indivíduos referindo dor leve/sem dor; 24,1% com dor moderada e 28,4% com dor intensa. Foi encontrada relação significativa entre a dor e o sexo ( $p=0,02$ ), estado de saúde ( $p=0,001$ ), percepção da saúde, quanto a se sentir doente ou não ( $p=0,001$ ) e o estágio da infecção ( $p=0,005$ ). A dor foi caracterizada em lancinante (69%), perfurante (55%) e em queimação (41%), sendo encontrada relação significativa entre essas variáveis ( $p<0,001$ ). Foi possível encontrar também uma associação significativa com relação a intensidade da dor ( $p<0,001$ ) e o tempo ( $p<0,001$ ). Quando aplicado o modelo de regressão logística, o fato de ser mulher representou um risco de 7,256 ( $p<0,001$ ) para a dor moderada e de 5,329 ( $p<0,004$ ) para dor intensa. Com relação a idade, as faixas etárias de 21 a 30 anos (0,073;  $p<0,046$ ), 41 a 50 anos (0,068;  $p<0,023$ ) e 51 a 60 anos (0,063;  $p<0,030$ ), apresentaram-se como fator de proteção para a presença de dor moderada. Com relação ao estado de saúde, esta variável apresentou-se como fator de risco para a presença de dor moderada (8,13;  $p<0,038$ ) e intensa (11,73;  $p<0,005$ ).

**CONCLUSÃO:** A dor foi um sintoma prevalente entre as pessoas que vivem com o vírus da imunodeficiência humana.

**Descritores:** Dor, Síndrome da imunodeficiência adquirida, Vírus da imunodeficiência humana.

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**INTRODUCTION**

Pain is a complex multidimension physical and psychic experience triggered by some primary stimulus and being influenced by sociocultural, family and gender context. So, the same stimulus might induce totally different painful responses in different individuals<sup>1,2</sup>.

This context may be also influenced by a baseline disease, as it is the case of people living with human immunodeficiency virus (HIV) or with already installed acquired immunodeficiency syndrome (AIDS), and this might happen due to three primary reasons: HIV symptom; other opportunistic disease or infection; adverse effect of antiretroviral therapy (ARVT). Pain is also a symptom which may be present in all stages of the disease in up to 90% of cases<sup>3</sup>.

Estimates reveal that approximately 80% of world population have inadequate access to moderate to severe pain management and that millions of people living with HIV/AIDS suffer of untreated severe pain<sup>4</sup>. It is also worth highlighting that HIV/AIDS is a major global health challenge, counting on 34.2 million people infected with HIV worldwide<sup>5</sup>. In Brazil, in 2012, 39185 cases of AIDS were notified<sup>6</sup>.

So, one should take into consideration the presence not only of infectious complications but also of painful syndromes<sup>7</sup>.

This study aimed at relating the level of pain of HIV/AIDS patients to socio-demographic and clinical variables.

**METHODS**

Descriptive, cross-sectional research carried out from October 2013 to May 2015, in Hospital Rafael Fernandes, city of Mossoró, Rio Grande do Norte, Brazil.

To make up the sample, subjects attending the service for medical follow up and who voluntarily accepted to participate in the study were probabilistically and randomly selected. To determine the necessary number of HIV/AIDS individuals, sample size for finite populations calculation was applied, according to the following formula:

$$R = \frac{Z^2 \cdot p \cdot q \cdot N}{e^2 \cdot (N - 1) + Z^2 \cdot p \cdot q}$$

Where:

N= Population Size, in this study population is made up of 709 elements.

Z = Chosen confidence level 95% equal to 1.96.

p = proportion in which the phenomenon is observed. Value was p = 0.50.

According to Mattar<sup>8</sup>, if there are no previous estimates for p, 0.50 is admitted, thus obtaining the largest possible sample size.

q = (1-p) proportion of non-occurrence of the phenomenon.

e = sample error expressed in the variable unit. Sample error is maximum difference admitted by investigator between real population average. In this research, maximum error of 0.05 was admitted.

Transcribing values described for the formula, the following sample calculation is obtained:

$$R = \frac{1.96^2 \cdot 0.5 \cdot 0.5 \cdot 709}{0.05^2 \cdot (709 - 1) + 1.96^2 \cdot 0.5 \cdot 0.5}$$

$$R = \frac{680,92}{1.77 + 0.96}$$

$$R = \frac{680.92}{2.73}$$

$$R = 249.4$$

A total of 249 questionnaires was needed to consider the sample significant, thus being included 261 people living with HIV/AIDS with minimum diagnostic time of six months; ages varied from 20 to 64 years; of both genders dwellers of Mossoró and neighbor cities, being excluded all individuals with cognitive abnormalities or unable to answer the questionnaires.

Pain was evaluated with the visual analog scale (VAS) validated in 1983<sup>9</sup>.

This scale is considered a one-dimension tool, for evaluating just one aspect of pain, which is intensity; however, this is done in a minimally intrusive way. So, it classifies pain in mild (1-2), moderate (3-7) and severe (8-10).

A semi-structured interview to evaluate other pain dimensions was developed to complement VAS pain investigation (Table 1).

**Table 1.** Semi-structured interview to evaluate pain dimensions

Questions	Objectives
Where is your pain?	To identify and classify pain as to location
For how long do you feel this pain?	To classify pain in chronic or acute
How is it or how does this pain behave?	To identify characteristic of pain felt by respondent.

With regard to other clinical variables associated to HIV/AIDS a direct investigation was carried out asking individuals about their perception of their health, how they considered their health status, whether they felt ill or not, and the stage of their infection, mode and year when they were infected and year of the first test.

This study was approved by the Ethics Committee, Universidade do Estado do Rio Grande do Norte, opinion 421.293 in 2013.

**Statistical analysis**

Data were analyzed with statistical software packages SPSS 21.0 (Statistical Package for the Social Sciences) and STATA 13.0, be-

ing expressed in mean±standard deviation, minimum and maximum values, as well as simple frequency and percentage.

To observe relationship between socio-demographic factors and pain levels in HIV/AIDS patients, odds ratio (OR), 95% confidence intervals and significance determined by Chi-square and Fisher Exact tests were used. The latter, in turn, was used whenever values with expected frequency below five were found.

Logistic regression model was developed to study multiple effects which might be involved with pain. When needed, variables were translated into dummies. Values of  $p < 0.05$  were considered significant.

## RESULTS

Table 2 shows results obtained by evaluated socio-demographic indicators, showing association among studied variables, with regard to the outcome of this study: pain.

With regard to pain intensity (Table 2), there has been a total of 47.5% individuals (n=124) referring mild or no pain, 24.1% individuals (n=63) with moderate pain and 28.4% (n=74) with severe pain.

With regard to age, there has been concentration of cases between 41 and 50 years (34.9%), being also very close to the number of the group between 31 and 40 years of age (32.6%). Predominant education level was complete basic education

(49%); most people were single (36.8%), followed by people living as married (26.8%) and infection stage of most participants of the study was AIDS (87%).

When pain was correlated to involved socio-demographic variables, it was possible to find significant relationship only between pain and gender ( $p=0.02$ ).

Table 3 shows results with regard to clinical aspects, being found significant associations between pain intensity and health status ( $p=0.001$ ), health perception, as to feeling ill or not ( $p=0.001$ ), and infection stage ( $p=0.005$ ).

In our study, among those evaluating their health as poor, 61.5% have referred severe pain versus 28.8% referring moderate pain and 9.6% referring mild or no pain. Conversely, most people classifying their health as good belonged to the mild or no pain group (66.7%), having 17.5% referred moderate pain and 15.9% severe pain. With regard to considering themselves ill or not, those answering yes corresponded to 45% of those referring severe pain, 27.9% moderate pain and 27% mild or no pain.

With regard to infection mode, our study points to a significant correlation with the presence of pain, with higher concentration among people acquiring HIV/AIDS by means of sexual intercourse with males. This fact might be explained because most participants of this study were females, thus showing a strong correlation between gender and presence of pain.

**Table 2.** Frequency values (%) of socio-demographic variables associated to pain level of evaluated patients

Variables	Total n=261	No pain/mild n=124 (47,5%)	Moderate n= 63 (24,1%)	Severe n=74 (28,4%)	p value Chi-square for categorical variables Kruskal-Wallis for continuous variables
<b>Gender</b>					
Male	130 (49.8)	76 (58.5)	26 (20.0)	28 (21.5)	12.61. p=0.02*
Female	131 (50.2)	48 (36.6)	37 (28.2)	46 (35.1)	
<b>Age (years)</b>					
21 to 30	32 (12.3)	19 (59.4)	08 (25.0)	05 (15.6)	2.369 p=0.124†
31 to 40	85 (32.6)	40 (47.1)	21 (24.7)	24 (28.2)	
41 to 50	91 (34.9)	41 (45.1)	23 (25.3)	27 (29.7)	
51 to 60	45 (17.2)	22 (48.9)	07 (15.6)	16 (35.6)	
> 60	08 (3.1)	02 (25.0)	04 (50.0)	02 (25.0)	
<b>Education</b>					
None	67 (25.7)	25 (37.3)	16 (23.9)	26 (38.8)	8.059. p=0.234
Basic	128 (49.0)	69 (53.9)	27 (21.1)	32 (25.0)	
High school	54 (20.7)	24 (44.4)	16 (29.6)	14 (25.9)	
College	12 (4.6)	06 (50.0)	04 (33.3)	02 (16.7)	
<b>Marital Status</b>					
Single	96 (36.8)	42 (43.8)	20 (20.8)	34 (35.4)	11.918. p=0.291
Married	38 (14.6)	19 (50.0)	07 (18.4)	12 (31.6)	
Stable relationship	70 (26.8)	38 (54.3)	18 (25.7)	14 (20.0)	
Separate	24 (9.2)	09 (37.5)	07 (29.2)	08 (33.3)	
Divorced	12 (4.6)	05 (41.7)	06 (50.0)	01 (8.3)	
Widow(er)	21 (8.0)	11 (52.4)	05 (23.8)	05 (23.8)	

\* Statistical significance ( $p < 0.05$ ); † Chi-square for trend.

**Table 3.** Frequency values (%), clinical aspects and pain intensity of studied patients

Variables	Total n=261	No pain/mild n=124 (47.5%)	Moderate n= 63 (24.1%)	Severe n=74 (28.4%)	Chi-square statistical test for categorical variables Kruskal-Wallis for continuous variables
Health status <sup>†</sup>					
Poor	52 (29.2)	05 (9.6)	15 (28.8)	32 (61.5)	52.532. p<0.001*
Good	126 (70.8)	84 (66.7)	22 (17.5)	20 (15.9)	
Ill					
Yes	111 (42.5)	30 (27.0)	31 (27.9)	50 (45.0)	37.186. p<0.001*
No	150 (261)	94 (62.7)	32 (21.3)	24 (16.0)	
Infection stage					
Asymptomatic	23 (8.8)	14 (60.9)	01 (4.3)	08 (34.8)	14.759. p=0.005*
Symptomatic	11 (4.2)	10 (90.9)	01 (9.1)	0 (0.0)	
AIDS	227 (87.0)	100 (44.1)	61 (26.9)	66 (29.1)	
Year of the first test <sup>†</sup>					
1988 to 1997	20 (8.0)	06 (30.0)	07 (35.0)	07 (35.0)	1.214. p=0.271 <sup>‡</sup>
1998 to 2007	94 (37.5)	46 (48.9)	19 (20.2)	29 (30.9)	
2008 to 2013	137 (54.6)	67 (48.9)	33 (24.1)	37 (27.0)	
Year of infection <sup>†</sup>					
1973 to 1982	03 (2.2)	02 (66.7)	0 (0.0)	01 (33.3)	0.796. p=0.372 <sup>‡</sup>
1983 to 1992	26 (19.1)	07 (26.9)	10 (38.5)	09 (34.6)	
1993 to 2002	51 (37.5)	20 (39.2)	14 (27.5)	17 (33.3)	
2003 to 2012	56 (41.2)	24 (42.9)	17 (30.4)	15 (26.8)	
Infection mode					
Intercourse with male	161 (61.7)	62 (38.5)	41 (25.5)	58 (36.0)	29.371. p<0.001*
Intercourse with female	70 (26.8)	48 (68.6)	14 (20.0)	08 (11.4)	
Injectable drugs	11 (4.2)	04 (36.4)	02 (18.2)	05 (45.5)	
Blood byproducts	10 (3.8)	04 (40.0)	04 (40.0)	02 (20.0)	
Others	01 (0.4)	0 (0.0)	0 (0.0)	01 (100)	
Does not know	08 (3.1)	06 (75.0)	02 (25.0)	0 (0.0)	

\* Statistical significance (p<0.05); <sup>‡</sup> Chi-square for trend; <sup>†</sup> = Missing values.

Still evaluating pain symptom and for this being a multidimensional variable, it may receive more than one classification. In our study, in addition to intensity, pain was classified with regard to feature, site and duration (Table 4).

As to site, it was possible to find significant association (p<0.001) with intensity according to the classification of mild, moderate and severe. From total participants, 18% have referred headache and from this total, 44.7% have referred severe pain. Next was widespread pain where individuals referring pain throughout the body were classified, representing 15.3% of total, with higher concentration in the severe pain group (60%). Muscle (2.7%) and abdominal (11.9%) pains were also reported, and included all those referring stomach, bowel and kidneys pain, among other organs; upper limbs and shoulder (1.9%), lower limbs and knee (6.5%) and spine (6.1%). These groups were determined according to participants' answers.

With regard to characteristic, it was possible to find significant association with regard to pain intensity (p<0.001), be-

ing especially characterized as shooting (69%), drilling (55%) and burning (41%).

With regard to time, there has been significant association (p<0.001) with 15.3% with acute and 47.1% chronic pain.

Table 5 illustrates multinomial logistic regression model with variables with value of p<0.2. At this moment, the risk for moderate and severe pain was identified, taking as reference the no pain/mild pain group.

With regard to gender, females had a risk of 7.256 (p<0.001) for moderate pain and of 5.329 (p<0.004) for severe pain.

With regard to age, it was possible to notice that groups from 21 to 30 years (0.073; p<0.046), 41 to 50 years (0.068; p<0.023) and 51 to 60 years (0.063; p<0.030) were protection factors for the presence of moderate pain using as reference the group above 60 years of age.

With regard to health status, this variable was risk factor for moderate (8.13; p<0.038) and severe (11.73; p<0.005) pain. Since classification as good or poor was given by respondents

**Table 4.** Pain classification with regard to site, feature and time

Variables	Total n=261	No pain/mild n=124 (47.5%)	Moderate n= 63 (24.1%)	Severe n=74 (28.4%)	p value Chi-square
<b>Pain site</b>					
Head	47 (18.0)	14 (29.8)	12 (25.5)	21 (44.7)	167.016. p<0.001*
Widespread	40 (15.3)	04 (10.0)	12 (30.0)	24 (60.0)	
Muscle	07 (2.7)	04 (57.1)	03 (42.9)	0 (0.0)	
Abdominal	31 (11.9)	04 (12.9)	15 (48.4)	12 (38.7)	
UULL & shoulders	05 (1.9)	0 (0.0)	04 (80.0)	01 (20.0)	
ILL & knee	17 (6.5)	02 (11.8)	09 (52.9)	06 (35.3)	
Spine	16 (6.1)	03 (18.8)	06 (37.5)	07 (43.8)	
No place	98 (37.5)	93 (94.9)	02 (2.0)	03 (3.1)	
<b>Feature</b>					
Shooting	69 (26.4)	11 (15.9)	27 (39.1)	31 (44.9)	156.723. p<0.001*
Drilling	55 (21.1)	09 (16.4)	22 (40.0)	24 (43.6)	
Burning	41 (15.7)	10 (24.4)	12 (29.3)	19 (46.3)	
None	96 (36.8)	94 (97.9)	02 (2.1)	0 (0.0)	
<b>Classification (time)<sup>a</sup></b>					
No pain	98 (37.5)	96 (98.0)	02 (2.0)	0 (0.0)	95.164. p<0.001*
Acute	40 (15.3)	06 (15.0)	20 (50.0)	14 (35.0)	
Chronic	123 (47.1)	22 (17.9)	41 (33.3)	60 (48.8)	

\* Statistical significance (p<0.05); Chi-square for trend; UULL = upper limbs; ILL = lower limbs.

**Table 5.** Multinomial logistic regression model for socio-demographic and variables and clinical aspects of pain for people living with HIV/AIDS

Variables	OR	CI95%	p value	OR (Adjusted) <sup>a</sup>	CI95%	p value
<b>Moderate pain</b>						
<b>Gender</b>						
Female	2.253	1.21-4.18	0.012*	7.256	2.267-23.224	<0.001*
Male	1.0			1.0		
<b>Age (years)</b>						
21 to 30	0.211	0.032-1.39	0.159	0.073	0.005-0.958	0.046*
31 to 40	0.263	0.044-1.55	0.186	0.125	0.012-1.314	0.083
41 to 50	0.280	0.048-1.65	0.196	0.068	0.006-0.685	0.023*
51 to 60	0.159	0.024-1.06	0.063	0.063	0.005-0.765	0.030*
> 60	1.0	-	-	1.0	-	-
<b>Health status</b>						
Poor	11.45	3.75-34.95	<0.001*	8.13	1.128-58.617	0.038*
Good	1.0			1.0		
<b>Ill</b>						
Yes	3.03	1.59-5.77	0.001	1.352	0.243-7.4971	0.730
No	1.0			1		
<b>Infection stage</b>						
AIDS	8.54	1.09-66.57	0.015*	5.04	-	1.0
Symptomatic	1.4	0.078-25.1	1.0	1.759	-	1.0
Asymptomatic	1.0	-	-	1.0	-	-

Continue...

**Table 5.** Multinomial logistic regression model for socio-demographic and variables and clinical aspects of pain for people living with HIV/AIDS – continuation

Variables	OR	CI95%	p value	OR (Adjusted) <sup>a</sup>	CI95%	p value
Severe pain						
Gender						
Female	2.601	1.438-1.470	<0.001*	5.329	1.728 – 16.433	0.004*
Male	1.0			1.0		
Age (years)						
21 to30	0.263	0.029 – 2.360	0.253	0.1384	0.007 – 2.612	0.187
31 to 40	0.60	0.07 – 4.544	0.975	0.261	0.0188 – 3.624	0.317
41 to 50	0.658	0.087 – 4.963	0.907	0.390	0.031- 4.899	0.466
51 to 60	0.727	0.09 – 5.726	0.819	0.582	0.040 – 8.399	0.691
> 60	1.0	-	-	1.0	-	-
Health status						
Poor	26.88	9.299 - 77.70	<0.0001*	11.73	2.095- 65.708	0.005*
Good	1.0			1.0		
Ill						
Yes	6.528	3.452 – 12.35	<0.0001*	3.251	0.698 – 15.145	0.133
No	1.0			1.0		
Infection stage						
AIDS	1.155	0.459 – 2.906	0.940	1.181	0.19711- 7.078	0.855
Symptomatic	0.008	0.004 - 1.570	0.07	0.000	-	0.992
Asymptomatic	1.0	-	-	1.0	-	-

<sup>a</sup>OR (CI95%): odds ratio and 95% confidence interval adjusted by all variables listed in tables 1 and 2, by means of multinomial logistic regression; reference class was "No pain/mild pain".

and corresponded to their perception of their health, this fact is directly linked to symptoms load and perception in face of all this presentation.

## DISCUSSION

Our results point to pain as common symptom in people living with HIV/AIDS, being present in any stage of infection, in agreement with other studies<sup>10,11</sup>. Still confirming our results, another study<sup>12</sup> after evaluating 302 ambulatory HIV/AIDS patients in Uganda, has found a total of 53% of individuals reporting mild pain, 20% moderate pain and 27% severe pain.

However, some authors have disagreed from our study when evaluating 156 individuals of whom 48.7% have reported pain, being that 51.3% had moderate to severe pain<sup>11</sup>.

When pain was correlated to socio-demographic variables, and in line with the literature, it was possible to find significant relationship with gender, which has already been reported by other authors, being females with higher prevalence of painful symptoms, being this fact associated to females' anatomo-functional characteristics, as well as to modulation of some nervous system impulses, hormonal and psychological problems<sup>13,14</sup>.

Our results point to a higher number of females with moderate (28.2%) and severe (35.1%) pain. Conversely, most

males had no pain or mild pain (58.5%). In this same line of thought, some authors have found strong association between pain and female gender<sup>15</sup>.

Confirming our results, a study with 354 Cuban participants (73 females, 281 males) has shown that pain significantly interfered with females as compared to males<sup>16</sup>. This was also true in a study by Norval<sup>17</sup> with 103 adult HIV/AIDS patients, where it was possible to detect high prevalence of pain, being that females have referred more pain as compared to males, which strengthens even more our results, in spite of the different number of individuals in these studies. However, in disagreement with our study, other studies with populations living with HIV/AIDS, have not found significant differences between gender and the presence of pain<sup>12,18,19</sup>.

With regard to health status, it is classified as good or poor and the perception of feeling ill or not. So, these two variables are intrinsically connected because they correspond to the individual perception of their health. Some studies have made this correlation between health perception and pain, finding an inversely proportional relationship between these variables<sup>20,21</sup>, which confirms our results.

Health perception is directly related to patients' state of mind, how they position themselves in face of a chronic, permanent and full of stigmata disease, being reflected in the way patients decide to face potential challenges of the

disease and how they will cope with the treatment. So, a study with 953 people living with HIV/AIDS has stated that pain is directly related to health self-evaluation after finding significant relationship between pain and health status self-evaluation<sup>22</sup>.

With regard to infection stage, our study is in agreement with the literature because it is known that pain predominance may vary depending on disease stage, care and treatment. This was proved by Bravin<sup>10</sup> who has found in his prospective study 38% of ambulatory patients with HIV reporting significant pain, versus 50% of AIDS patients with the same symptoms; while just 25% of patients in early stages of infection have referred pain.

In agreement with our results, different studies have found significant relationship between pain, immune status and advanced disease stage, advanced infection stage and the appearance of a larger number of symptoms and comorbidities, reporting pain as a significantly common symptom in people living with HIV/AIDS (PVHA)<sup>12,18,23,24</sup>.

Conversely, however, a study with 79 PVHA, although having found pain as early symptom, has found weak and negative correlation between pain and disease stage, without statistical significance<sup>19</sup>.

With regard to mode of infection, our study points to a significant correlation with pain, with higher concentration among those acquiring HIV/AIDS through sexual intercourse with males. This fact might be explained because most participants of this study were females and, as observed, there is strong correlation between gender and pain. With regard to other pain classifications, and in agreement with our results, other studies have also found the head as primary site of pain<sup>10,18,24</sup>. Similarly, other studies have found more common diagnoses: headache (46%), joint pain (31%) and muscle pain (27%)<sup>25</sup>; 40.9% had lower limbs pain, 44.4% neuropathic pain affecting feet, 31.8% abdominal pain, 31.8% head and neck, while just 4.5% had widespread pain<sup>19</sup>.

Differently from our results, another study has reported that pain was especially referred in abdomen and mouth (33%), followed by muscle pain (32%), joint or bone pain (20%)<sup>26</sup>, or even lower limbs (66%) followed by mouth pain (50.5%), headache (42.3%), throat ache (39.8%), chest pain (17.5%)<sup>17</sup>; joint (52.36%) and abdominal (50.37%) pain<sup>22</sup>. Another study with 157 participants has identified chest pain as primary pain site, followed by headache<sup>27</sup>.

However, even with variations as to pain site prevalence among patients, our results, in general, are in line with the literature with regard to major pain sites referred by people living with HIV/AIDS.

It is important to stress that pain site might be associated to rheumatologic problems, which are very common among people with HIV/AIDS, as adverse effect of antiretroviral therapy and also due to opportunistic diseases<sup>19,25</sup>.

So, the association of pain site and intensity could be explained by the infection stage, being associated to the presence of comorbidities and the use of antiretroviral drugs,

which may induce nervous injuries being responsible for peripheral neuropathy pain, which may vary from mild to severe in addition to being incapacitating<sup>23,28</sup>.

With regard to characteristic there has been significant association with pain intensity ( $p < 0.001$ ), being primarily characterized as shooting (69%), drilling (55%) and burning (41%), in agreement with other studies which have also established this classification<sup>29,30</sup>.

Understanding quality is critical for the establishment of some treatment goals. So, in a documental study as from medical charts of a reference hospital, it was possible to classify pain as radiating (33.3%), pulsing (20.0%), burning (6.7%), jumping (6.7%), pressing (6.7%), allodynia (6.7%), colic-type (6.7%) and widespread (6.7%)<sup>31</sup>.

With regard to time, it calls the attention the number of people with severe chronic pain (48.8%), since this pain is associated to a multifactorial character, but may also be related to the association of mixed pathogenic mechanisms<sup>32,34</sup>. In case of people living with HIV/AIDS, this fact might be directly linked to disease stage, as well as to immune status, because there are estimates that approximately one million terminal patients suffer pain due to lack of treatment, being mostly classified as chronic pain<sup>1,3,35</sup>.

A study has found frequent pain reports in the two weeks previous to the study in 27 patients, 2% of the sample, being that 22% have stated that pain persisted for more than three months, being then classified as chronic pain<sup>4</sup>.

Literature, however, is in disagreement with these results when reporting correlation of pain with early disease symptom, being that in our study correlation was weak and negative with regard to stage, not being statistically significant<sup>19</sup>. Logistic regression analysis has shown relative risk of being female and having pain. These data strengthen previous discussions with regard to the association of female gender and pain.

Some studies have shown fragility of females with HIV/AIDS to present pain, be it due to the burden of the disease, which is considered higher for females, to cultural and economic disparities and education level, as well as to physiology, emotional and psychological states and gynecologic problems. These factors add to the fact that females are at risk for persistent, widespread and more severe pain. Among most common symptoms referred by females there are radiculopathies and headache<sup>36-38</sup>.

However, some studies disagree with this statement, as from relative risk measurement, not finding association between being female and the presence of pain<sup>12,18,39</sup>.

Our results also point to the fact that being younger is a protection factor for pain in PVHA, which might be partially explained by the brittleness syndrome affecting the elderly<sup>40</sup>, as well as by the difficulty of diagnosing AIDS in the elderly primarily due to differential diagnosis<sup>41,42</sup>.

In general, some studies advocate the theory of symptoms management, supporting the fact that individual characteristics, among them age, could be a risk factor, interacting with a health problem<sup>43,44</sup>.

Another study<sup>18</sup>, after regression analysis, has found the variable age as risk of 1.03 ( $p < 0.016$ ) for the presence of pain. It is worth mentioning that there has been no division by age groups.

On the other hand, some authors report that younger adults are more prone to some symptoms related to HIV/AIDS, more specifically to headache<sup>45</sup>. However, the same authors have concluded that effects related to age as risk factor could be mistaken with those related to race. Another study has not found risk relationship between age and the appearance of symptoms such as pain<sup>44</sup>.

With regard to health status being a risk factor, this was because classification was made as from individual perception, which is directly linked to symptoms load and perception with regard to the disease. A study has reported that the number of symptoms had 1.30 ( $p < 0.03$ ) risk for the presence of severe pain<sup>12</sup>.

Similarly, other studies state that health self-evaluation is a risk factor for the presence of pain<sup>22,46</sup>.

## CONCLUSION

In light of our results, it was possible to observe association between pain and some socio-demographic and clinic factors in people living with HIV/AIDS.

## REFERENCES

1. International HIV& AIDS charity. Pain in people with HIV. 2013. Disponível em: <http://www.avert.org/aids-pain.htm>. Acesso em: 08/07/2015.
2. Grunenthal F. Estudio EPIDOR: estudio epidemiológico del dolor en España. Sociedade Espanhola de Reumatologia. Madrid: Edipharma; 2003.
3. Oliveira RM, da Silva LM, Pereira ML, Moura MA. [Pain management in patients with AIDS: analysis of the management structure of a reference hospital]. Rev Esc Enferm USP. 2013;47(2):456-63. Portuguese.
4. Robbins NM, Chaiklang K, Supparatpinyo K. Undertreatment of pain in HIV + adults in Thailand. J Pain Symptom Manage. 2013;45(6):1061-72.
5. UNAIDS. UNAIDS report on the global AIDS epidemic 2012 "UNAIDS / JC2417E. Disponível em: [http://www.unaids.org.br/sobre\\_aids/sobre\\_aids.asp](http://www.unaids.org.br/sobre_aids/sobre_aids.asp). Acesso em: 04 de março de 2015.
6. Brasil. Boletim Epidemiológico - AIDS/DST. (Ano VIII - nº 1 - 27ª a 52ª - semanas epidemiológicas - julho a dezembro de 2010; Ano VIII - nº 1 - 01ª a 26ª - semanas epidemiológicas - janeiro a junho de 2011). Ministério da Saúde. Ano VIII nº 01. 2012. Disponível em: <http://www.aids.gov.br/pagina/publicacoes?page=1>. Acesso em: 20/06/2013.
7. Aires EM, Bammann RH. Pain in hospitalized HIV-positive patients: clinical and therapeutical issues. Braz J Infect Dis. 2005;9(3):201-8.
8. Mattar F N. Pesquisa de marketing: metodologia, planejamento. 6a ed. São Paulo: Atlas; 2005.
9. Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. Pain. 1983;17(1):45-56.
10. Bravin F. HIV+ e a dor crônica. Disponível em: <http://drfranciscobravim.site.med.br/index.asp?PageName=HIV-2B-20e-20a-20Dor-20Cr-F4nica>. Acesso em 21/06/2015.
11. Merlin JS, Cen L, Praestgaard A, Turner M, Obando A, Alpert C, et al. Pain and physical and psychological symptoms in ambulatory HIV patients in the current treatment era. J Pain Symptom Manage. 2012;43(3):638-45
12. Namisango E, Harding R, Atuhaire L, Ddunga H, Katabira E, Muwanika FR, et al. Pain among ambulatory HIV/AIDS patients: multicenter study of prevalence, intensity, associated factors, and effect. J Pain. 2012;13(7):704-13.
13. Sarlani E, Greenspan JD. Gender differences in temporal summation of mechanically evoked pain. Pain. 2002;97(1-2):163-9.
14. Quiton RL, Greenspan JD. Sex differences in endogenous pain modulation by distracting and painful conditioning stimulation. Pain. 2007;132(Suppl 1):S134-49.
15. Cipriano A, Almeida DB, Vall J. Perfil do paciente com dor crônica atendida em um ambulatório de dor de uma grande cidade do sul do Brasil. Rev Dor. 2011;12(4):297-300.
16. Calvetti PU, Giovelli GR, da Rosa CT, Gauer GJ, Moraes JF. Qualidade de vida em mulheres portadoras de HIV/Aids. Aletheia. 2012;(38-39):25-38.
17. Norval DA. Symptoms and sites of pain experienced by AIDS patients. S Afr Med J. 2004;94(6):450-4.
18. Aouizerat BE, Miaszkowski CA, Gay C, Portillo CJ, Coggins T, Davis H, et al. Risk factors and symptoms associated with pain in HIV-infected adults. J Assoc Nurses AIDS Care. 2010;21(2):125-33.
19. Wahab KW, Salami AK. pain as a symptom in patients living with HIV/AIDS Seen at the outpatient clinic of a Nigerian Tertiary Hospital. J Int Assoc Physicians AIDS Care (Chic). 2011;10(1):35-9.
20. Siqueira FV, Facchini LA, Hallal PC. Epidemiology of physiotherapy utilization among adults and elderly. Rev Saude Publica. 2005;39(4):663-8.
21. Siqueira FV, Facchini LA, Piccini RX, Tomasi E, Thumé E, Silveira DS, et al. Atividade física em adultos e idosos residentes em áreas de abrangência de unidades básicas de saúde de municípios das regiões Sul e Nordeste do Brasil. Cad Saúde Pública. 2008;24(1):39-54.
22. daCosta DiBonaventura M, Gupta S, Cho M, Mrus J. The association of HIV/AIDS treatment side effects with health status, work productivity, and resource use. AIDS Care. 2012;24(6):744-55.
23. Parker R, Stein DJ, Jelsma J. Pain in people living with HIV/AIDS: a systematic review. J Int AIDS Soc. 2014;17:18719.
24. Nair SN, Mary TR, Prarthana S, Harrison P. Prevalence of pain in patients with HIV/AIDS: a cross-sectional survey in a South Indian State. Indian J Palliat Care. 2009;15(1):67-70.
25. Hewitt DJ, McDonald M, Portenoy RK, Rosenfeld B, Passik S, Breitbart W. Pain syndromes and etiologies in ambulatory AIDS patients. Pain. 1997;70(2-3):117-23.
26. Larue F, Fontaine A, Colleau SM. Underestimation and undertreatment of pain in HIV disease: multicentre study. BMJ. 1997;314(7073):23-8.
27. Ebrim LN, Otokwala JG. Inadequate pain relief in ambulatory patients with human immunodeficiency virus disease in Port Harcourt. HIV/AIDS (Auckl). 2013;5:199-203.
28. Krashin DL, Merrill JO, Trescot AM. Opioids in the management of HIV-related pain. Pain Physician. 2012;15(3 Suppl):E157-68.
29. Oliveira RM, Silva LM, Pereira ML, Gomes JM, Figueiredo SV, Almeida PC. Dor e analgesia em pacientes com síndrome da imunodeficiência adquirida. Rev Dor. 2012;13(4):332-7.
30. Fonseca JF, Britto MN. Terapias complementares como técnicas adjuvantes no controle da dor oncológica. Rev Saúde e Pesquisa. 2009;2(3):387-95.
31. Oliveira RM, da Silva LM, Pereira ML, Moura MA. [Pain management in patients with AIDS: analysis of the management structure of a reference hospital]. Rev Esc Enferm USP. 2013;47(2):456-63. Portuguese.
32. Castro LJ, Saramago P, Romão J, Paiva MD. A Dor Crônica em Portugal. Pain Proposal. 2011;24(12):1-12.
33. D'arcy Y. Compact clinical guide to acute pain management: an evidence-based approach for nurses. New York: Springer Publishing Company; 2011.
34. Vellucci R. Heterogeneity of chronic pain. Clin Drug Investig. 2012;32(Suppl 1):3-10.
35. Alves Neto O, et al. Dor: princípios e prática. Porto Alegre: Artmed; 2008. 1438p.
36. PEPFAR: President's Emergency Plan for AIDS Relief. Fact Sheet. Washington, DC: Office of the Global AIDS Coordinator; 2005.
37. Breitbart W, Passik SD, Reddy KS. Pain: clinical updates. IASP. 2006;4:1-8.
38. IASP. Task Force for Global Year Against Pain in Women. October 2007–2008: Fact Sheet. Coller B. 2007. Pesquisado em: <http://www.iasp-pain.org/GlobalYear/PaininWomen>. Acesso em: 20/06/2013
39. Cervia LD, McGowan JP, Wesley AJ. Clinical and demographic variables related to pain in HIV-infected individuals treated with effective, combination antiretroviral therapy (cART). Pain Med. 2010;11(4):498-503.
40. Fhon JR, Diniz MA, Leonardo KC, Kusumota L, Haas VJ, Rodrigues RA. Síndrome de fragilidade relacionada à incapacidade funcional no idoso. Acta Paul Enferm. 2012;25(4):589-94.
41. Azambuja KE. Perfil do paciente HIV+ com mais de 60 anos no Estado do Rio de Janeiro. Disponível em: [http://www.aidscongress.net/7\\_congresso](http://www.aidscongress.net/7_congresso). Acesso em: 28/08/2015.
42. Serra A, Sardinha AH, Pereira AN, Lima SC. Percepção de vida dos idosos portadores do HIV/AIDS atendidos em centro de referência estadual. Saúde em Debate. 2013;37(97):294-304.
43. Humphreys J. A middle range theory of symptom management. In: Smith MJ, Liehr PR, eds. Middle range theory for nursing. New York: Springer Publishing Company; 2008. 145-58p.
44. Lee KA, Gay C, Portillo CJ, Coggins T, Davis H, Pullinger CR, et al. Symptom experience in HIV-infected adults: a function of demographic and clinical characteristics. J Pain Symptom Manage. 2009;38(6):882-93.
45. Zingmond DS, Kilbourne AM, Justice AC, Wenger NS, Rodriguez-Barradas M, Rabeneck L, et al. Differences in symptom expression in older HIV-positive patients: the Veterans Aging Cohort 3 Site Study and HIV cost and service utilization study experience. J Acquir Immune Defic Syndr. 2003;33(Suppl 2):S84-92.
46. Berber JS, Kupek E, Berber SC. Prevalência de depressão e sua relação com a qualidade de vida em pacientes com síndrome da fibromialgia. Rev Bras Reumatol. 2005;45(2):47-54.

# Temporomandibular disorders and relationship with socio-demographic and clinical variables in a University of the state of Rio de Janeiro

*Disfunções temporomandibulares e a relação com determinantes sócio-demográficos e clínicos em uma universidade do estado do Rio de Janeiro*

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** This study aimed at identifying the prevalence of suspected temporomandibular disorders in employees and students of a Brazilian university and at evaluating the influence of socio-demographic and clinical variables on this disorder.

**METHODS:** This study had a non-probabilistic sample of 575 volunteers who were evaluated by a questionnaire proposed by the American Academy of Orofacial Pain.

**RESULTS:** Suspected temporomandibular disorder was present in 60.87% of the population. By means of multiple logistic regression analysis, just clinical variables were associated to the presence of suspected temporomandibular disorder, such as: headache, neck pain or teethache (OR=47.60), stiff, tight or regularly tired jaws (OR=13.37), mouth opening difficulty (OR=13.55) and pain around the ears, temples or cheeks (OR=4.61).

**CONCLUSION:** The questionnaire was effective as a pre-screening tool to identify symptoms, and results support the importance of clinical symptoms for the identification and follow up of patients with such disorders.

**Keywords:** Epidemiology, Headache, Neck pain, Temporomandibular joint, Temporomandibular joint disorders.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** O objetivo deste estudo foi identificar a prevalência de suspeita de disfunção temporomandibular em funcionários e estudantes em uma universidade no Brasil e analisar a influência das variáveis sócio-demográficas e clínicas sobre essa disfunção.

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**MÉTODOS:** Este estudo teve uma amostra não probabilística compreendendo 575 voluntários que foram avaliadas por um questionário, proposto pela Academia Americana de Dor Orofacial.

**RESULTADOS:** A suspeita de disfunção temporomandibular estava presente em 60,87% da população. Por meio da análise de regressão logística múltipla, apenas variáveis clínicas foram associadas com a presença de suspeita de disfunção temporomandibular, como: apresentar cefaleia, dores no pescoço ou nos dentes (OR=47,60), maxilares rígidos, apertados ou cansados com regularidade (OR=13,37), dificuldade na abertura da boca (OR=13,55) e dor ao redor das orelhas, têmporas ou bochecha (OR=4,61).

**CONCLUSÃO:** O questionário foi eficaz como um instrumento de pré-triagem no levantamento dos sintomas; e os resultados suportam o ponto forte dos sintomas clínicos na identificação e acompanhamento de indivíduos com tais lesões.

**Descritores:** Articulação temporomandibular, Cefaleia, Cervicalgia, Epidemiologia, Transtornos da articulação temporomandibular.

## INTRODUCTION

Temporomandibular disorders (TMD) are part of a complex of pathologies that affect the masticatory system in its joints and muscles. Due to its multifactorial origin, many studies have sought to define the mechanisms that prompt or cause this condition. Although the etiology of TMD is unknown, these disorders can be caused by trauma to the face or even by an inflammatory process of the temporomandibular joint (TMJ)<sup>1</sup>.

Epidemiological studies have shown considerable variability in the pattern of this condition<sup>2,3</sup>. There are factors such as age, gender, direct and indirect traumas, oral parafunctions, tooth loss, pathophysiological factors, occlusal disorders, as well as psychosocial and psychological factors that can be associated with TMD<sup>4-9</sup>.

Health professionals have been reported to have high levels of anxiety, which begins in the undergraduate years. Anxiety levels and other stress factors in students have been subject to research, since this has been related to increased risk for the onset of other conditions<sup>10</sup>.

Based on this, various studies have been carried out within universities<sup>11-13</sup> and results generally show that a large percentage of students have some degree of TMD, especially females, individuals who are anxious and those that are in the latter part of their course<sup>12,14-16</sup>.

The literature reveals different tools to measure TMD, organized in various forms: questionnaires, anamnestic indexes, and clinical diagnostic criteria<sup>8</sup>. Each of these tools has its own advantages, di-

sadvantages and limitations, as well as distinct applications. Thus, both the clinician and the researcher must be aware of the type of data that can be obtained from the application of each tool, and how to use it adequately<sup>17</sup>.

Various surveys have been used for initial screening of potential patients with orofacial pain, including TMD<sup>8</sup>. One such survey has been prepared by the American Academy of Orofacial Pain (AAOP)<sup>8</sup>. This questionnaire has ten specific issues related to TMD. However, the author of the questionnaire recommends that such screening should be combined with anamnesis and clinical data<sup>17</sup>. It should be pointed out that such tool is viable for large populations, like a study with epidemiological characteristics.

Early diagnosis of TMD is of extreme importance so that any deterioration can be prevented and/or controlled. Also, with proper diagnosis, treatment strategies can be tailored for each patient.

Thus, the present study aimed at evaluating the prevalence of suspected TMD in employees and students of Nova Friburgo Campus of the Fluminense Federal University of the State of Rio de Janeiro, Brazil, and at analyzing the influence of socio-demographic and clinical variables on the way people experience this condition.

## METHODS

This cross-sectional census survey was carried out by initially counting on the participation of all students (n=658), teachers (n=87), outsourced employees and technical and administrative staff (n=105) of three health courses: Phonoaudiology, Dentistry and Biomedicine at the Nova Friburgo Campus of the Fluminense Federal University, where, because it was a census study, it was proposed to take 100% of the sample. With the losses due to exclusion criteria, there were 850 individuals of both genders, aged 18 to 69 years in 2012. The majority of the individuals at the University are from the inland mountainous region of the state of Rio de Janeiro. Volunteers could refuse to participate or withdraw from the study at any time, without this implying any type of penalty or damage to their care.

The Free and Informed Consent Form was signed by volunteers in order to participate in the study, and they were duly informed that all identities would remain undisclosed.

A pilot study was carried out before the main study with teachers (n=5), employees (n=5) and students (n=5) linked to the Nova Friburgo Campus of UFF, in order to check the understanding of the questions in the questionnaires to be applied as well as to train the researchers in the organization, and how to approach and carry out the main research phase.

In this second stage, the semi-structured questionnaires, previously tested in a pilot study, were presented to participants in the classroom, together with the Free and Informed Consent form, and also to other participants in their work places. Prior to handing out the questionnaires, the researcher explained the objectives of the study and restated the confidentiality of the replies to avoid any influence among participants concerning the information provided. The questionnaires and Informed Consent forms were collected immediately after being filled out. The semi-structured questionnaire used here was the questionnaire for pre-screening of orofacial pain and temporomandibular disorders recommended by the AAOP<sup>8</sup>. The

questionnaire is composed of 10 self-explanatory questions of clinical nature, with yes/no answers to the most common signs and symptoms of orofacial pain and TMD<sup>9</sup>. Information on suspected TMD, was combined with socio-demographic characteristic data of participants (Attachment 1).

The questionnaire was reapplied in 10% of the study population, after a minimum interval of one week, in order to determine the reproducibility/consistency of answers.

At first a descriptive analysis of the data was carried out to grasp an initial understanding of data acquired and characterization of the population. For bivariate and multivariate analyses, suspected TMD was considered as dependent variable (dichotomized into 'yes' and 'no'). Independent variables were categorized as follows: gender (male, female), age (<30, ≥ 30 years old), race (leucoderm, melanoderm, feoderm and xanthoderm), occupation (student, teacher, technical/administrative, outsourced), education (high school - maximum, graduation - minimum), course (not a student, biomedical, speech pathology and dentistry), study period (not a student, up to the third period - basic cycle, as of the fourth period professional-cycle), mouth opening difficulty (no, yes), closed lock jaw (no, yes), difficulty in using the jaw (no, yes), presence of TMJ noise (no, yes), stiff, tight or frequently tired jaws (no, yes), pain around the ears, temples or cheek (no, yes), TMD signs and symptoms (muscle, joint, joint and muscle), headaches, neck pains or toothaches (no, yes), co-morbidities commonly associated with TMD (headaches, toothaches, neck, no pain, more than one pain), recent trauma to the head, neck, or jaw (no, yes), recent change in bite (no, yes), treatment for a problem not explained in TMJ (no, yes).

This study was approved by the Ethics Committee of the Fluminense Federal University (UFF), following Resolution 196/96 of the National Health Council, Ministry of Health, under process: CEP/CMM/HUAP n.12395 - CAAE n.00895412.0 .0000.5243.

## Statistical analysis

The association of independent and dependent variables underwent Chi-square or Fisher's Exact test and 5% significance level was applied. Variables that were statistically significant at 20% level or less in the bivariate analysis were selected for multiple logistic regression analysis using the stepwise procedure. Odds ratio (OR) and respective 95% confidence intervals (CI) were estimated for variables that remained in the multiple regression model at 5% level. All statistical tests were performed using SAS software (SAS User's Guide: Statistics, version 9.2 Cary [NY]: SAS Institute Inc in 2001).

## RESULTS

Response rate was 67.65% (n=575) of 850 individuals at the UFF. Factors related to this drop of participants were: refusal to participate in the research, incomplete or inadequate filling out of the Free and Informed Consent form and absence or difficulty in locating the individual to hand over and collect the questionnaires.

However, despite of this loss of individuals (n=275; 32.35%), information obtained from the course coordination department showed that these subjects had similar socio-demographic characteristics to those who participated in the survey.

The reproducibility of the answers, from the questionnaires reapplied to 57 individuals (10% of the total evaluated), gave a satisfactory result, with agreement values of 87%.

Sample included students (84.69%), teachers (8.69%), technical/administrative personnel (4.34%) and outsourced personnel (3.65%). Out of this total 24.69% were males and 75.13% were females, mean population age was 24.7 years (>30 years (16%) <30 years (84%)).

Based on analyzed information, there was higher proportion of positive responses among female subjects and students (from the latter periods of the Dentistry course, and those who were not living with their families).

Characteristics related to the movement of mouth opening and closing as well as limitations and difficulties (questions 1 and 2) represented 15.36% and fatigue and difficulties in chewing, (questions 3 and 5) represented 22.09% in the studied group. These results suggest the need for further research into teeth clenching.

Joint noises noticed by subjects (clicks, crackle, friction and hypermobility) (question 4) represented 35.47% of affirmative answers.

A prevalence of 34% positive answers for co-morbidities associated with neck pains, headaches or toothaches was identified, which should be given closer attention due to the high frequency of these positive answers (19.03%).

Regarding the bivariate analysis, variables age, race, occupation, education, course, period and TMD signs and symptoms had no significant association with suspected TMD (Table 1).

Multiple logistic regression analysis showed that risk factors associated with the presence of suspected TMD were: headaches, neck pains or toothaches (OR=47.60), stiff, tight or frequently tired jaws (OR=13.37), mouth opening difficulty (OR=13.55) and pain and tenderness around the ears, temples or cheeks (OR=4.61) (Table 2).

**Table 1.** Bivariate analysis by Chi-square test or Fisher's Exact test for association between dependent variable (suspected TMD) and independent variables (socio-demographic variables). Nova Friburgo, Rio de Janeiro, Brazil, 2013

Variables	Suspected TMD				OR	CI95%	p value
	No		Yes				
	n	%	n	%			
<b>Gender</b>							
Female	155	35.88	277	64.12	ref		
Male	71	50.00	71	50.00	0.56	0.38-0.82	0.0028
<b>Age (years)</b>							
<30	183	38.28	295	61.72	ref		
>=30	42	45.65	50	54.35	0.74	0.47-1.16	0.1855
<b>Race</b>							
Leucoderm	176	39.29	272	60.71	ref		
Melanoderm	12	60.00	8	40.00	0.43	0.17-1.08	0.1062
Feoderm	24	35.29	44	64.71	1.19	0.70-2.02	0.6199
Xanthoderm	2	50.00	2	50.00	0.65	0.09-4.64	0.9384
<b>Occupation</b>							
Student	185	38.70	293	61.30	ref		
Teacher	19	38.00	31	62.00	1.03	0.57-1.88	0.9557
Technical/administrative personnel	11	44.00	14	56.00	0.80	0.36-1.81	0.7497
Outsource personnel	11	52.38	10	47.62	0.57	0.24-1.38	0.3040
<b>Education</b>							
Incomplete higher	196	39.60	299	60.40	Ref		
Complete higher	30	37.97	49	62.03	1.07	0.66-1.75	0.7842
<b>Course</b>							
Not a student	41	43.16	54	56.84	ref		
Dentistry	134	36.02	238	63.98	1.35	0.85-2.13	0.2445
Speech pathology	22	43.14	29	56.86	1.00	0.50-1.99	0.8628
Biomedicine	29	51.79	27	48.21	0.71	0.36-1.37	0.3909
<b>Period</b>							
Not a student	40	42.55	54	57.45	ref		
Up to 3 <sup>rd</sup> period (basic)	92	45.10	112	54.90	0.90	0.55-1.48	0.7753

OR = odds ratio; CI = confidence interval; 'Yes' category is the reference level of dependent variable (suspected TMD); Not possible to calculate OR as the frequency was equal to zero.

**Table 2.** Bivariate analysis by Chi-square test or Fisher's Exact test for association between dependent variable (suspected TMD) and independent variables (clinical variables). Nova Friburgo, Rio de Janeiro, Brazil, 2013

Variables	Suspected TMD				OR	CI 95%	P Value
	No		Yes				
	n	%	n	%			
<b>Difficult in mouth opening</b>							
No	225	44.29	283	55.71	ref		
Yes	1	1.52	65	68.48	51.68	7.12-375.32	<0.0001
<b>Closed lock</b>							
No	226	43.46	294	56.54	-		
Yes	0	0.00	54	100.00	-	-	-
<b>Difficulty using the jaws</b>							
No	225	43.44	293	56.56	ref		
Yes	1	1.79	55	98.21	42.23	5.80-307.53	<0.0001
<b>Presence of noise in the TMJ</b>							
No	224	60.38	147	39.62	ref		
Yes	2	0.99	201	99.01	153.14	37.46-626.16	<0.0001
<b>Stiff, tight or regularly tired jaws</b>							
No	223	47.85	243	52.15	ref		
Yes	3	2.78	105	97.22	32.12	10.05-102.66	<0.0001
<b>Pain around the ears, temples or cheek</b>							
No	222	46.84	252	53.16	ref		
Yes	4	4.00	96	96.00	21.14	7.65-58.42	<0.0001
<b>Location of one pain</b>							
Muscular type	3	4.48	64	95.52	-		
Articular type	1	5.00	19	95.00	-	-	-
Articular and muscular	0	0.00	9	100.00	-	-	-
<b>Headaches, neck pains or toothaches</b>							
No	222	57.96	161	42.04	ref		
Yes	4	2.09	187	97.91	64.46	23.46-177.16	<0.0001
<b>Location of two pains</b>							
Headaches	2	1.83	107	98.17	ref		
Teeth	0	0.00	20	100.00	-	-	-
Neck	0	0.00	29	100.00	-	-	-
No pains	222	58.12	160	41.88	0.01	0.00-0.06	<0.0001
More than one pain	2	5.88	32	94.12	0.30	0.04-2.21	0.5131
<b>Recent history of trauma to the head, neck, or jaws</b>							
No	226	40.36	334	59.64	-		
Yes	0	0.00	14	100.00	-	-	-
<b>Recent change in bite</b>							
No	225	43.27	295	56.73	ref		
Yes	1	1.85	53	98.15	40.42	5.55-294.53	<0.0001
<b>Treatment for problem not explained by TMJ</b>							
No	226	40.87	327	59.13	-		
Yes	0	0.00	21	100.00	-	-	-

OR = odds ratio; CI = confidence interval; A 'Yes' category is the reference level of dependent variable (suspected TMD). Not possible to calculate OR as the frequency was equal to zero; TMJ = temporomandibular joint.

**Table 3.** Multiple logistic regression analysis. Nova Friburgo. RJ. Brasil. 2013

Variables	Suspected TMD		OR	CI95%	p value
	n	%			
Headache, neck pains or toothaches					
No	161	42.04	Ref		
Yes	187	97.91	47.60	17.06-132.79	<0.0001
Stiff, tight or frequently tired jaws					
No	243	52.15	Ref		
Yes	105	97.22	13.37	3.90-45.81	<0.0001
Mouth opening difficulty					
No	283	55.71	ref		
Yes	65	68.48	13.55	1.65-111.11	<0.0001
Pain around the ears, temples or cheeks					
No	252	53.16	ref		
Yes	96	96.00	4.61	1.42-15.02	0.0009
Difficulty using the jaws					
No	293	56.56	ref		
Yes	55	98.21	7.27	0.82-64.34	0.0452

A 'Yes' category is the reference level of dependent variable (suspected TMD); OR = odds ratio; CI = confidence interval.

## DISCUSSION

Previous epidemiological studies have shown prevalence of TMD between 40% and 75%<sup>1,6,16,19-21</sup> when using pre-structured questionnaires in different populations<sup>8</sup>, which corroborates the results of this study that reported prevalence of suspected temporomandibular dysfunction of 60.87%.

This result in itself would suggest, depending on the tool used, a more specific study and systematic classification.

Temporomandibular disorder may be related to parafunctional habits, muscle pain, joint noises and other comorbidities that should be investigated as from the suspected diagnosis.

Parafunctional habits such as teeth clenching may overload masticatory muscles and TMJ, and could therefore affect the entire chewing system<sup>17</sup> in agreement with results found in this study. Those who answered "yes" to questions 3 and 5 (difficulty using the jaws and stiff, tight or frequently tired jaws), 97.22 and 68.48%, respectively, are more likely to develop the condition.

Joint noises noticed by the subjects (clicks, crackle, friction and hypermobility) (question 4) represented 35.47% of the answers. However, a high occurrence of these noises in different studies is well known<sup>24,25</sup> and this is not necessarily characterized as TMD or the need for professional attention or intervention.

It is important to identify co-morbidities such as headaches and neck pains, as well as other non TMDs pains in the orofacial region, due to their pathophysiological relationship with trigeminal nerve nuclei, which perpetuate morbid TMD characteristics, such as peripheral and central sensitizations, and decrease tolerance thresholds for these inter-related injuries<sup>26</sup>. The prevalence of 19.13% (OR=47.60), which was found for headaches, requires more detailed attention.

Individual psychological and interpersonal factors as well as situational variables can influence the adaptive capacity of a patient, which

leads to hypotheses that some emotional conditions such as anxiety, depression and individual personality traits are characteristics that may predispose, initiate and perpetuate TMD<sup>27,28</sup>.

It is also worth noting that dentistry students have a greater awareness of issues related to dental occlusion and suspected TMD, which generates a possible overestimation of positive responses for this class of individuals. Thus, they should receive further clarification and professional guidance. Also a deeper and more personal investigation of these individuals is recommended.

Thus, the results presented in this study point out the need for a systematic investigation and classification by a tool comprising these factors, such as the Research Diagnostic Criteria for Temporomandibular Disorders - RDC/TMD<sup>22</sup> or Diagnostic criteria for temporomandibular disorders DC/TMD<sup>23</sup> in future studies. Results presented here are also in agreement with other authors<sup>6</sup>, stating that the questionnaire proposed by the AAOP is feasible and viable as a pre-screening tool in patients with temporomandibular disorders and may even be used by general practitioners in their offices. However it should be emphasized that this questionnaire is not the only tool for diagnosis, and should be used as an auxiliary tool to track individuals with suspected TMD and subsequent referral to specialists for Temporomandibular Disorders.

## CONCLUSION

This study was able to identify important aspects of temporomandibular disorders at the Nova Friburgo Campus suggesting that a deeper systematic investigation and classification in 60.87% of the population studied should be held. Clinical variables presented a significant correlation with suspected TMD, which shows the importance of clinical symptoms in identifying and tracking individuals with such an injury.

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**Attachment 1.** Questionnaire adapted for orofacial pain and temporomandibular disorders recommended by the American Academy of Orofacial Pain (AAOP)

Name:.....  
 Date:.././.....  
 Address: .....  
 Who do you live with? ( ) Friends ( ) Family ( ) Others  
 Gender: ( ) F ( ) M Age: years Date of Birth:.././.....  
 Race.....  
 Occupation: .....  
 Education: .....  
 Sector:.....Course:.....  
 Period: .....  
 E-mail:.....

1. Do you have difficulties, pain or both when opening your mouth, for example when yawning?  
( ) yes ( ) no
  2. Has you jaw become stiff, closed locked or dislocated?  
( ) yes ( ) no
  3. Do you have difficulty, pain or both when you chew, speak or use your jaws?  
( ) yes ( ) no
  4. Do you notice noises in your jaw joints?  
( ) yes ( ) no
  5. Do your jaws feel stiff, tight or are frequently tired?  
( ) yes ( ) no
  6. Do you have pain in or around your ears, temples or cheeks?  
( ) yes ( ) no
  7. Do you have headaches, neck pains or toothaches frequently?  
( ) yes ( ) no
  - 62 Where: a ( ) head; b ( ) neck; c ( ) teeth?
  8. Have you suffered any recent head, neck or jaw trauma?  
( ) yes ( ) no
  9. Have you noticed any recent change to your bite?  
( ) yes ( ) no
  10. Have you had any recent treatment for a problem not explained by a TMJ disorder?  
( ) yes ( ) no
- Do you use any dental device.....

**REFERENCES**

1. Carlsson GE. Epidemiology and treatment need for temporomandibular disorders. *J Orofac Pain.* 1999;13(4):232-7.
2. Helkimo M. Studies on function and dysfunction of the masticatory system. 3. Analyses of anamnestic and clinical recordings of dysfunction with the aid of indices. *Sven Tandlak Tidsskr.* 1974;67(3):165-81.

3. Feteih RM. Signs and symptoms of temporomandibular disorders and oral parafunctions in urban Saudi Arabian adolescents: a research report. *Head Face Med.* 2006;2:25-31.
4. Shiau YY, Chang C. An epidemiological study of temporomandibular disorders in university students of Taiwan. *Community Dent Oral Epidemiol.* 1992;20(1):43-7.
5. LeResche L. Epidemiology of temporomandibular disorders: implications for the investigation of etiologic factors. *Crit Rev Oral Biol Med.* 1997;8(3):291-305.
6. Manfredi AS, Silva AA, Vendite LL. Avaliação da sensibilidade do questionário de triagem para dor orofacial e desordens temporomandibulares recomendado pela Academia Americana de Dor Orofacial. *Rev Bras Otorrinolaringol.* 2001;67(6):763-8.
7. De Boever JA, Nilner M, Orthlieb JD, Steenks MH. Recommendations by the EACD for examination, diagnosis, and management of patients with temporomandibular disorders and orofacial pain the general dental practitioner. *J Orofac Pain.* 2008;22(3):268-78.
8. Chaves TC, Oliveira AS, Grossi DB. Principais instrumentos para avaliação da disfunção temporomandibular. parte II: critérios diagnósticos; uma contribuição para a prática clínica e de pesquisa. *Fisioter Pesq.* 2008;15(1):101-6.
9. Leeuw R, Klasser GD. Dor orofacial: guia de avaliação, diagnóstico e tratamento. 4ª ed. São Paulo: Quintessence; 2010.
10. Barbería E, Fernández-Frías C, Suárez-Clúa C, Saavedra D. Analysis of anxiety variables in dental students. *Int Dent J.* 2004;54(4):445-9.
11. Diniz MR, Sabadin PA, Leite FP, Kamizaki R. Psychological factors related to temporomandibular disorders: an evaluation of students preparing for college entrance examinations. *Acta Odontol Latinoam.* 2012;25(1):74-81.
12. Rosa RS, Oliveira PA, Faot F, Cury AA, Garcia RC. Prevalence of signs and symptoms of temporomandibular disorders and their association with young university students. *RGO.* 2008;56(2):121-6.
13. Conti PC, Ferreira PM, Pegoraro LF, Conti JV, Salvador MC. A cross-sectional study of prevalence and etiology of signs and symptoms of temporomandibular disorders in high school and university students. *J Orofac Pain.* 1996;10(3):254-62.
14. Nomura K, Vitti M, Oliveira AS, Chaves TC, Semprini M, Stéssere S, et al. Use of the Fonseca's questionnaire to assess the prevalence and severity of temporomandibular disorders in Brazilian dental undergraduates. *Braz Dent J.* 2007;18(2):163-7.
15. Fernandes AU, Garcia AR, Zuim PR, Cunha LD, Marchiori AV. Desordem temporomandibular e ansiedade em graduandos de odontologia. *Ciênc Odontol Bras.* 2007;10(1):70-7.
16. Goyatá FR, Taira NV, Almeida S, Silva DM, Taira CV. Avaliação de sinais e sintomas de disfunção temporomandibular entre os acadêmicos do curso de odontologia da Universidade Severino Sombra, Vassouras-RJ. *Int J Dent. Recife.* 2010;9(4):181-6.
17. Okeson JP. Tratamento das Desordens Temporomandibulares e Oclusão. 6ª ed. São Paulo: Elsevier; 2008.
18. Bonjardim LR, Lopes-Filho RJ, Amado G, Albuquerque RL Jr, Gonçalves SR. Association between symptoms of temporomandibular disorders and gender, morphological occlusion and psychological factors in a group of university students. *Indian J Dent Res.* 2009;20(2):190-4.
19. Gesch D, Bernhardt O, Alte D, Schwahn C, Kocher T, John U, et al. Prevalence of signs and symptoms of temporomandibular disorders in a urban and rural German population: results of a population-based Study of Health in Pomerania. *Quintessence Int.* 2004;35(2):143-50.
20. Pedroni CR, de Oliveira AS, Guaratini MI. Prevalence study of signs and symptoms of temporomandibular disorders in university students. *J Oral Rehabil.* 2003;30(3):283-9.
21. Bevilacqua-Grossi D, Chaves TC, de Oliveira AS, Monteiro-Pedro V. Anamnestic index severity and signs and symptoms of TMD. *Cranio.* 2006;24(2):112-8.
22. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. *J Craniomandib Disord.* 1992;6(4):301-55.
23. Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP, et al. Diagnostic criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: recommendations of the International RDC/TMD Consortium Network and Orofacial Pain Special Interest Group. *J Oral Facial Pain Headache.* 2014;28(1):6-27.
24. Moresca R, Urias D. Estudo epidemiológico dos ruídos da ATM em adultos jovens sul-brasileiros: parte 1. *J Bras Oclusao ATM Dor Orofac.* 2001;1(2):121-9.
25. Conti PC, Miranda JE, Ornelas F. Ruídos articulares e sinais de disfunção temporomandibular: um estudo comparativo por meio de palpação manual e vibratografia computadorizada da ATM. *Pesqui Odontol Bras.* 2000;14(4):367-71.
26. Franco AL, Godoi DA, Castanharo SM, Camparis CM. Interação entre cefaléias e disfunção temporomandibular: uma revisão da literatura. *Rev Odontol UNESP.* 2008;37(4):401-6.
27. Schwartz RA, Greene. CS, Laskin DM. Personality characteristics of patients with myofascial pain-dysfunction (MPD) syndrome unresponsive to conventional therapy. *J Dent Res.* 1979;58(5):1435-9.
28. Gross SM, Vachiano RB. Personality correlates of patients with temporomandibular pain dysfunction. *J Prosthet Dent.* 1973;30(3):326-9.

# Clinical evidence on visceral pain. Systematic review

## Evidência clínica sobre dor visceral. Revisão sistemática

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** Visceral pain is induced by abnormalities of organs such as stomach, kidneys, bladder, gallbladder, intestines and others and includes distension, ischemia, inflammation and mesenteric traction. It is responsible for physical and psychic incapacity, absenteeism and poor quality of life. This study aimed at discussing major aspects of visceral pain with regard to prevalence, etiology and diagnosis.

**CONTENTS:** According to Evidence-Based Medicine concepts, visceral pain etiology, diagnosis and prognosis were reviewed in LILACS, EMBASE and Pubmed databases. Therapeutic studies were not selected. The following terms were used as search strategy: (“visceral pain”[MeSH Terms] OR (“visceral”[All Fields] AND “pain”[All Fields]) OR “visceral pain”[All Fields]). Only studies published in Portuguese, English or Spanish were included. Narrative reviews with opinionated content and specific therapeutic procedures of medical specialties were excluded. Studies on visceral pain related to heart, cancer and musculoskeletal diseases and pregnancy were also excluded.

**CONCLUSION:** Visceral pain is a heterogeneous condition where most frequent presentation is abdominal pain in the course of irritable bowel syndrome. Other diseases induce visceral pain and adequate diagnosis is critical for effective treatment.

**Keywords:** Chronic pain, Systematic review, Visceral pain.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A dor visceral é causada por anormalidades de órgãos como o estômago, rim, bexiga, vesícula biliar, intestinos ou outros e inclui distensão, isquemia, inflamação e tração do mesentério. É responsável por incapacidade física e psíquica, absentismo do trabalho e má qualidade de vida. O objetivo deste estudo foi discutir os principais aspectos da dor visceral relacionados a prevalência, etiologia e diagnóstico.

**CONTEÚDO:** Foram revisados segundo os preceitos da Medicina Baseada em Evidência os enfoques etiológicos, diagnóstico e prognóstico da dor visceral nas bases de indexações biomédicas, LILACS, EMBASE e Pubmed. Não foram selecionados os estudos terapêuticos. Utilizou-se como estratégia de busca os termos: («visceral pain»[MeSH Terms] OR (“visceral”[All Fields] AND “pain”[All Fields]) OR “visceral pain”[All Fields]). Somente foram incluídos os estudos publicados em português, inglês ou espanhol. Foram excluídas as revisões narrativas de conteúdo opinativo e procedimentos terapêuticos específicos das especialidades médicas. Também foram excluídos os estudos sobre dor visceral relacionada às doenças do coração, neoplásicas, musculoesqueléticas e a gestação.

**CONCLUSÃO:** A dor visceral é uma condição heterogênea, cuja apresentação mais frequente é de dor abdominal no curso de síndrome do intestino irritável. Outras doenças cursam com dor visceral e o diagnóstico adequado é fundamental para o tratamento eficaz.

**Descritores:** Dor crônica, Dor visceral, Revisão sistemática.

### INTRODUCTION

The International Association for the Study of Pain (IASP) has updated in 2011 visceral pain taxonomy and identification among chronic conditions, according to anatomic location in abdominal viscerae, chest and neck<sup>1</sup>.

Visceral pain is characterized by painful subjective perception in the abdomen or chest, and may be referred to somatic structures. So, it is difficult to diagnose visceral pain, especially if it is long-lasting, recurrent and without specific pathophysiological abnormality.

Functional chronic visceral pain is one of the most common causes of morbidity among general population. Functional chronic visceral pain (FCVP) and functional gastrointestinal disorders (FGID) have different definitions:

- FCVP is defined as pain coming from internal organs (visceral) such as stomach, kidneys, gallbladder and others, and

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lasting more than three months. The term functional describes a symptom or complex of symptoms in the absence of any structural or tissue abnormality.

- FGID is defined as digestive system disorder where symptoms cannot be explained by the presence of structural or tissue changes, based on clinical symptoms.

Visceral pain causes depend on the nature of triggering stimulation. Symptoms characteristics are: 1) abrupt onset; 2) widespread and difficult to locate pain, more often perceived along trunk midline; 3) pain referred on superficial tissues; 4) presence of hyperalgesia; 5) motor, autonomic and affective responses activation<sup>2</sup>.

Other authors have added more characteristics: 1) it is not evoked by all viscerae (solid organs such as liver, kidneys, pulmonary parenchyma are not sensitive to pain); 2) it is not always associated to visceral injury. A low threshold stimulus may activate visceral sensory afferents, such as intraluminal gas pressure; 3) it is referred in other sites, probably related to visceral and somatic nervous fibers convergence when connecting in spinal cord dorsal horn<sup>3</sup>.

Based on the importance of the subject, the Brazilian Society for the Study of Pain (SBED), in 2013, which has been the international year against visceral pain, tried to gather best scientific quality material to sensitize healthcare system researchers, clinicians and managers for the impact and consequences of lack of adequate diagnosis and management of this syndrome.

This document updates systematic reviews of Pubmed, EMBASE and LILACS databases on Visceral Pain, carried out by SBED in the year 2013. The objective of this study is limited to the publication of articles indexed just as visceral pain.

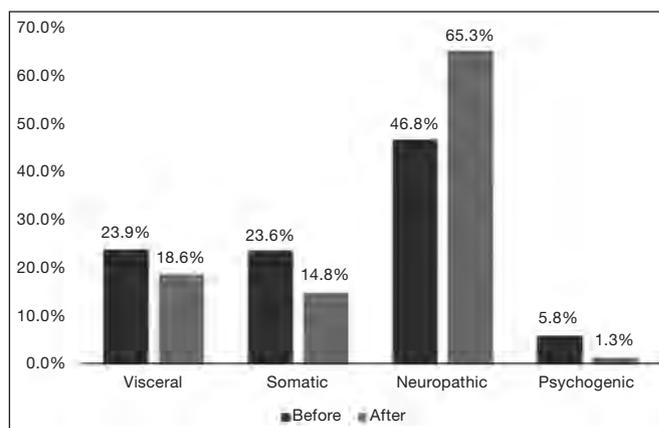
## CONTENTS

According to Evidence-Based Medicine concepts, etiologic and prognostic visceral pain approaches were reviewed in the two largest biomedical databases, Pubmed and EMBASE, and in LILACS database for being the one with the highest number of Brazilian publications. Original diagnostic or therapeutic studies on peculiarities of different specialties related to the subject and which moved away from the interest of general informative and educational aspects were not included. Although not including original articles on diagnosis and therapy in the primary search of this review, a complementary Pubmed search was carried out to recover systematic reviews of diagnostic and therapeutic studies on primary and more frequent types of visceral pain. Query strategy has contemplated visceral pain descriptors with regard to health education, information dissemination, patients' participation, patients' education, patients' preference, patient-centered assistance, evaluation of results, etiologic and prognostic aspects. Only studies published in Portuguese, English or Spanish were included in the review. Exclusion criteria were narrative reviews with opinionated contents, diagnostic or therapeutic procedures specific to medical specialties, such as clinical consequences of surgical interventions, hormonal treatment, antibiotic therapy, alpha-adrenergic blockers, radiofrequency ablation, immunobiologic, neural plexus blocks, transcranial magnetic stimulation,

myelotomy, botulinum toxin injection, acupuncture, homeopathy and alternative practices. Studies on visceral pain related to heart, cancer, musculoskeletal diseases and gestation were also excluded.

The following strategy was adopted for complementary Pubmed query: ("visceral pain"[MeSH Terms] OR ("visceral"[All Fields] AND "pain"[All Fields]) OR "visceral pain"[All Fields]) AND ("2013/01/01"[PDAT]: "2015/11/30"[PDAT]). Scientific quality of publications was evaluated as A (high), B (moderate), C (low) and D (very low), by the GRADE system<sup>4</sup>.

Words visceral, somatic, neuropathic and psychogenic were considered to evaluate the proportion of studies on pain. We ended up with 16337 quotations until 2013. After adding the filter corresponding to most recent studies from 1/1/2013 to 11/30/2015, we have obtained 4461 quotations, being visceral pain the second most studied from the four types of pain. Figure 1 shows increased number of recent publications as compared to somatic and psychogenic pain, although neuropathic pain was the one with the highest growth rate in number of quotations, probably due to the interest of pharmaceutical industries.



**Figure 1.** Quotations on Pubmed database, according to type of pain, before and after January 2013

In the first search, in 2013, 105 scientific articles were selected from 1793 recovered quotations. From these, 37 quotations were selected by the group to continue with the process. Evidence synthesis corresponded to the evaluation of 34 full text articles, presented in the literature quotation format in Vancouver style, publication quality evaluated by the GRADE system and text of primary results in the language originally used for the article or translated into Portuguese. Fifteen articles with children and infants and nine low quality articles according to the group of specialists were excluded. So, 10 articles were considered for description.

Similarly, in these last three years, 1106 quotations were recovered, corresponding to 20% of the total of 5541 quotations on visceral pain indexed since 1956. Following, there is qualitative and descriptive synthesis of the evidences of 29 articles meeting inclusion criteria and of 10 more of the first systematic search. Heterogeneity of studies has prevented any meta-analysis-type quantitative synthesis.

## CHRONIC ABDOMINAL PAIN AND IRRITABLE BOWEL SYNDROME (IBS)

A systematic review of 14 studies on the prevalence of chronic abdominal pain observed in primary care has shown that mean grouped frequency of consultations for this type of complaint was 2.8%. In approximately one third of patients, underlying cause of abdominal pain could not be identified. Most common etiologies were gastroenteritis (7.0-19.2%), IBS (2.6-13.2%), urologic cause (5.3%) and gastritis (5.2%). Approximately one out of 10 patients had acute disease such as appendicitis (1.9%), diverticulitis (3.0%), cancer (1.0%), biliary or pancreatic disease (4.0%) needing immediate treatment<sup>5</sup> (A).

Another study carried out in Canada with 2382 chronic pain patients has shown that visceral pain corresponded to 5.4% of the sample. Among 128 visceral pain patients, etiologic diagnoses were endometriosis, IBS, chronic pancreatitis, refractory angina, vulvodynia, post-cholecystectomy syndrome and post-herniorrhaphy pain<sup>6</sup>. Visceral pain has affected individuals with mean age of 44 years and was often related to depressive symptoms. On the other hand, a review of 58 epidemiologic studies involving 196472 children between 4 and 8 years of age, suggested a global prevalence of 13% (CI<sup>95%</sup> 12-15%) of abdominal pain. IBS was more frequently reported with approximately 9% (CI<sup>95%</sup> 6-12%). Highest rates were reported for South America and Asia, with approximate value of 16% as compared to 10% in Europe. Abdominal visceral pain has affected more females and was associated to the presence of anxiety, depressive disorders, stress and traumatic events<sup>7</sup> (A). IBS was also common among 120 female students of the Warsaw University, aged between 19 and 27 years. Abdominal pain or discomfort was more frequent in the group of students considering their practice of physical activity as low and was reason for school or work absenteeism<sup>8</sup> (B).

It is important to remember that IBS prevalence depends on studied population. A meta-analysis of epidemiologic studies estimates global prevalence of 11.2% being lower in South-eastern Asia and India. There are many risk factors, such as being female and the presence of depression, post-traumatic stress, daily life stress, family history and bacterial gastroenteritis epidemics<sup>9</sup> (B). Also, early manifestation of gastrointestinal symptoms, socioeconomic level during childhood, prenatal, trauma during childhood as well as disease behavior reinforcement and modeling (behavioral) are potential risk factors<sup>10</sup> (A).

IBS is a functional gastrointestinal tract disorder characterized by abdominal discomfort, pain and change in intestinal habits, often associated to psychological or psychiatric disorders. The development of the syndrome may be related to body response to stress and to the interaction between visceral perception and bowel motility. In addition, there might be serotonin receptors changes (5hydroxytryptamine, 5HT)<sup>11</sup> (C) and regional decrease of anterior and insular cingulate cortex gray matter. In addition, neuroplastic changes in female patients were related to symptoms severity<sup>12</sup> (A), favoring the

hypothesis that females have stronger connectivity of brain networks related to pre-frontal regions modulators of medial and dorsolateral cortex<sup>13</sup> (A).

Similarly in a fear model with different conditioning visual stimuli and with rectal pain as non-conditioning stimulus, healthy males and females were compared with the aid of functional nuclear resonance, with regard to neural responses during aversive visceral learning, in extinction and with the reactivation or reestablishment of fear memory. Positive response to conditioning stimulus has further reactivated females' hippocampus, thalamus and cerebellum. This suggests differences between genders with regard to neural processes mediators of aversive visceral learning, being that reactivation reinforcement of the anterior fear memory trait in females could justify the predominance of females among chronic abdominal visceral pain patients<sup>14</sup> (A).

On the other hand, IBS may induce specific abnormalities in the attention, anxiety, hypersurveillance and visceral hypersensitivity network test<sup>15</sup> (B). So, anxiety disorder may induce visceral hypersensitivity<sup>16</sup> (D) and psychological factors increased the perception of painful sensations only in hypersensitive patients to bowel inflation tests<sup>17</sup> (B).

Chronic pain, chronic abdominal pain and IBS are associated to increased psychiatric comorbidity. In chronic pain populations, there is significantly increased risk for depression and anxiety, regardless of pain location. With regard to IBS, there are more than 20 studies measuring the overlapping of IBS and psychiatric disorders. Authors have concluded that approximately half of IBS patients meet criteria for one or more psychiatric disorders. In addition, the prevalence of comorbid psychiatric disorders is higher among patients looking for hospital care, where up to 90% suffer of psychiatric disorders. Data indicate that no psychiatric disorder is solely associated to IBS, but that most common comorbid conditions are depression, followed by widespread anxiety disorder.

IBS is then marked by a high load of psychiatric comorbidity. Several studies have found that suicide behavior rates in chronic abdominal pain have increased even after psychiatric disorder control. Depression is probably the most powerful predictor of suicide behavior through a variety of populations, including chronic pain groups; however, it is not the only significant psychosocial predictor. Chronic abdominal pain and IBS are known for significantly affecting a wide variety of quality of life variables, including extraintestinal chronic stress symptoms and "vital exhaustion", so it is possible that this is also linked to increased suicide behavior<sup>18</sup> (C);

## IRRITABLE BOWEL SYNDROME AND ASSOCIATED DISEASES

Specific IBS somatic comorbidity conditions are:

**Fibromyalgia:** the association between IBS and fibromyalgia (FM) has been studied more than any other comorbidity. FM is present in approximately 32.5% (interval of 28-65%) of IBS patients and IBS is present in approximately 48% (interval of 32-77%) of FM patients.

**Chronic fatigue syndrome (CFS):** the prevalence of CFS in general population is estimated in 0.4%. Six studies have examined the presence of IBS in chronic fatigue patients and have reported high level of overlapping, varying from 35 to 92% (mean of 51%). The only study to date informing about the prevalence of CFS among IBS patients has concluded that 14% have reported CFS.

**Chronic pelvic pain:** IBS is a common comorbidity, affecting 29-79% (mean of 49.9%) of females with chronic pelvic pain.

**Temporomandibular joint disorder:** IBS was present in 64% of 25 patients with temporomandibular joint pain (TMJ) and TMJ pain was present in 16% of 270 IBS patients.

**Other disorders:** IBS was reported by 30.2% of 2045 respondents with interstitial cystitis, as compared to IBS prevalence in general population of 9.4%. It was observed that 38% of IBS patients have reported back pain, 18% premenstrual syndrome and 10% dysmenorrhea; all these rates are significantly higher as compared to patients with other gastrointestinal disorders. IBS was common among gynecological references, in patients with dyspareunia (52.4%), dysmenorrhea (50%), urinary symptoms (44.4%) and non-menstrual hemorrhage (40%). Global rate of IBS patients in a sample of 798 gynecologic patients was 37.3%, significantly higher than that observed in patients with skin, ear, nose or throat disease. IBS was present in 22.7% of individuals with bronchial hyper-responsiveness.

**Symptoms of non-gastrointestinal comorbidity:** urinary symptoms compatible with detrusor hyperreflexia (that is, increased micturition frequency, urinary urgency, nocturia) or bladder output dysfunction (that is, incomplete bladder emptying) are also common in IBS patients.

Described conditions and which are strongly associated to IBS share some clinical features: 1) all are substantially more common in females; 2) may be triggered or worsened by stress and; 3) are associated to fatigue, difficulty to sleep, anxiety and depression. It would seem probable that disorders with so many similarities and overlaps would share a common etiology, however, evidence is not convincing.

Pathophysiological mechanisms considered for IBS symptoms are:

1. Visceral hypersensitivity;
2. Autonomous nervous system deregulation;
3. Smooth muscle hyperreactivity;
4. Neurotransmitters level abnormalities, such as serotonin or neurotransmitters receptors;
5. Sustained activation of the immune system after infection, stress or other psychological factors;
6. History of sexual trauma.

IBS comorbidity with other functional gastrointestinal disorder is even more impressive than its overlapping with somatic non-gastrointestinal conditions and the overlapping of functional gastrointestinal disorders is so important that some have proposed that terms such as "irritable bowel", should be used for all of them, and that drugs effective for one of these disorders should also be effective for the others<sup>19</sup> (B).

On the other hand, it is possible that patients with kidney stone are at higher risk of developing IBS<sup>20</sup> (C).

### Irritable bowel syndrome diagnosis

A systematic review including 110 publications has found a huge number of standardized tools to evaluate chronic abdominal pain in IBS patients. Single domain methods, such as validated 10 points scale (NRS) and gastrointestinal symptoms severity questionnaires, primarily focus on abdominal pain intensity evaluation. Among validated questionnaires, the Symptom Severity Scale (IBS) has presented broader pain-related aspects. General pain questionnaires and electronic evaluation tools for current symptoms are still waiting for validation. Evidences for the use of challenge tests, such as balloon distention, are weak due to the low correlation with retrospective questionnaires<sup>21</sup> (A).

With regard to additional exams, IBS patients often complain of symptoms worsening after meals. Standardized meal challenge test has observed differences as compared to healthy controls with regard to abdominal pain, distention, discomfort, gases and feeling of fullness. Test was carried out with the ingestion during breakfast of food with 540 kcal, being 8g fiber, 36% fat, 15% proteins and 49% carbohydrates. Authors have concluded that the test is useful to define the approach and follow up the effect of interventions<sup>22</sup> (A).

Endoscopic capsule to evaluate small bowel (SBCE) is considered a noninvasive exam to help the diagnosis of patients with chronic non-explained abdominal pain. A systematic review with 1520 patients participating in 21 studies has shown low grouped diagnostic yield (20%; CI<sup>95%</sup> 16-26%). Among patients with positive results, inflammatory injuries are the most common (78%), followed by tumors (9%). Wide heterogeneity observed among studies may be explained by variable pain duration and by different previous exams performed before SBCE<sup>23</sup> (A).

A predictive model was derived from a study with 160 healthy females with IBS, who had volume, mean curvature, surface area and cortical thickness calculated for each brain region. Results have shown that algorithms developed as from regional brain morphometry had no predictive capacity for the diagnosis of the syndrome. However, it was possible to identify relevant neurobiological markers to be used together with other clinical manifestations, in broader diagnostic criteria to be studied in the future<sup>24</sup> (B).

Notwithstanding the large number of diagnostic tests, there are no convenient methods to differentiate patients with predominance of moor gastric dysfunction or visceral hypersensitivity. A total of 120 patients with functional dyspepsia and 30 healthy volunteers were included in a cross-sectional study to evaluate ultrasound combined with the ingestion of up to one liter of water. Test was useful to differentiate patients with predominant postprandial fullness from those where epigastralgia has prevailed, helping the therapeutic decision-making process<sup>25</sup> (B).

The development of new biomarkers and the identification of specific psychological patterns have helped the differential diagnosis of visceral pain common to IBS, intestinal inflammatory syndrome and other functional gastrointestinal diseases. Biological markers and psychological patterns have been as-

sociated to clinical and demographic information to generate automated algorithms allowing the differential diagnosis of visceral pain associated to bowel diseases<sup>26</sup> (B).

A systematic literature review to identify diagnostic studies for IBS in adult populations has found 22 articles in a total of 7106 patients. Positive and negative likelihood ratio meta-analysis of Rome III criterion, current gold standard, has shown values of 3.35 (CI<sup>95%</sup> 2.97-3.79) and 0.39 (CI<sup>95%</sup> 0.34-0.46), similar to other symptoms-based criteria. Eleven individually evaluated biomarkers had no better results than symptoms-based criteria.

Psychological patterns had good performance in just one study. Five different combinations of criteria were evaluated and the best in terms of positive likelihood ratio was fecal calprotectin associated to bowel patency and to Rome I criterion with LR+ of 26.4 (CI<sup>95%</sup> 11.4-61.9). In terms of negative likelihood ratio, the association of serum biomarkers and psychological patterns with LR- of 0.18 (CI<sup>95%</sup> 0.12-0.25). Authors have concluded that combined criteria of symptoms, biological markers and psychological pattern have better diagnostic performance than when considered separately<sup>27</sup> (A). Repeated noninvasive electromagnetic stimulation has modulated visceral sensitivity in study with healthy volunteers and IBS patients, increasing healthy limits of rectal pain for up to one hour after intervention. The study helps justifying the use of neurostimulation to control functional gastrointestinal disorders<sup>28</sup> (B).

### Chest pain

Pain is becoming a clinical complication for chronic pulmonary obstructive disease patients (CPOD). A review of 358 studies has selected five of them considered of good quality where combined prevalence of moderate to very severe pain and CPOD was 66% (CI<sup>95%</sup> 44-85%). Most severe pain was associated to increased dyspnea, fatigue, worse quality of life and more specific comorbidities<sup>29</sup> (A).

Conversely, visceral pain predominates among causes of chest pain identified in the review of 11 studies with 3900 patients. In decreasing order of prevalence, there were cardiovascular disease (14 to 16%), respiratory disease (10 to 18%), gastrointestinal disorders (6 to 10%) and esophageal diseases (6 to 7%). Other pains were costochondritis (25 to 50%) and psychogenic pain (10 to 18%). Authors call the attention to the fact that such percentages should accurately estimate the pretest probability to guide procedures indicated during diagnostic process<sup>30</sup> (A).

Non-cardiogenic chest pain (NCCP), also called non-cardiac chest pain, is the angina-type retrosternal pain of non-cardiogenic origin. Its prevalence is high; in the United States, for example, up to one fourth of the population refer such complaint. On the other hand, among patients submitted to coronaryography to investigate chest pain, 10 to 13% have normal results. The Rome III Consensus has considered the application of the "functional chest pain of presumable esophageal origin" to patients with episodes of retrosternal chest pain of visceral quality without apparent explanation, being previ-

ously ruled out cardiac origin and diagnostic hypotheses of gastroesophageal reflux disease (GERD) and esophageal motility disorders.

NCCP prevalence is not known in most Latin-American countries, but because it is often associated to GERD, it is worth evaluating the prevalence of the latter. In Latin-America, the prevalence of GERD varies from 12 to 25%. NCCP pathophysiology is not totally explained. Proposed etiopathogenic factors include GERD, esophageal motor disorders, esophageal mechanical and physical properties, visceral hypersensitivity, abnormal central esophageal stimulation processing, abnormal autonomic activity and psychological comorbidities.

NCCP may significantly affect quality of life. It is interesting to observe that notwithstanding the heart disease having been ruled out by previous exams, patients still have modifications and limitations in their lifestyle. This may often worsen the presentation due to persistent belief that patients have heart disease. NCCP implies considerable costs due to work absenteeism, chronic use of cardiovascular drugs, repeated hospitalizations for investigation and substantial anxiety.

It is important to highlight that esophageal evaluation of NCCP patients is indicated just after cardiologic investigation having effectively ruled out the possibility of heart disease as the cause of the symptom. This is necessary because the isolated analysis of the clinical presentation may not provide the perfect distinction between chest pain of esophageal origin and of cardiac origin, and morbidity and mortality of both are totally different. Options for diagnostic aid are: 1. Therapeutic test with proton pump inhibitor (PPI); 2. Esophageal manometry; 3. Prolonged pHmetry, telemetric pHmetry and esophageal impedance; 4. High digestive endoscopy; 5. Challenge tests; and 6. Psychological evaluation<sup>31</sup> (D).

A systematic review of diagnostic tests used for non-cardiovascular chest pain has included 28 studies, being that 20 have investigated gastroesophageal reflux disorder (GERD), three musculoskeletal chest pain and 5 psychiatric conditions. Quality of studies was good in 15 and moderate in 13. GERD diagnosis was more probable with typical disease symptoms or when using proton pump inhibitor. Grouped sensitivity and specificity of the six studies was 89 and 88%, respectively. Findings of clinical musculoskeletal pain results had low yield. Panic and anxiety disorders were not frequently diagnosed and should always be considered in differential chest pain diagnosis. Questionnaires for panic syndrome and anxiety disorder screening have accurately identified individuals needing further tests to close the diagnosis<sup>32</sup> (A).

It should be highlighted that thoracic spine disc protrusion might mimic visceral pain syndrome and should be taken into account in situations of symptoms with characteristics of digestive or urologic affection which are not confirmed by specific diagnostic tests. This observation was obtained in a case-control study involving 200 people<sup>33</sup> (C).

### Other chronic pains

Functional abdominal pain syndrome (FAPS) is a debilitating disorder with constant or almost constant abdominal pain,

lasting for at least six months. Prevalence estimates are 0.5 to 1.7% and tend to predominate among females.

Few pathophysiological studies were carried out specifically in FAPS patients, so there are few available data. FAPS pathophysiology seems to be the only one where pain is especially caused by amplified central sensory perception of normal visceral sensory input. FAPS diagnosis is according to Rome III symptoms-based diagnostic criteria. These criteria are oriented to identify patients with severe symptoms and how they represent constant or almost constant abdominal pain, with loss of daily functions (work/school leave, family and social activities limitations) and are differentiated from IBS based in their non-association with changes in intestinal habits or other bowel-related events.

Physicians should obtain specific pain characteristics, especially whether there is association with bowel movements, eating and menstrual cycle. If abdominal pain is associated to bowel movements (changes in frequency or consistency, and relief after evacuation), IBS should be considered. In patients with right upper quadrant or epigastric pain, epigastric pain syndrome should be considered and differential diagnosis should include functional gall bladder syndrome. If pain is associated to eating, especially in cases of pain of recent onset in elderly patients with history of vascular disease, chronic mesenteric ischemia should be evaluated. Finally, if pain is associated to menstruation, gynecologic diseases, such as endometriosis, or dysfunctional uterine bleeding should be evaluated by a gynecologist.

FAPS patients may manifest symptoms reported by typical behaviors, which may provide important hints for diagnosis. In addition to their contribution for diagnosis, recognizing and addressing such behaviors may play a critical role in the establishment of physician-patient therapeutic relationship, as well as in the development of a treatment plan<sup>34</sup> (D).

Referred visceral pain may justify the higher intensity of symptoms associated to low back pain. Ambulatory study with 2974 low back pain patients has shown that 19.6% of them have also reported chest, abdomen and groin pain. These patients, as compared to isolated low back pain patients, had higher levels of pain and functional incapacity which, however, have not impaired low back pain clinical course and recovery<sup>35</sup> (A).

Visceral agioedema abdominal pain is an uncommon complication and often not recognized in the anti-hypertensive treatment with angiotensin converting enzyme inhibitors, which more often induces cough and respiratory angioedema. In addition to widespread abdominal hypersensitivity, computerized tomography may show widespread thickening of the intestinal wall. Symptoms improve in 48 to 72h after drug withdrawal<sup>36</sup> (C).

There is consensus that symptomatic kidney stones should be treated. Kidney stones diagnosis is relatively easy when evaluated by ultrasound. As opposed, establishment of symptoms of patients which could be attributed to gallstones is a major challenge for medical diagnosis in primary care. Seven abdominal symptoms suggestive of gallstones were evaluated in a meta-analysis of 24 studies about diagnostic accuracy of ab-

dominal symptoms for gallstones. Methodological quality of included studies was low. Evaluators were blind for reference standards for abdominal symptoms in just eight studies, only eight studies were adjusted by age and gender and in hospital studies, the extension of gallstone disease of included patients was poorly described.

This lack of methodological quality, however, does not explain the heterogeneity of diagnostic accuracy of abdominal symptoms. Biliary colic, defined as “constant pain in right upper abdominal quadrant lasting more than half an hour”, “pain irradiation” and “administered analgesics” were the only three symptoms consistently related to gallstones, although non-adjusted estimates of diagnostic precision were kept low. These three symptoms had better diagnostic precision in referred patients, although without statistical significance for pain irradiation, which may be explained by the small number of studies included in the evaluation of such symptom. Biliary colic, described as “severe and episodic constant pain lasting more than 15 minutes” is considered a diagnostic symptom.

Although our analysis confirms this relationship, discriminative biliary colic capacity was low. Biliary colic was present in 20% of patients with gallstones and 6% of patients without stones. Eighty percent of patients with gallstones were referred with other abdominal symptoms. Discussion is whether patients have asymptomatic gallstones or their gallstones induce other symptoms different from biliary colic<sup>37</sup> (A).

Cyriax syndrome is a subluxation of the distal part of 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> ribs, in general secondary to trauma. It is predominantly manifested by high abdominal pain, with possibility of confusion with visceral pain. Diagnostic is clinic and should be present as differential diagnosis, thus avoiding numerous investigations contributing to patients' distress. Its etiology is in general trauma of variable intensity, such as: 1) single right trauma (fall, car accident, martial sports, use of surgical separators); 2) repeated right trauma (cobblers chest, weight load on chest, postman); 3) indirect trauma (sudden traction, example: practice of tennis, golf, lifting heavy loads). Pain is in general violent and may last from minutes to some hours, being related to movements<sup>38</sup> (D).

Interstitial cystitis (IC) is a visceral pain syndrome with deep impact on quality of life; it is a devastating bladder condition characterized by pelvic pain, urinary frequency and urgency and nocturia. Recently, investigators started to use the term “painful bladder syndrome” to describe cases with painful micturition which may not fit the stricter IC definition.

Real IC prevalence rate is unknown and estimates widely vary from 67 per 100 thousand to 575 per 100 thousand cases, based on diagnostic criteria and methods used to estimate the rate. IC is primarily diagnosed among Caucasian females, with mean age at diagnosis of 42-46 years.

Although being known since 1836, IC etiology and pathogeny are still not clear. So, it is not surprising that patients suffer from IC from 5 to 7 years, in average, and very often visit eight physicians before having the correct diagnosis.

Debilitating IC symptom makes many patients unable to deal with daily life functions. In severe cases, patients often need to

empty the bladder more than 60 times per day and experiment severe pelvic pain and dyspareunia, which may impact several quality of life domains and result in severe depression<sup>39</sup> (C). IC patients have widespread hypersensitivity to deep tissue stimulation with lower thresholds, as compared to healthy individuals. In addition, there are evidences that IC patients have perception of poorer health, increased somatic complaints and added surveillance to sensations<sup>40</sup> (B). History of sexual abuse is estimated in approximately 40% of all adult patients with chronic abdominal pain or gastrointestinal complaints. Data on the prevalence of sexual abuse in children with chronic abdominal pain are, however, scarce. Systematic review of studies investigating the prevalence in children has resulted in 269 articles, of which just two have met inclusion criteria. Abuse condition was found in 2.1 and 8.0% of patients with chronic abdominal visceral pain between 4 and 21 years of age. Major limitation of the studies was sample size (48 and 50) and lack of control group<sup>41</sup> (B). Visceral pain associated to functional syndromes is among different clinical manifestations which may also be attributed to hysteria. According to the North-American manual for diagnosis of mental disorders, the new approach is due to the lack of pathologic substrate and the physiologic and expressional nature of such condition<sup>42</sup> (C).

## CONCLUSION

Visceral pain is a heterogeneous condition, the more frequent presentation of which is abdominal pain with IBS. IBS is a complex disease involving still not explained pathophysiological mechanisms. The strategy for diagnosis still needs literature consensus. Visceral pain requires well developed propeudetics to avoid inadequate etiologic diagnosis and treatment.

## REFERENCES

- Merskey H, Bogduk N. International association for the study of pain (IASP) classification of chronic pain. [Internet]. Seattle, Washington; 1994. Available from: <http://www.iasp-pain.org/files/Content/ContentFolders/Publications2/FreeBooks/Classification-of-Chronic-Pain.pdf>.
- Austin PD, Henderson SE. Biopsychosocial assessment criteria for functional chronic visceral pain: a pilot review of concept and practice. *Pain Med*. 2011;12(4):552-64.
- Kraychete DC, Guimarães AC. [Visceral hyperalgesia and chronic abdominal pain: diagnostic and therapeutic approach]. *Rev Bras Anestesiol*. 2003;53(6):833-53. Portuguese.
- Guyatt GH, Oxman AD, Schünemann HJ, Tugwell P, Knottnerus A. GRADE guidelines: a new series of articles in the Journal of Clinical Epidemiology. *J Clin Epidemiol*. 2011;64(4):380-2.
- Viniol A, Keunecke C, Biroga T, Stadje R, Dornieden K, Bösner S, et al. Studies of the symptom abdominal pain--a systematic review and meta-analysis. *Fam Pract*. 2014;31(5):517-29.
- Giladi H, Scott W, Shir Y, Sullivan MJ. Rates and correlates of unemployment across four common chronic pain diagnostic categories. *J Occup Rehabil*. 2015;25(3):648-57.
- Kortelerink JJ, Diederik K, Benninga MA, Tabbers MM. Epidemiology of pediatric functional abdominal pain disorders: a meta-analysis. *PLoS One*. 2015;10(5):e0126982.
- Niemyska S, Ukleja A, Ławiński M. Evaluation of irritable bowel syndrome symptoms amongst Warsaw University students. *Pol PrzeglChir*. 2015;87(5):252-9.
- Bokic T, Storr M, Schicho R. Potential causes and present pharmacotherapy of irritable bowel syndrome: an overview. *Pharmacology*. 2015;96(1-2):76-85.
- Chitkara DK, van Tilburg MA, Blois-Martin N, Whitehead WE. Early life risk factors that contribute to irritable bowel syndrome in adults: a systematic review. *Am J Gastroenterol*. 2008;103(3):765-74.
- Stasi C, Bellini M, Bassotti G, Blandizzi C, Milani S. Serotonin receptors and their role in the pathophysiology and therapy of irritable bowel syndrome. *Tech Coloproctol*. 2014;18(7):613-21.
- Jiang Z, Dinov ID, Labus J, Shi Y, Zamanian A, Gupta A, et al. Sex-related differences of cortical thickness in patients with chronic abdominal pain. *PLoS One*. 2013;8(9):e73932.
- Labus JS, Gupta A, Coveleskie K, Tillisch K, Kilpatrick L, Jarcho J, et al. Sex differences in emotion-related cognitive processes in irritable bowel syndrome and healthy control subjects. *Pain*. 2015;154(10):2088-99.
- Benson S, Kattoor J, Kullmann JS, Hofmann S, Engler H, Forsting M, et al. Towards understanding sex differences in visceral pain: enhanced reactivation of classically-conditioned fear in healthy women. *Neurobiol Learn Mem*. 2014;109:113-21.
- Hubbard CS, Hong J, Jiang Z, Ebrat B, Suyenobu B, Smith S, et al. Increased attentional network functioning related to symptom severity measures in females with irritable bowel syndrome. *Neurogastroenterol Motil*. 2015;27(9):1282-94.
- Chen ZL, Zhang XC, Pan GR, Sun Y, Xu M, Li XQ. Clinical features and therapeutic options for isolated visceral artery dissection. *Ann Vasc Surg*. 2015;30:227-35.
- Grinsvall C, Törnblom H, Tack J, Van Oudenhove L, Simrén M. Psychological factors selectively upregulate rectal pain perception in hypersensitive patients with irritable bowel syndrome. *Neurogastroenterol Motil*. 2015;27(12):1772-82.
- Spiegel B, Schoenfeld P, Naliboff B. Systematic review: the prevalence of suicidal behavior in patients with chronic abdominal pain and irritable bowel syndrome. *Aliment Pharmacol Ther*. 2007;26(2):183-93.
- Whitehead WE, Palsson O, Jones KR. Systematic review of the comorbidity of irritable bowel syndrome with other disorders: what are the causes and implications? *Gastroenterology*. 2002;122(4):1140-56.
- Erdem E, Akbay E, Sezgin O, Doruk E, Canpolat B, Cayan S. Is there a relation between irritable bowel syndrome and urinary stone disease? *Dig Dis Sci*. 2005;50(3):605-8.
- Mujagic Z, Keszthelyi D, Aziz Q, Reinisch W, Quetglas EG, De Leonardi F, et al. Systematic review: instruments to assess abdominal pain in irritable bowel syndrome. *Aliment Pharmacol Ther*. 2015;42(9):1064-81.
- Posserud I, Strid H, Störsrud S, Törnblom H, Svensson U, Tack J, et al. Symptom pattern following a meal challenge test in patients with irritable bowel syndrome and healthy controls. *United Eur Gastroenterol J*. 2013;1(5):358-67.
- Xue M, Chen X, Shi L, Si J, Wang L, Chen S. Small-bowel capsule endoscopy in patients with unexplained chronic abdominal pain: a systematic review. *Gastrointest Endosc*. 2015;81(1):186-93.
- Labus JS, Van Horn JD, Gupta A, Alaverdyan M, Torgerson C, Ashe-McNalley C, et al. Multivariate morphological brain signatures predict patients with chronic abdominal pain from healthy control subjects. *Pain*. 2015;156(8):1545-54.
- Kugler T. The usefulness of water-drinking ultrasonography combined test for evaluating patients with functional dyspepsia. *Korean J Gastroenterol*. 2015;66(2):92-7.
- Sood R, Law GR, Ford AC. Diagnosis of IBS: symptoms, symptom-based criteria, biomarkers or "psychomarkers"? *Nat Rev Gastroenterol Hepatol*. 2014;11(11):683-91.
- Sood R, Gracie DJ, Law GR, Ford AC. Systematic review with meta-analysis: the accuracy of diagnosing irritable bowel syndrome with symptoms, biomarkers and/or psychological markers. *Aliment Pharmacol Ther*. 2015;42(5):491-503.
- Algladi T, Harris M, Whorwell PJ, Paine P, Hamdy S. Modulation of human visceral sensitivity by noninvasive magneto-electrical neural stimulation in healthy and irritable bowel syndrome. *Pain*. 2015;156(7):1348-56.
- Lee AL, Harrison SL, Goldstein RS, Brooks D. Pain and its clinical associations in individuals with COPD: a systematic review. *Chest*. 2015;147(5):1246-58.
- Haasenritter J, Biroga T, Keunecke C, Becker A, Donner-Banzhoff N, Dornieden K, et al. Causes of chest pain in primary care - a systematic review and meta-analysis. *Croat Med J*. 2015;56(5):422-30.
- Domingues GR, Moraes-Filho JP. Dor torácica não-cardiogênica. *Arq Gastroenterol*. 2009;46(3):233-40.
- Wertli MM, Ruchti KB, Steurer J, Held U. Diagnostic indicators of non-cardiovascular chest pain: a systematic review and meta-analysis. *BMC Med*. 2013;11:239.
- Lara FJ, Quesada JQ, Ramiro JA, Toledo RB, Del Rey Moreno A, Muñoz HO. Chronic abdominal syndrome due to nervous compression. Study of 100 cases and proposed diagnostic-therapeutic algorithm. *J Gastrointest Surg*. 2015;19(6):1059-71.
- Sperber AD, Drossman DA. Review article: the functional abdominal pain syndrome. *Aliment Pharmacol Ther*. 2011;33(5):514-24.
- Panagopoulos J, Hancock MJ, Kongsted A, Hush J, Kent P. Does anterior trunk pain predict a different course of recovery in chronic low back pain? *Pain*. 2014;155(5):977-82.
- Mutnuri S, Khan A, Variyam EP. Visceral angioedema: an under-recognized complication of angiotensin-converting enzyme inhibitors. *Postgrad Med*. 2015;127(2):215-7.
- Berger MY, van der Velden JJ, Lijmer JG, de Kort H, Prins A, Bohnen AM. Abdominal symptoms: do they predict gallstones? A systematic review. *Scand J Gastroenterol*. 2000;35(1):70-6.
- Pinto Devia J, Michel H. Síndrome de Cyriax. 54 casos y revision de la literatura. *Rev Med Surg*. 1990;15(2):102-5.
- El Khoudary SR, Talbott EO, Bromberger JT, Chang CC, Songer TJ, Davis EL. Severity of interstitial cystitis symptoms and quality of life in female patients. *J Womens Health*. 2009;18(9):1361-8.
- Ness TJ, Powell-Boone T, Cannon R, Lloyd LK, Fillingim RB. Psychophysical evidence of hypersensitivity in subjects with interstitial cystitis. *J Urol*. 2005;173(6):1983-7.
- Sonneveld LP, Brilleslijper-Kater SN, Benninga MA, Hoytema van Konijnenburg EM, Sieswerda-Hoogendoorn T, Teeuw AH. Prevalence of child sexual abuse in pediatric patients with chronic abdominal pain. *J Pediatr Gastroenterol Nutr*. 2013;56(5):475-80.
- Medeiros De Bustos E, Galli S, Haffen E, Moulin T. Clinical manifestations of hysteria: an epistemological perspective or how historical dynamics illuminate current practice. *Front Neurol Neurosci*. 2014;35:28-43.

# Pain curriculum for graduation in Physiotherapy in Brazil

## *Currículo em dor para graduação em Fisioterapia no Brasil*

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** To introduce the curriculum in Pain for Graduation in Physiotherapy, suggesting its use for academic training in Brazil.

**CONTENTS:** Considering that physiotherapists should be prepared to engage in the health care professional team assisting patients with different kinds of pain understanding the role of each professional, a group of physiotherapists with academic and clinical experience in pain treatment has developed, after consensus, this curriculum of pain for physiotherapy, which highlights the role of this professional in the health care team and the development of a therapeutic relationship with patients, favoring patients' autonomy and education, as well as the strategies for pain evaluation and management.

**CONCLUSION:** The specific content of this pain curriculum can be integrated into different programs/courses, using the most adequate structure and educational method with regard to professional needs and their demands. Physical therapy, pain and models of academic training in health are discussed.

**Keywords:** Curriculum, Education, Pain, Physical therapy.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** Apresentar e divulgar o currículo em dor para graduação em Fisioterapia, sugerindo sua utilização para formação acadêmica no Brasil.

**CONTEÚDO:** Considerando que o fisioterapeuta deve ser preparado para integrar a equipe profissional de cuidados de paci-

entes com diferentes tipos de dor, compreendendo a atuação de cada profissional, um grupo de fisioterapeutas com experiência acadêmica e clínica no tratamento da dor elaborou, após consenso, o currículo nuclear de dor para fisioterapia, o qual destaca o papel desse profissional na equipe e na construção de uma relação terapêutica com os pacientes, favorecendo autonomia e educação do paciente, além das estratégias para avaliação e manuseio da dor.

**CONCLUSÃO:** O conteúdo específico deste currículo de dor pode ser integrado em diferentes programas/cursos, usando a estrutura e o método educacional mais adequado no que tange às necessidades profissionais locais e as suas demandas. Discute-se a fisioterapia, a dor e modelos de formação acadêmica em saúde.

**Descritores:** Dor, Currículo, Educação, Fisioterapia

### INTRODUCTION

Post-war period is a historical landmark for physiotherapy, due to the need to rehabilitate surviving veterans and civilians. Although there is this social landmark of profession recognition, its techniques and strategies are millenarian. There are records in archeological Egyptian, Hindu, Greek, Roman, Chinese and Japanese studies from approximately 3000 b.C. about therapeutic benefits of massage<sup>1</sup>, today studied and based on Manual Therapy techniques.

In the history of physiotherapy, the profession goes through a difficult period in the 18<sup>th</sup> Century, which lasted for approximately 200 years. In this period, medicine was academically developed within a biomedical, linear and rigid model, in a powerful and intense movement, basing medicine on diagnostic investigation and on the tireless search for permanent healing. The notion of health becomes associated to medical care and follow up, without encouraging self-care and "good life habits". The manipulation of medical-hospital care is present and "steals" dignity<sup>2</sup>.

Academic graduation of health professionals was based on this linear and hierarchical model where "symptomatic medicine", which adapted therapy to patients' complaints and symptoms, was for years labeled as "low quality medicine" associated to the inability of professionals to define a single and accurate diagnosis to develop the treatment plan. Physiotherapy, similarly to palliative medicine, has gained space when classic/traditional physicians started to say "there is nothing more to be done"<sup>3,4</sup>, in a simplistic way, to the biomedical model (synonym to technocentric or biocentric model)<sup>6</sup> of cause and consequence. Within this cause and consequence context, physiotherapy was prescribed for being a "distraction" option for patients without "permanent cure" according to medical evaluation.

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In the last decades, physiotherapy has traveled between the area subordinated/dependent on prescription and others, and current scenario where physiotherapists are part of the multidisciplinary team, discussing cases and contributing for the development of a treatment plan. In a similar context, palliative medicine and pain specialist physicians overcome their challenges.

The biopsychosocial model proposed by psychiatrist Engel, in 1977<sup>3</sup>, introduces a new paradigm to health/disease inserting it in a biological, psychological and social context. According to this movement, pain, which was previously defined as associated to real injury, is now studied and treated as an unpleasant emotional sensation associated to real or potential injury<sup>4</sup>, showing that pain is a dynamic phenomenon, where rigid neurophysiologic concepts are abandoned and give space to pain in a multidimensional context dependent on the interaction of several endogenous and exogenous mechanisms<sup>5</sup>.

Pain is a common problem and primary therapeutic objectives of physiotherapists when treating painful patients are to improve pain and associated dysfunction, function improvement as well as health and daily life wellbeing promotion<sup>6</sup>. Physiotherapists should participate in the facilitation process of understanding pain by patients. For most effective analgesic therapies, physiotherapists have to understand pain biological basis and psychosocial and environmental components, as well as their impact on pain experience throughout life<sup>7</sup>. Physiotherapists must be familiar with ways to evaluate and measure pain<sup>8</sup> and should be able to implement different strategies of analgesic therapies based on scientific evidence. Focus is to encourage early patients' commitment to active pain management strategies (what patients have to do) and not to passive interventions (what you have to do for patients). So, interventions proposed by physiotherapists should be established as part of a global approach to manage pain, which should also incorporate self-care.

Even considering that physiotherapists are not responsible for pharmacological interventions, they must have enough knowledge about pharmacological agents and their adverse effects, as well as being able to optimize the therapeutic window offered by pharmaceutical agents to encourage the use of active management strategies adequate to each patient. It is critical to have patient-centered collaborative and holistic view of the needs of patients with pain and dysfunction.

Physiotherapists should also be prepared to integrate the health-care team of painful patients, understanding the role of each professional. In addition, they should be able to act on primary, secondary and tertiary health attention levels, as well as being qualified to act as first contact professionals<sup>6</sup>.

The imminent need to improve Pain teaching in Brazil and, especially, since graduation, is the subject of this article. The physiotherapists committee of the Brazilian Society for the Study of Pain (SBED) – made up of expert clinicians and researchers on the study of pain – has queried specialized literature, has asked the cooperation of specialists and has identified major aspects of pain which should be addressed still at graduation level. The pain curriculum of the International Association for the Study of Pain was used as important reference, the content of which was carefully studied, evaluated and discussed by such specialists.

So, the physiotherapists committee has prepared this specific pain curriculum, adapting or adjusting the content to Brazilian population dynamics and reality, as well as to professional praxis in force in Brazil. The objective of the pain curriculum for Graduation in Physiotherapy is to help the integration of this subject to different programs/courses, using the most adequate structure and educational methods with regard to local professional needs and their demands.

## CONTENTS

### Principles

The following principles guide the development of the curriculum for physiotherapists starting in the study of pain and had as model the Declaration of Montreal (IASP 2010).

Article 1. All people have the right to pain management, without prejudice.

Article 2. The right of all painful people to know their pain and be informed about how it can be evaluated and managed.

Article 3. The right of all painful people to have access to adequate pain evaluation and management by a duly trained health professionals' team.

Pain is considered a biopsychosocial experience including sensory/discriminative, emotional/motivational, cognitive, behavioral, spiritual, cultural and developmental components.

Pain may be acute, persistent, or both, and its duration guides the development of a therapeutic plan.

Pain should be broadly and consistently evaluated with valid and reliable evaluation tools.

Patients have the right to the best possible pain management.

Pain evaluation and management are integral aspects of the physiotherapeutic treatment; they should involve patients and their relatives and should be recorded in a clear and accessible manner.

Patients and their relatives' education on pain and self-care are critical components to the physiotherapeutic plan. Physiotherapists are essential members of the multidisciplinary pain team.

Students should be familiar with theoretical models supporting interventions and empirical evidences for their efficacy; it is also important to evaluate from the epistemological point of view to consider the interim character of the concept of pain, having in mind that knowledge is constantly being built. Professors are encouraged to adopt a critical evaluation perspective as the basis for decision-making when reviewing benefits and limitations of their interventions.

### Objectives

Physiotherapists should be able:

- To apply basic pain science knowledge to evaluate and manage painful people;
- To promote health and wellbeing through pain and dysfunction prevention;
- To evaluate and measure biological and psychosocial factors contributing to the presence of pain, movement dysfunction and incapacities, using valid and reliable measurement tools;
- To identify barriers among professionals, systems, patients, relatives and community for effective pain evaluation and management;

- To develop evidence-based physiotherapeutic program in cooperation with patients, directed to changing pain, improving function and decreasing incapacities, being limited to the management of an intervention program with regard to action in physiotherapy and respecting the actions of other health professionals;
- To implement therapies including patients' education, active approaches, such as functionally oriented movement re-education, exercises (including grading), and passive strategies, such as manual therapy and electrothermophotherapy;
- To show awareness of their practical competences to evaluate and manage painful patients using practical strategies based on evidences for clinical decision-making;
- When adequate, to refer patients for evaluation by other health professionals, according to their needs, establishing an active professional relationship with other professionals following up the patient;
- To recognize people at risk of undertreatment of their pain (example, individuals with verbal communication disorders, neonates and with cognitive deficits);
- To practice the profession according to the Code of Ethics, which recognizes human rights, diversity and recommendation of the non-maleficence principle;
- To critically reflect on effective ways of working with painful patients and improving care for this population;
- To regularly update their knowledge on pain and related issues;
- To understand that specific knowledge on the area is constantly changing and that professionals should develop a high level of criticism with regard to used concepts and techniques, always looking for the possibility of proving through quantitative and/or qualitative techniques and patients' satisfaction. Professionals should be aware that part of any pain therapy involves a placebo or nocebo effect and should constantly try to know through ongoing education the active effect of resources/techniques used to diagnose and treat, understanding that this active effect may be predominantly physical, psychological or social;
- To act in all health attention levels, engaging in health promotion, maintenance, prevention, protection and recovery programs;
- To act, in multiprofessional, interdisciplinary and transdisciplinary manner, whenever possible and necessary.

## CURRICULUM CONTENTS

### Pain multidimensional nature

- A) Problem magnitude: health-disease process and its determining/conditioning factors; limitation, dysfunction and incapacity; pain epidemiology as public health problem in Brazil and worldwide, with social, ethic and economic considerations.
- B) Current theories on anatomy, physiology and psychology of pain and its relief, according to knowledge evolution, since classic to more recent concepts.
- C) Definition of pain and its multidimensional nature, considering conceptual updates published in IASP<sup>9</sup> websites and its Brazilian chapter SBED<sup>10</sup>.

- D) Impact of age, gender, family, culture, religion, environment, myths and beliefs on pain.
- E) Role and responsiveness of physiotherapists in managing pain, and integration of physiotherapists in a multidisciplinary team; legal aspects related to physiotherapists' professional responsibility<sup>11-13</sup>.
- F) Role and responsiveness of other health professionals in the area of pain management and merits of interdisciplinary cooperation; legal aspects and bases of interdisciplinary and multiprofessional relationships; team communication and relationship.
- G) Integration of physiotherapeutic interventions into holistic management strategies in cooperation with other professionals (health professionals or not), introducing different physiotherapeutic modalities available in pain clinical practice, which still do not have scientific evidences, but which are widely used<sup>6</sup>.
- H) Pain and life expectation (physiologic and psychosocial factors, implications for evaluation, measurement and intervention); persistent chronic pain and its implications on individual's relationship with his internal (body) and external (family, society) environment; measurements aimed at detection of resilience and physical organic, psychic (behavioral, emotional, cognitive) and socioenvironmental (labor, family, community, religion) impacts<sup>14</sup>.
- I) Implications and pain evaluation in neonates, during childhood, adolescence, adulthood and senescence<sup>15</sup>, as reference for physical, psychological, educational and social development and integrating them to the intervention strategy and also considering individuals with communication and cognition deficits.
- Specific problems faced by painful elderly with regard to the influence of comorbidities, services with adequate access and maintenance of independence.

### Basic science<sup>16</sup>

- Understanding and describing adequate nociceptors and stimuli to activate nociceptors in different types of tissues (skin, muscle, joint, viscera); explaining afferent and efferent spinal cord innervations and different types of tissues, and how pain of different tissues is centrally processed;
- Defining and describing peripheral sensitization and how these changes are associated to pain perception;
- Describing neurogenic inflammation, neurotransmitters involved in this process, and how such neurotransmitters may contribute for peripheral pain processing;
- Understanding changes and the role of ion channels, excitatory and inhibitory neurotransmitters in peripheral nervous system and non-neuronal cells, and explaining how such changes are important for pain transmission processing;
- Describing pain pathways involved with pain discriminative sensory and motivational affective components;
- Describing and defining central sensitization and why it is similar or different from peripheral sensitization;
- Describing and understanding mechanisms explaining pain behaviors: referred pain, primary hyperalgesia, secondary hyperalgesia, allodynia, dysesthesia, hyperpathy, temporal and spatial summation and kinesiophobia;

- Understanding the role of excitatory and inhibitory neurotransmitters, as well as of central and peripheral nervous systems glia in potentiating pain transmission and changes resulting from tissue injury;
- Describing ascending pain transmission modulating pathways;
- Understanding differences between pain facilitation and inhibition, brain regions and neurotransmitters playing a role in this process;
- Understanding how nervous pathways may be activated by non-pharmacological therapies;
- Understanding long-term consequences of chronic pain on brain, spinal cord and peripheral tissues;
- Describing animal pain models; understanding what different animal models intend to mimic and why animal models are used to study pain;
- Understanding neuroimage tools and major brain regions underlying the painful experience, and how such changes depend on individuals' cognitive and emotional states;
- Comparing and contrasting theories on interactions between pain and motor function (example, Vicious cycle theory and Pain adaptation theory);
- Understanding types of pain in a neurophysiologic perspective: nociceptive, neuropathic and psychogenic;
- Understanding neuroplasticity, pain memory and onset of chronicity;
- Understanding how pain interacts with movements control and the role of plasticity of different tissues on associated dysfunctions.

### **Pain evaluation and management**

- A) Recognizing differences between acute, sub-chronic and chronic pain and implications for patients' evaluation and management, as well as understanding chronic pain worsening process, chronic postoperative pain and chronic pain disease<sup>17-19</sup>.
- B) Emphasizing the need for broad evaluation, using reliable and valid tools during pain acute phase to prevent onset of chronicity<sup>20</sup>.
- C) Using biopsychosocial strategy for pain and incapacity evaluation, since this interferes with pain multidimensional nature in relevant domains for physiotherapy practice<sup>17</sup>.
- D) Considering pain multidimensional nature, including adequate evaluation measurements for primary domains, such as: sensory, affective, cognitive, physiologic, psychological behavioral. Pain-related characteristics which can be measured: pain intensity at rest and movement, location, inhibition, temporal summation, spatial summation, ongoing modulation, skin and deep sensitivity.
- Different available tools are for screening, rather than for diagnosis, although sometimes their psychometric properties are high with regard to the gold standard, which is always the professional diagnosis. In addition, it is worth evaluating IMMPACT group recommendations<sup>21</sup> with regard to pain studies outcomes, considering as primary outcomes the pain scale, perception of improvement and patients' satisfaction, and that clinical chronic pain intensity improvement is of at least 30% and that tools should always be used to evaluate other variables such as anxiety/depression, catastrophic thoughts, mood, sleep, fatigue, kinesio-

- phobia and quality of life. Still, within this context, it is important to recognize populations for which these tools are validated<sup>20</sup>
- E) Recognizing and using the International Classification of Functioning and Disability (ICFD) as important method for pain classification and functional diagnosis<sup>22</sup>.
- F) Recognizing strengths and limitations of commonly used measurements for different pain dimensions: self-report, physical performance measurements including functional capacity evaluations, physiologic/autonomic responses measurements<sup>5,17</sup>.
- G) Recognizing placebo and nocebo effects and their interference with pain evaluation and measurement processes.
- H) Considering intrinsic and extrinsic factors which promote intraindividual variations on results obtained with different tools and pain evaluation scores.
- I) Changing pain evaluation strategies to correspond to inherent variability associated to patients' clinical presentation: individual factors (age, gender, etc.), sociocultural influences (religion, race, etc.), pain clinical characteristics (duration, anatomic site, etc.), pain type and state (neuropathic, cancer, etc.), vulnerable populations (communication barriers, cognitive deficits, etc.).
- J) Critically interpreting and evaluating (reliability, validity and responsiveness) and implementing available pain evaluation tools for: identification of sub-groups of patients accepted for treatment, establishment of clinical relevance and/or magnitude of patients' results.
- K) Understanding the need to monitor and review the efficacy of treatment/management and adequately modifying treatment and management strategies<sup>6</sup>.
- L) Understanding pain as the fifth vital sign and contributing for the implementation of the Painless Hospital program, with regard to hospital environment.
- M) Understanding the need to refer patients to other health professionals, as the case may be and in a timely manner, through the recognition of phenomena deserving specialized attention of other health professionals, as well as for other physiotherapists with different abilities and competences with regard to evaluating and managing different pain conditions.
- N) Understanding the importance and need for experimental animal studies for the study of pain, as well as recognizing and understanding evaluation tools used in animal experimental models.
- O) Identifying whether patients respond or not to certain intervention strategies and evaluating the need for changing approach.

### **Pain management**

- A) Showing ability to integrate patient's evaluation to an adequate treatment plan using clinical reasoning concepts and strategies<sup>6</sup>.
- B) Understanding the principles of effective therapist/patient/professional relationship to improve pain, promote function in optimal levels and decrease incapacity through the use of active or passive pain management approaches, as adequate. Physiotherapists should develop a fundamental role to motivate painful patients for the effective application of proposed therapy adequately using different motivational feedback methods to directly interfere with patients' symptoms improvement.

C) Assisting patients in the development of a daily routine to get support and, when necessary, readjusting habits and roles according to individual capacity and life situation, considering daily actions (gestural, postural, organizational, dietary, sleep, etc.). Patients should be encouraged to develop active and participative behavior on their treatment, being major responsible for their improvement<sup>23</sup>.

D) Understanding the need for involving family members and other relevant people, including employers, if adequate<sup>17</sup>.

E) Using a person-centered perspective to formulate collaborative intervention strategies consistent with physiotherapists' perspective.

F) Understanding pharmacology: pharmacological principles of drugs used to manage pain (non-opioids, opioids, adjuvant topic analgesics, local anesthetics), limitations of pharmacological intervention for chronic pain, importance of combining pharmacological and non-pharmacological strategies for chronic pain and use of strategies such as active evidence-based self-care. In addition, deeply understanding mechanisms and effects of iontophoresis and phonophoresis<sup>24</sup>.

G) Basically understanding therapeutic approaches of other healthcare areas: nursing, speech therapy, medicine, dentistry, psychology, occupational therapy.

H) Patients' education<sup>25,26</sup>:

- Recognizing the impact and evidence for the use of therapeutic education in neuroscience and self-care as critical part of pain management;
- Designing and applying adequate educational strategies based on educational science;
- Identifying the variation of available educational opportunities in therapeutic domains (injury, disease, medical and postoperative intervention) considering age, culture and gender;
- Considering the scope and evidence for/against different contemporary therapeutic educational styles (biomedical, psychological, neuroscience);
- Identifying important variables which may impact the understanding of results for patients (self-efficacy, level of instruction on health, comorbidities, culture), clinicians (pain related beliefs of the health professional), message (use of multimedia), and context (health insurance limitations; injury prevention).

I) Behavioral management<sup>17</sup>:

- Understanding and applying functional behavioral analyses of painful conditions;
- Evaluating the usefulness of screening tools to identify psychosocial factors predictive of persistent incapacity;
- Applying behavioral approaches (physical and cognitive-behavioral components) and evaluating the effects.

J) Exercise<sup>27</sup>

- Understanding parameters (e.g.: mode, frequency, duration, intensity/dose) of therapeutic exercises for pain relief;
- Understanding different physical exercise modalities and relate them to your objectives (example: motor control, resistance, strength, cardiovascular fitness exercises);

- Evaluating individuals' adaptation ability to the proposed exercise/dosimetry;
- Describing how to modify exercise parameters taking into account pain condition, age, psychosocial factors and health status;
- Recognizing the importance of implementing adjuvant therapies to treat issues regarding exercise prescription (e.g.: biopsychosocial, fear and avoidance behavior, catastrophizing, cognitive-behavioral therapy)<sup>28</sup>;
- Understanding the importance of patients' education in the prescription of therapeutic exercises, including the concept of motivation and grading to potentiate the efficacy of global therapy and compliance.

K) Reintegrating to work (paid and unpaid work)<sup>29</sup>:

- Identifying factors associated to prolonged loss of productivity and integrating strategies to overcome obstacles and return to work or readapt it;
- Understanding the role of ergonomic principles and modified accommodations in the workplace;
- Developing an intervention plan in coordination with employers/managers/bosses;
- Understanding Brazilian medical leave and return to work system.

L) For the following interventions<sup>30</sup>:

- Acupuncture and electroacupuncture;
- Biofeedback;
- Cryotherapy
- Transcutaneous electrical nerve stimulation (TENS, interferential, diadynamic, average frequency modulated along time);
- Russian, galvanic, microcurrents, transcranial electric stimulation with constant current and repetitive transcranial magnetic stimulation;
- Sensory stimulation;
- Motor imagetic;
- Laser;
- Orthoses;
- Virtual reality;
- Relaxation;
- Manual therapy (massage, manipulation, mobilization);
- Superficial and deep thermotherapy;
- Understanding proposed neurophysiologic mechanisms and/or biomechanical actions for each intervention, as well as their associated effects with regard to pain management;
- Understanding clinical application principles and current evidences for each form of intervention to manage different pain conditions;
- Having adequate theoretic and scientific basis for all proposed techniques.

### Clinical conditions

A) Understanding the use of physiotherapeutic strategies and interventions with regard to acute and/or chronic pain conditions. A list of different painful clinical conditions often treated by physiotherapists is presented below. Remember that other not

mentioned clinical conditions may also need physiotherapeutic interventions.

- Neck pain, back pain and low back pain;
- Arthritides;
- Headaches;
- Cancer pain;
- Fibromyalgia;
- Myofascial pain;
- Peripheral and central neuropathic pain;
- Complex regional pain syndrome;
- Cervicocraniomandibular disorder;
- Tendinopathies, bursitis and myositis;
- Adhesive capsulitis;
- Sprains;
- Postoperative pain;
- Pelvic pain.

## DISCUSSION

Inclusion of the Pain subject in academic teaching institutions is a broader movement than the noble cause of minimizing patients' distress and pain<sup>31-33</sup>. Studying pain as a dynamic phenomenon which might be amplified or inhibited by the context, separating acute pain symptom from chronic pain disease<sup>34</sup> under the paradigm of biopsychosocial context means breaking linear and rigid paradigms and recognizing that there is therapeutic limit in identified diseases, as well as there are those still not labelled<sup>35</sup>.

Importantly, this scientific trend should be translational, able to promote interdisciplinary relationships and to accelerate the bidirectional exchange of information between basic and clinical science aiming at giving a direction to laboratory basic research findings for applied environments involving human health<sup>36</sup>.

Many aspects should be considered for translational science effectiveness, such as technological development, clinical research, industrial productive process, commercialization of products, as well as health systems themselves. The network of relations and interests between basic and applied science and the translational potential of studies are complex and it is necessary to understand potential factors preventing the translation of basic scientific discoveries to clinical trials, and from these to clinical practice, making difficult health-care systems decision making processes<sup>37</sup>.

Conversely, one should not admit the priority use of clinical science information without duly understanding phenomena explained by basic science, which allows, by means of specific methods, to explain action mechanisms of interventions which are clinically used for therapeutic purposes.

However, for interdisciplinary studies to be developed by professors, it is necessary an interdisciplinary working methodology implying the integration of knowledge; transition from fragmented to unitary knowledge conception; overcoming the dichotomy between teaching and research, considering study and research as from the contribution of different sciences. Interdisciplinary methodology refers to

scientific freedom, based on dialog and collaboration, on ability to innovate, to create, to research, aiming not only at technical-productive appreciation but especially at reflexive education<sup>38,39</sup>. Interdisciplinarity allows questioning the fragmentation of different knowledge fields, looking for possible convergence points among different areas and epistemological relationship among disciplines.

Interconnections of disciplines help the integrated understanding of contents, enhancing students' knowledge. However, in our culture, the difficulty of institutionalizing interdisciplinary teaching in different schools remits to two facts: 1) most of the time, students learn from the simplest to the most complex, with slow advances requiring little reasoning, especially abstract reasoning; 2) interconnecting different contents and mastering different contents.

This conception assumes educators imbued with true critical spirit, open to cooperation, interchange among different disciplines, constant questioning of arbitrary knowledge disconnected from reality. On the other hand, it demands research, sharing and systematization of ideas, knowledge building, in an ongoing questioning and search process.

So, transversality and interdisciplinarity are, in this sense, ways of working with knowledge aiming at reintegrating isolated dimensions by the disciplinary treatment. With this, the intention is to have a broader understanding of reality which is often fragmented by available means to know it.

Within this perspective, from the practical point of view with regard to disciplinary content distribution in graduation courses, professors of each graduation course should discuss and decide whether pain-related subjects should be discussed during specific disciplines or should be offered by means of a separate discipline where contents are detailed and deeply presented and discussed with a professor specialist in this area.

It is important to stress that, today, good health professionals should master theoretical and clinical information as well as being updated with scientific evidences to base their practice, understanding how and when to use this evidence associated to technical experience and patient's preference. Evidence-based practice relates to systematic decision making process, where research results are evaluated and used to direct clinical practice<sup>40,41</sup>. So, it is advisable that professors encourage and be active in the evidence-based practice teaching-learning process, which should encompass different professional action aspects, from functional evaluation to therapeutic planning and subsequent patient's evolution follow-up.

Evidence-based practice does not determine types of evaluation or intervention procedures to be used by professionals, but helps them in selecting the best evaluation and treatment method to be used in a certain population with a given clinical condition and in organizing different information sources to justify clinical decision-making<sup>42</sup>.

It is important to stress ongoing education investments to update a clinical problem or dysfunction, be it by formal means (specializations, course, congresses, conferences) or more infor-

mally (in meetings with groups or professionals to discuss literature or case reports, for example). In addition, ongoing update of information through the reading of scientific articles, since ongoing learning is critical for the clinical practice.

## CONCLUSION

With this study, SBED's Committee of Physiotherapists hopes having contributed for an objective and updated direction on major aspects of the study of pain, to help and guide in a standardized and universal way, education on pain in Brazilian Physiotherapy graduation courses.

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## REFERENCES

- Remondiere R. L'institution de la Kinesithérapie em France (1840-1946). Les Cahiers du Centre de Recherches Historiques. 1994;12.
- Pessini L. Humanização da dor e sofrimento humanos no contexto hospitalar. *Bioética*. 2002;10(2):51-72.
- Engel GL. The need for a new medical model: a challenge for biomedicine. *Science*. 1977;196(4286):129-36.
- Apkarian AV, Baliki MN, Geha PY. Towards a theory of chronic pain. *Prog Neurobiol*. 2009;87(2):81-97.
- Marchand S. The phenomenon of pain. Seattle: IAPS Press; 2012.
- Sluka KA. Mechanisms and Management of Pain for the Physical Therapist, Seattle: IASP Press; 2009.
- Strong J. Lifestyle management. In: Strong J, Unruh AM, Wright A, Baxter GD, (editors). Pain: A textbook for Therapists. Churchill Livingstone; 2002. 289-306p.
- Turk DC, Melzack R. Handbook of pain assessment. 2<sup>nd</sup> ed. The Guilford Press; 2001.
- International Association for the Study of Pain (IASP) <http://www.iasp-pain.org/> (acessado em 20 janeiro de 2017)
- Sociedade Brasileira para o Estudo da Dor (SBED). <http://www.sbed.org.br/> (acessado em 20 janeiro de 2017)
- Código de Ética e Deontologia da Fisioterapia. <http://coffito.gov> (acessado em 20 janeiro de 2017)
- Código Civil Brasileiro - <http://www.planalto.gov.br> (acessado em 20 janeiro de 2017)
- Protocolo Clínico e Diretrizes Terapêuticas da Dor Crônica <http://portalsaude.saude.gov.br>. (acessado em janeiro de 2017)
- Giamberardino MA, Jensen TS. Pain Comorbidities: Understanding and Treating the Complex Patient. Seattle: IASP Press; 2012
- Hadjistavropoulos T. Pain Management for Older Adults: A Self-Help Guide. Seattle: IASP Press; 2008.
- McMahon S, Koltzenburg M, Tracey I, Turk D. Wall & Melzack's Textbook of Pain. 6<sup>th</sup> ed. Saunders; 2013.
- Flor R, Turk DC. Chronic Pain: An Integrated Biobehavioral Approach. Seattle: IASP Press; 2011.
- Arendt-Nielsen L, Perrot S. Pain in the Joints. Seattle: IASP Press; 2016.
- Wildor-Smith O, Arendt-Nielsen L, Yarnitsky D, Vissers K. Postoperative Pain: Science and Clinical Practice. Seattle: IASP Press; 2014.
- Dworkin RH, Turk DC, Farrar JT, Haythornthwaite JA, Jensen MP, Katz NP, et al. Core outcome measures for chronic pain clinical trials: IMMPACT recommendations. *Pain*. 2005;113(1-2):9-19.
- Turk DC, Dworkin RH, Allen RR, Bellamy N, Brandenburg N, Carr DB, et al. Core outcome domains for chronic pain clinical trials: IMMPACT recommendations. *Pain*. 2003;106(3):337-45.
- Organização Mundial de Saúde (OMS), 1999/2001. /CD/H-2: International Classification of Functioning and Disability. <http://www.who.int/icidh/>.
- Strong J. Life Management. In: Strong J, Unruh AM, Wright A, Baxter GD, (editors). Pain: A textbook for Therapists. Churchill Livingstone; 2002. 289-306p.
- Beaulieu P, Lussier D, Porreca F, Dickenson A. Pharmacology of Pain. Seattle: IASP Press; 2010.
- Ogbonna P. Educational Materials for Use in Patients Home Education Programs. In Shepard, KF, Jensen, GM. Handbook of teaching for physical therapists. 2<sup>nd</sup> ed. Butterworth Heinemann; 2002. 23-438p.
- Gahmier J, Morris DM, Community Health Education: Envolving Opportunities for Physical Therapist. In Shepard, KF, Jensen, GM. Handbook of teaching for physical therapists. 2<sup>nd</sup> ed. Butterworth Heinemann. 2002. 439-68p.
- Hides J, Richardson C. Exercise and pain. In: Strong J, Unruh AM, Wright A, Baxter GD, (editors). Pain: A textbook for Therapists. Churchill Livingstone; 2002. 245-66p.
- Vlaeyen JW, Morley SJ, Linton SJ, Boersma K, Jong J. Pain-Related Fear: Exposure-Based Treatment. Seattle: IASP Press; 2012.
- Gibson L, Allen S, Strong J. Re-integration into work. In: Strong J, Unruh AM, Wright A, Baxter GD, (editors) Pain: A textbook for Therapists. Churchill Livingstone; 2002. 267-88p.
- Galantino ML, Lucci SL. Chapter 17 – Living with Chronic Pain: Exporation of Complementary Therapies and Impact on Quality of Life. In: Wittink H, Michel T. Chronic Pain Management for Physical Therapists. 2<sup>nd</sup> ed. Elsevier Science; 2002. 279-90p.
- Wall PD. Foreword. In: Strong J, Unruh AM, Wright A, Baxter GD, (editors). Pain: A textbook for Therapists. Churchill Livingstone; 2002.
- Engers AJ, Jellema P, Wensing M, van der Windt DAWM, Grol R, van Tulder MW. Individual patient education for low back pain. *Cochrane Database Syst Rev*. 2008;1:CD004057
- Foster G, Taylor SJ, Eldridge S, Ramsay J, Griffiths CJ. Self-management education programmes by lay leaders for people with chronic conditions. *Cochrane Database Syst Rev*. 2007;4:CD005108.
- Moseley GL, Nicholas MK, Hodges PW. A randomized controlled trial of intensive neurophysiology education in chronic low back pain. *Clin J Pain*. 2004;20(5):324-30.
- Melo MC, Caricatti JM. O ensino de ciências e a educação básica: Propostas para Superar a Crise, Academia Brasileira de Ciências e Fundação Conrado Wessel; 2007.
- Advancing Translational Cancer Research: A Vision of the Cancer Center and SPORE Programs of the Future Report of the P30/P50 Ad Hoc Working Group February 2003. [documento da internet]. [acessado 2013 jan 12]. Disponível em: <http://deainfo.nci.nih.gov/advisory/ncab/workgroup/p30-p50/P30-P50final12feb03.pdf> [ Links ]
- Sung NS, Crowley Júnior WF, Genel M, Salber P, Sandy L, Sherwood LM, et al. Central challenges facing the national clinical research enterprise. *JAMA*. 2003;289(10):1278-87.
- Fazenda ICA. Práticas interdisciplinares na escola. São Paulo: Cortez; 1993.
- Fazenda ICA. Interdisciplinaridade: história, teoria e pesquisa. Campinas: Papirus; 1994.
- Sackett DL. Straus S, Richardson WS, Rosenberg W, Haynes BR. Evidence-based medicine. How to practice and teach EBM. 2<sup>nd</sup> ed. Churchill Livingstone, Edimburg, London, New York, Sr Louis, Toronto, Sydney; 2000.
- Abreu BC, Peloquin SM, Ottenbacher K. Competence in scientific inquiry and research. *Am J Occup Ther*. 1998;52(9):751-9.
- Helewa A, Walker JM. Critical evaluation of research in physical rehabilitation. Canada: WB Saunders Company; 2000.

# Effects of deep heating to treat osteoarthritis pain: systematic review

## *Efeitos do calor profundo no tratamento da dor na osteoartrite: revisão sistemática*

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** Osteoarthritis is an inflammatory and degenerative joint disease, causing pain, musculoskeletal disorders and impact on functionality, daily life activities and quality of life. The action of physical agents by means of deep heating seems to be an alternative to treat such disease. This study aimed at verifying the effects of deep heating on osteoarthritis patients.

**CONTENTS:** A systematic review was carried out in Medline, Scielo and LILACS databases as from keywords “Osteoarthritis”, “Induced Hyperthermia”, “Physiotherapy” and “Ultrasound”, and other keywords such as “Deep heat”, “Microwaves” and “Short-waves”, in Portuguese, English and Spanish, in the period from January 2005 to January 2016, and 986 articles were found. Initially, 16 potentially relevant articles were selected for the study and, after a judicious qualitative analysis, nine complete articles meeting inclusion criteria were selected.

**CONCLUSION:** Physical deep heating physical agents (ultrasound, short-waves diathermy and microwaves) were beneficial to manage pain and other variables in individuals with osteoarthritis in different levels of severity, especially in the long term. However, these effects are better observed when applied simultaneously with kinesiotherapy.

**Keywords:** Induced hyperthermia, Osteoarthritis, Pain, Physiotherapy, Ultrasound.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A osteoartrite é uma doença articular inflamatória e degenerativa, que provoca dor, agravos osteoarticulares e impacto na funcionalidade, nas atividades de vida diária e na qualidade de vida. A ação de agentes físicos por meio do calor profundo parece ser uma alternativa no tratamento dessa doença. O objetivo deste estudo foi verificar os efeitos do calor profundo em indivíduos com osteoartrite.

**CONTEÚDO:** Realizou-se uma revisão sistemática nas bases de dados Medline, Scielo e LILACS, a partir dos descritores “Osteoartrite”, “Hipertermia Induzida”, “Fisioterapia” e “Ultrassom” e outras palavras-chaves como “Calor profundo”, “Micro-ondas” e “Ondas curtas”, nas línguas portuguesa, inglesa e espanhola, no período de janeiro de 2005 a janeiro de 2016. Encontraram-se 986 artigos. Inicialmente, 16 artigos potencialmente relevantes foram selecionados para o estudo, e, após uma análise qualitativa criteriosa, selecionaram-se 9 artigos completos que preencheram os critérios de inclusão exigidos.

**CONCLUSÃO:** Os agentes físicos em forma de calor profundo (ultrassom, diatermia por ondas curtas e micro-ondas) ofertam benefícios no manuseio da dor e outras variáveis em indivíduos com osteoartrite em diferentes graus de acometimento, especialmente no longo prazo. Contudo, esses efeitos são mais bem observados quando aplicados em concomitância à cinesioterapia.

**Descritores:** Dor, Fisioterapia, Hipertermia induzida, Osteoartrite, Ultrassom.

### INTRODUCTION

Osteoarthritis (OA) is a degenerative inflammatory joint disease resulting from chondrocytes and synoviocytes-mediated responses, in addition to presenting higher serum and synovial inflammatory cytokine levels as compared to individuals not affected by the disease<sup>1-3</sup>.

OA is multifactorial and involves changes in osteoarticular alignment causing joint instability<sup>4</sup>. This is the most common form of arthritis, being considered one of the ten more disabling diseases in developed countries and one of the most prevalent rheumatic diseases among the elderly<sup>5-7</sup>.

Although able to affect any body region, it preferably affects joints supporting major weight loads and requiring frequent use, such as the knees<sup>3</sup>. Clinical results show increased joint volume due to synovitis caused by synovial effusion or thickening, pain at rest, morning stiffness, deformities, instabilities, movements limitation,

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incapacity and muscle weakness<sup>8-10</sup>. Pain intensity may vary from no pain to individuals' immobilization and physical incapacity<sup>2</sup>.

In this sense, physiotherapy attempts to attenuate OA-induced injuries and adverse effects of drugs<sup>11</sup>. In addition to kinesiotherapy, some physical resources, such as deep heating involving tools such as ultrasound (US), short-waves diathermia (SWD) and microwaves (MW), have been used with analgesic and anti-inflammatory action<sup>12,13</sup>, and have shown good results with regard to pain and functionality of OA patients<sup>13</sup>.

This study aimed at reviewing in the literature sources documenting the effects of deep heating on pain management of OA individuals.

**CONTENTS**

A systematic search was carried out looking for articles published in journals indexed in Medline, Scielo and LILACS databases. Descriptors used for search were according to Health Science Descriptors, as from the primary descriptor "osteoarthritis" crossed with secondary descriptors such as "induced hyperthermia", "physiotherapy" and "ultrasound". In addition, the following keywords were used: "deep heating", "microwaves" and "short waves". A search was also carried out with variations of these words in Portuguese and Spanish.

Included in the study were randomized clinical trials; studies carried out exclusively with humans; studies with pain evaluation as outcome, being or not followed by other variables, such as mobility, joint movement amplitude, muscle strength, gait velocity, functionality, incapacity and/or quality of life; studies found in full and available for free; studies in Portuguese, English or Spanish; studies published between January 2005 and December 2015.

Exclusion criteria were unfinished studies, studies involving individuals submitted to some surgical procedures due to OA or those not complying with mentioned criteria.

Initially, titles and abstracts were identified and independently evaluated by a reviewer, to select those meeting eligibility criteria. Potentially relevant studies were kept for further analysis of the full text.

Table 1 shows the strategy for studies search and selection.

Among selected studies, four involved the use of SWD, four the use of US (continuous or pulsed) and one involved MW. Sample size of included studies has varied from 25 to 203 OA individuals, being that 100% had knee joint affected. Most samples were predominantly females and elderly. All studies had comparison between at least two groups.

Table 2 shows sample characterization of included studies. Table 3 shows used evaluative tools and intervention protocols, as well as outcomes found in included studies. Selected studies suggest a limitation of the subject proposed by this review, since in a period of ten years, just nine studies have contemplated the effects of deep heating on pain management of OA patients, according to required criteria. It is possible to observe that scientific interest on the subject seems to be recent, because seven studies were carried out in the last five years.

However, included studies have shown that heating tools are beneficial for pain management of OA patients. Although they do not stand out with regard to conventional kinesiotherapy, they may complement treatment when used simultaneously with physical exercises. Such measures were of major interest for managing OA-induced impacts and complications, especially with regard to pain.

**Table 1.** Studies search and selection

Studies identified by electronic search in Medline (n=873), Scielo (n=98) and LILACS (n=15) databases		
Screening	970 were excluded by title and abstract	Other physiotherapeutic approaches: 396 Outside of the subject: 364 Non-randomized studies: 64 Duplication of themes: 52 Surgical approach: 39 Pharmacological approach: 34 Unfinished studies: 21
Eligibility	16 complete evaluated articles	7 have not met inclusion criteria 3 had no outcome variables 2 were not available in full and for free 1 was unfinished 1 was a systematic review
Inclusion	9 articles were included in the qualitative synthesis	

**Table 2.** Sample characterization of recruited studies on deep heating effects for osteoarthritis pain management

Authors	Number	Age (years)	Gender	Affection	Osteoarthritis level
Akyol et al. <sup>10</sup>	40	±58.2	40 females 0 males	Bilateral	I, II or III
Rabini et al. <sup>13</sup>	54	±65.15	45 females 9 males	Uni or bilateral	II or III
Jan et al. <sup>14</sup>	30	±65.7	24 females 6 males	Uni or bilateral	I, II or III
Silva, Imoto & Croci <sup>15</sup>	25	±67.56	19 females 6 males	Unilateral	I
Fukuda et al. <sup>16</sup>	121	±60	121 females 0 males	Not specified	II or III
Carlos, Belli e Alfredo <sup>17</sup>	30	±63.33	21 females 9 males	Uni or bilateral	II, III or IV
Atamaz et al. <sup>18</sup>	203	±61.48	167 females 36 males	Uni or bilateral	II or III
Mascarin et al. <sup>19</sup>	40	±62.4	40 females 0 males	Bilateral	Not specified
Chen et al. <sup>20</sup>	120	±63.0	102 females 18 males	Bilateral	III

**Table 3.** Evaluative tools, intervention protocols and outcomes of studies on the effect of deep heating on osteoarthritis pain management

Authors	Evaluation tools and intervention protocol	Outcomes
Akyol et al. <sup>10</sup>	Evaluation: WOMAC, VAS, isokinetic dynamometry, SF-36, TC6, Beck inventory. Intervention: G1 (n=20): kinesiotherapy (muscle strengthening on isokinetic dynamometer) + SWD (frequency 27,12 MHz, intensity according to patients' sensitivity, time of 20 minutes); G2 (n=20): kinesiotherapy (same protocol as G1); IT: 12 sessions, 3x/week, 4 weeks.	SWD has no additional significant effect on pain and other variables (functionality, stiffness, depression, gait velocity, muscle strength and quality of life).
Rabini et al. <sup>13</sup>	Evaluation: WOMAC, BMRC, VAS. Intervention: G1 (n=27): MW (potency of 40W, temperature of 38°C, time of 30 minutes). G2 (n=27): hot compresses (temperature of 38°C, time of 30 minutes). IT: 12 sessions, 3x/week, to 4 weeks.	MW has decreased pain and improved other variables (muscle strength and physical function) with long term benefits.
Jan et al. <sup>14</sup>	Evaluation: ultrasound, VAS. Intervention: G1 (n=11): SWD (intensity tolerated by patient, time of 20 minutes); G2 (n=10): SWD (same protocol as G1) + drugs (non-steroid anti-inflammatory drugs); G3 (n=9): control. IT: 30 sessions, 3x to 5x/ week, up to 8 weeks.	SWD has significantly decreased pain and synovial thickness.
Silva, Imoto & Croci <sup>15</sup>	Evaluation: sphygmomanometer, VAS, goniometry, Lequesne index. Intervention: G1(n=9): SWD (20 minutes, without specifying parameters) + kinesiotherapy (without specification); G2(n=6): criotherapy (20 minutes) + kinesiotherapy (without specification); G3(n=9): kinesiotherapy (without specification); IT: 10 sessions, 2x/week.	Most adequate protocol for improving pain was that of G2. Both protocols were effective in improving functionality, joint movement amplitude and flexibility, while only G3 has improved muscle strength.
Fukuda et al. <sup>16</sup>	Evaluation: KOOS questionnaire; Intervention: G1 (n=35): control. G2 (n=23): placebo (19 minutes). G3 (n=32): pulsed low dose SWD (power 14,5W, time 19 minutes; total energy 17 kJ); G4 (n=31): pulsed high dose SWD (power 14,5W, time 38 minutes; total energy 33kJ). IT: 9 sessions, 3x/week.	Pulsed SWD is an effective method to decrease pain and improve other variables (functionality and quality of life) in the short term.

Continue...

**Table 3.** Evaluative tools, intervention protocols and outcomes of studies on the effect of deep heating on osteoarthritis pain management – continuation

Authors	Evaluation tools and intervention protocol	Outcomes
Carlos, Belli & Alfredo <sup>17</sup>	Evaluation: WOMAC, Lequesne Index, VAS, goniometry, portable dynamometry and TGUG. Intervention: G1(n=10): CUS (intensity 1.5 W/cm <sup>2</sup> , continuous mode – 100%) + kinesiotherapy (heating, muscle strengthening, time 45 minutes); G2(n=10): PUS (intensity 2.5 W/cm <sup>2</sup> , pulsed mode 20% – pulse repetition frequency 100 Hz) + kinesiotherapy (same protocol as G1); G3(n=10): kinesiotherapy (same protocol as G1). IT: G1 and G2: 24 sessions (first 12; use of US and for other exercises). IT G3: 24 sessions (kinesiotherapy alone).	CUS associated to kinesiotherapy was the most effective protocol to decrease pain and improve other variables (joint mobility, functionality and quality of life).
Atamaz et al. <sup>18</sup>	Evaluation: VAS, WOMAC, TC15, goniometry, drug ingestion. Intervention: G1 (n=37): TENS sham and kinesiotherapy*; G2 (n=37): TENS (frequency 80Hz, intensity 10 to 30 mA, time 20 minutes) + kinesiotherapy*; G3 (n=35): CI sham + kinesiotherapy*; G4 (n=31): CI (modulation frequency in amplitude of 100 Hz, time 20 minutes) + kinesiotherapy*; G5 (n=32): US sham + kinesiotherapy*; G6 (n=31): US (frequency of 27.12MHz and intensity of 3.2 W/cm <sup>2</sup> , time 20 minutes) + kinesiotherapy*; *kinesiotherapeutic program used for all groups: warm up, muscle elongation and muscle strengthening. IT of physical agents: 15 sessions, 5x/week. IT of kinesiotherapy exercises: 09 sessions, 3x/week.	Groups using physical agents have decreased pain and drug ingestion in a more significant way, although all groups have shown improvements.
Mascarin et al. <sup>19</sup>	Evaluation: WOMAC, VAS, goniometry, TC6. Intervention: G1 (n=16): kinesiotherapy (muscle elongation and strengthening, time 20 minutes); G2 (n=12): TENS (frequency of 100 Hz, pulse width 50 mS, intensity according to individual sensitivity, mode 50% frequency, quadratic, two-phase symmetric pulse, during 20 minutes) + kinesiotherapy (same protocol as G1); G3 (n=12): US (frequency of 01 MHz and intensity at 0.8 W/cm <sup>2</sup> , time 25 minutes) + kinesiotherapy (same protocol as G1); IT: 24 sessions, 2x/week.	Both groups were effective in decreasing pain and improving WOMAC variables. However, just G2 and G3 have improved travelled distance in TC6.
Chen et al. <sup>20</sup>	Evaluation: goniometry, VAS, Lequesne Index, isokinetic dynamometry. Intervention: G1 (n=30): isokinetic muscle strengthening (muscle elongation, application of warm compresses on affected site, heating, muscle strengthening of knee extensors and flexors). G2 (n=30): PUS (frequency of 1 MHz, intensity of 2.5 W/cm <sup>2</sup> , pulse of 25%, time 10 minutes). G3 (n=30): shock waves (density 0.03-0.4 mJ/mm <sup>2</sup> , frequency 1-8 Hz and pressure range of 11-82 MPa). G4 (n=30): control. IT: 24 sessions (3x/week), except G3 (18 sessions).	Shock waves therapy was better than USP to decrease pain and other variables (joint movement amplitude, functionality, muscle strength).

BMRC = British Medical Research Council; IC = interferential current; SWD = short waves diathermy; VAS = visual analog scale; G1 = group 1; G2 = group 2; G3 = group 3; G4 = group 4; G5 = group 5; G6 = group 6; MW = microwaves; SF-36 = Short Form Health Survey-36; TC6 = 6 minutes walking test; TC15m = 15 meters walking test in shorter time; TENS = transcutaneous electrical nerve stimulation; TGUG = timed get up and go; IT = intervention time; CUS = continuous ultrasound; PUS = pulsed ultrasound; WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index. \* = Kinesiotherapeutic program consisting of heating, muscle stretching and muscle strengthening.

## DISCUSSION

OA is a disease causing more persistent musculoskeletal pain and may affect one out of five individuals, especially females and the elderly, causing chronic pain and incapacity especially on the knees<sup>5,21</sup>, which can be observed in selected studies, since in 100% of the reviewed content, samples had knee OA (levels from I to IV, with predominance of level III among

studies), and in eight out of nine studies mean age was above 60 years, characterizing predominantly elderly samples.

Interaction of factors such as disease worsening, pain, associated comorbidities, psychological and social factors, decreased aerobic work and lower limbs muscle weakness are determining factors for physical incapacity in OA individuals<sup>15</sup>.

Functional impairment may negatively interfere with quality of life of these people, especially if they are old aged, females

and symptomatic. OA knee pain prevalence is high (32.2% for males and 58.0% for females) which increases in up to five times the risk of poorer lower limbs function<sup>22,23</sup>.

Lequesne and WOMAC indices are specific and reliable tools for OA evaluation<sup>15</sup>. It was observed that studies have used such protocols, being that five have used WOMAC index<sup>10,13,17-19</sup>, three have used Lequesne index<sup>15,17,20</sup> and one has used the KOOS questionnaire, a scale of 11 questions to evaluate pain and functionality<sup>16</sup>.

In this sense, induced hyperthermia seems to be a strategy to manage OA pain since it is a conservative, low cost and non-invasive therapy<sup>24</sup>, which has led to the choice of this therapy as the target of our study.

Four recruited studies<sup>10,15,17,18</sup> have used physical agents as aid or intervention to physical exercises (kinesiotherapy). It was observed that groups adopting deep heating as treatment strategy have improved pain and other evaluated variables, without the adverse effects of individuals submitted to intervention protocols. From these, one has compared the action of physical agents and their placebos and has observed improved pain and functionality, movement amplitude and functional independence, without statistically significant difference among groups<sup>18</sup>. However, intervention groups have presented lower drug ingestion, indicating higher impact on OA treatment.

So, it is possible to observe the importance of conventional kinesiotherapy to decrease pain and improve other variables of knee OA individuals, being that physical agents may act as optimizers of the physiotherapeutic protocol. In addition, such resources decrease the use of drugs by OA patients and their possible adverse effects.

Studies suggest that US is beneficial to treat knee OA, because it is a safe strategy, decreases pain and improves physical functions, regardless of the mode (continuous or pulsed). Treatment duration should be adapted to specific needs of each individual<sup>25</sup>.

Two studies<sup>19,20</sup> have compared the effects of deep heating (US) and conventional kinesiotherapy or even other non-thermal physical agents. Their results show benefits with regard to pain, functionality, movement amplitude, functional independence<sup>19</sup> and muscle strength<sup>20</sup>, without significant difference among approaches<sup>19</sup>. However, it is worth highlighting that such experiments were carried out just with US and in one of them US with kinesiotherapy has been superior in the distance travelled by the individual<sup>19</sup>. The other has shown just immediate US effects<sup>20</sup>, which is in disagreement with most authors, since they report deep heating as therapy with long term benefits.

MW is a noninvasive method increasing in vivo temperature of internal tissues ( $\pm 0.2^\circ\text{C}$ ), in a depth of 3 to 7cm<sup>26</sup>. Its properties are beneficial to treat OA, since joint heat stimulation increases chondrocytes metabolism and partially generates cartilaginous matrix<sup>24</sup>.

A study has compared MW therapy (deep heating) with the use of hot compresses (superficial heat) and has concluded that deep approach has significant effect on pain, stiffness,

physical limitation and muscle strength in knee OA individuals<sup>13</sup>, in the long term, since such disease is chronic and generates severe pain.

SWD aims at decreasing pain in the clinical practice<sup>10</sup>. SW therapy in low (power of 14.5W; duration 19 minutes; total energy 17kJ) or high doses (power of 14.5W; duration 38 minutes; total energy 33kJ) is beneficial for pain relief and increased muscle strength in the long term, especially in low doses<sup>16</sup>. It may decrease joint inflammatory process, being or not associated to drugs<sup>14</sup>.

Two recruited studies<sup>14,16</sup> have evaluated the effects of deep heating exclusively with physical agents, observing positive effects on evaluated variables, such as those measured by WOMAC index, pain, joint movement amplitude or muscle strength. However, authors are not sure about its isolated efficacy.

## CONCLUSION

Physical agents in the form of deep heating (US, SWD and MW) are beneficial to manage pain and other variables such as muscle strength, joint movement amplitude, functionality, stiffness, daily life activities and quality of life in individuals with different levels of OA, especially in the long term. However, it has to be highlighted that such effects are better observed when applied simultaneously with kinesiotherapy.

## REFERENCES

- Sohn DH, Sokolove J, Sharpe O, Erhart JC, Chandra PE, Lahey LJ, et al. Plasma proteins present in osteoarthritic synovial fluid can stimulate cytokine production via Toll-like receptor 4. *Arthritis Res Ther*. 2012;14(1):7.
- Wibeling LM, Batista JS, Vidmar MF, Kayser B, Pasqualotti A, Schneider RH. Efeitos da fisioterapia convencional e da witerapia na dor e capacidade funcional de mulheres idosas com osteoartrite de joelho. *Rev Dor*. 2013;14(3):196-9.
- Duarte VS, Santos ML, Rodrigues KA, Ramires JB, Arêas GP, Borges GF. Exercícios físicos e osteoartrite: uma revisão sistemática. *Fisioter Mov*. 2013;26(1):193-202.
- Coelho Cde F, Leal-Junior EC, Biasotto-Gonzalez DA, Bley AS, de Carvalho Pde T, Politti F, et al. Effectiveness of phototherapy incorporated into an exercise program for osteoarthritis of the knee: study protocol for a randomized controlled trial. *Trials*. 2014;15:221.
- Cunha-Miranda L, Faustino A, Alves C, Vicente V, Barbosa S. Avaliação da magnitude da desvantagem da osteoartrite na vida das pessoas: estudo MOVES. *Rev Bras Reumatol*. 2015;55(1):22-30.
- Bijlsma JW, Berenbaum F, Lafeber FP. Osteoarthritis: an update with relevance for clinical practice. *Lancet*. 2011;377(9783):2115-26.
- Guermazi A, Niu J, Hayashi D, Roemer FW, Englund M, Neogi T, et al. Prevalence of abnormalities in knees detected by MRI in adults without knee osteoarthritis: population based observational study (Framingham Osteoarthritis Study). *BMJ*. 2012;345:e5339.
- Rezend MU, Campos GC. Is osteoarthritis a mechanical or inflammatory disease? *Rev Bras Ortop*. 2013;48(6):471-4.
- Fellet A, Fellet AJ, Fellet L. Osteoartrite: uma revisão. *Rev Bras Med*. 2007;64(1):55-61.
- Akyol Y, Durmus D, Alayli G, Tander B, Bek Y, Canturk F, et al. Does short-wave diathermy increase the effectiveness of isokinetic exercise on pain, function, knee muscle strength, quality of life, and depression in the patients with knee osteoarthritis? A randomized controlled clinical study. *Eur J Phys Rehabil Med*. 2010;46(3):325-36.
- Johnsen SP, Larsson H, Tarrone RE, McLaughlin JK, Friis S, Sorensen HT, et al. Risk of hospitalization for myocardial infarction among users of rofecoxib, celecoxib, and other NSAIDs: a population-based case-control study. *Arch Intern Med*. 2005;165(9):978-84.
- Ovanessian V, Cazarini Júnior C, Cunha RA, Carvalho NA, Fukuda TY. Use of different doses of pulsed short waves in the treatment of patients with osteoarthritis of the knee. *Rev Cienc Med Campinas*. 2008;17(3-6):149-55.
- Rabini A, Piazzini DB, Tancredi G, Foti C, Milano G, Ronconi G, et al. Deep heating therapy via microwave diathermy relieves pain and improves physical function in

- patients with knee osteoarthritis: a double-blind randomized clinical trial. *Eur J Phys Rehabil Med.* 2012;48(4):549-59.
14. Jan MH, Chai HM, Wang CL, Lin YF, Tsai LY. Effects of repetitive shortwave diathermy for reducing synovitis in patients with knee osteoarthritis: an ultrasonographic study. *Phys Ther.* 2006;86(2):236-44.
  15. Silva AL, Imoto DM, Croci AT. Estudo comparativo entre a aplicação de crioterapia, cinesioterapia e ondas curtas no tratamento da osteoartrite de joelho. *Acta Ortop Bras.* 2007;15(4):204-9.
  16. Fukuda TY, Alves da Cunha R, Fukuda VO, Rienzo FA, Cazarini C Jr, Carvalho Nde A, et al. Pulsed shortwave treatment in women with knee osteoarthritis: a multicenter, randomized, placebo-controlled clinical trial. *Phys Ther.* 2011;91(7):1009-17.
  17. Carlos KP, Belli BS, Alfredo PP. Efeito do ultrassom pulsado e do ultrassom contínuo associado a exercícios em pacientes com osteoartrite de joelho: estudo piloto. *Fisioter Pesqui.* 2012;19(3):275-81.
  18. Atamaz FC, Durmaz B, Baydar M, Demircioglu OY, Iyiyapici A, Kuran B, et al. Comparison of the efficacy of transcutaneous electrical nerve stimulation, interferential currents, and shortwave diathermy in knee osteoarthritis: a double-blind, randomized, controlled, multicenter study. *Arch Phys Med Rehabil.* 2012;93(5):748-56.
  19. Mascarin NC, Vancini RL, Andrade ML, Magalhães EP, Lira CA, Coimbra IB. Effects of kinesiotherapy, ultrasound and electrotherapy in management of bilateral knee osteoarthritis: prospective clinical trial. *BMC Musculoskelet Disord.* 2012;22(13):182.
  20. Chen TW, Lin CW, Lee CL, Chen CH, Chen YJ, Lin TY, et al. The efficacy of shock wave therapy in patients with knee osteoarthritis and popliteal cyamella. *Kaohsiung J Med Sci.* 2014;30(7):362-70.
  21. Marley J, Tully MA, Porter-Armstrong A, Bunting B, O'Hanlon J, McDonough SM. A systematic review of interventions aimed at increasing physical activity in adults with chronic musculoskeletal pain protocol. *Syst Rev.* 2014;3:106.
  22. Muraki S, Akune T, Oka H, En-yo Y, Yoshida M, Saika A, et al. Association of radiographic and symptomatic knee osteoarthritis with health-related quality of life in a population-based cohort study in Japan: the ROAD study. *Osteoarthr Cartil.* 2010;18(9):1227-34.
  23. Kim IJ, Kim HA, Seo YI, Jung YO, Canção YW, Jeong JY, et al. Prevalence of knee pain and its influence on quality of life and physical function in the Korean elderly population: a community based cross-sectional study. *J Korean Med Sci.* 2011;26(9):1140-6.
  24. Takahashi KA, Tonomura H, Arai Y, Terauchi R, Honjo K, Hiraoka N, et al. Hyperthermia for the treatment of articular cartilage with osteoarthritis. *Int J Hyperthermia.* 2009;25(8):661-7.
  25. Zhang C, Xie Y, Luo X, Ji Q, Lu C, He C, et al. Effects of therapeutic ultrasound on pain, physical functions and safety outcomes in patients with knee osteoarthritis: A systematic review and meta-analysis. *Clin Rehabil.* 2015. [Epub ahead of print].
  26. Zampeli E, Raftakis I, Michelongona A, Nikolaou C, Elezoglou A, Toutouzas K, et al. Detection of subclinical synovial inflammation by microwave radiometry. *PLoS One.* 2013;8(5):e64606.

# Support, attention and distant guidance for chronic pain patients. Case report

*Apoio, acolhimento e orientações à distância para pacientes com dor crônica. Relato de caso*

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** Mutual help among patients and distant support tools – such as phone calls and online discussions – are promising strategies to manage chronic conditions, however still poorly explored in the context of pain. This study aimed at evaluating two different remote guidance methods able to help chronic patients: (I) phone calls and (II) engagement in online discussion groups for patients.

**CASE REPORT:** To evaluate these two assistance models, a qualitative research model was used. Investigations have started as from practical needs of a Support Group for chronic pain patients in São Paulo. To evaluate approach (I), 15 semi-structured interviews were carried out with specialists working with telephone guidance. For approach (II), the ethnographic method was used where a Facebook fibromyalgia discussion group was followed up for three months.

**CONCLUSION:** Both studied initiatives have positive results but still lack well structured and uniform protocols. Interviews have shown that distant support practices for chronic patients could be expanded for a larger number of diseases.

**Keywords:** Chronic pain, Self-help group, Social network, Social support, Telemedicine.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A ajuda mútua entre pacientes e as ferramentas de apoio à distância - como telefonemas e discussões online - são estratégias promissoras no manuseio das condições crônicas, mas ainda pouco exploradas no contexto da dor. O objetivo deste estudo foi analisar duas diferentes formas de orientação remota capazes de auxiliar pacientes crônicos: (I) ligações telefônicas e (II) engajamento em grupo de discussão online para pacientes.

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**RELATO DO CASO:** Para analisar esses dois modelos de assistência utilizou-se um modelo qualitativo de pesquisa. As investigações surgiram a partir de necessidades práticas de um Grupo de Apoio para pacientes com dor crônica de São Paulo. Para analisar a abordagem (I) foram feitas 15 entrevistas semiestruturadas com especialistas que trabalham com orientação telefônica. Para a abordagem (II) utilizou-se o método etnográfico, em que um Grupo de discussão para fibromialgia presente no *Facebook* foi acompanhado por 3 meses.

**CONCLUSÃO:** As duas iniciativas investigadas têm mostrado resultados positivos, mas ainda carecem de protocolos bem estruturados e uniformes. As entrevistas conduzidas mostram que as práticas de apoio à distância para pacientes crônicos poderiam se estender para um maior número de doenças.

**Descritores:** Apoio social, Dor crônica, Grupo de autoajuda, Rede social, Telemedicina.

## INTRODUCTION

Support groups are characterized for offering support to a certain group of people with stresses related to crisis situations, life transitions, personal difficulties or specific diseases. They are in general targeted to individuals with similar problems willing to share personal experiences, which results in cohesion and mutual support process<sup>1</sup>.

These groups provide educational strategies and psychosocial support to contribute to better adherence to proposed therapies. It is important for these groups to encourage self-determination and independence, aiming at improving self-esteem, affection and autonomy of participants. Among other positive effects referred by members of such communities, there are: better use of social resources, improved capacity of coping with life situations, improved self-confidence, emotional relief and less hopelessness. Support groups work based on reciprocity and sociability principles, where the sharing of experiences contributes to create a common memory which strengthens participants<sup>2-4</sup>.

Studies have shown satisfactory results with the implementation of such groups in different health conditions, such as in autoimmune diseases, cancer, dementia and chronic pain<sup>5,6</sup>. However, many of these groups face difficulties with regard to management and communication. In a previous survey, aiming at characterizing support groups and associations of rheumatic patients in Brazil, it was identified that from a total of 45 existing groups, more than 70% had no website and approximately 50% were difficult to be accessed (character-

ized by undisclosed e-mail associated to a telephone number not corresponding to the internet record or phone calls which were not answered after three attempts in different days and business hours)<sup>6</sup>. In spite of these differences, such groups are in general reference in information support to other places, which often need telephone or e-mail guidance and, more recently, Facebook discussion groups<sup>6,7</sup>.

However, although being a promising field, distant support approaches still lack studies to define best working methods highlighting major benefits, challenges and criticisms related to each approach. Such problems will then be discussed as from the case report of difficulties of a chronic pain support group of São Paulo. This group received contacts from different Brazilian states and had difficulties in guiding people of other places. As a way to work around the problem, the study aimed at evaluating two different remote guidance methods: telephone calls and online discussion groups.

## CASE REPORT

A Support Group was created in 2008 in São Paulo for chronic pain patients that meet every week to perform activities such as experience sharing, group therapy, relaxation exercises and e-mail guidance, among other educational experiences.

Among results of this group, more than 2.6 thousand e-mails were answered and national and international events were organized. However, frequent questions have been raised in recent years about how to maximize the impact of the group by offering support to people of other states/cities who often get in touch with questions and different requests. With this, the team started to call some patients who reported more severe cases in their e-mails, to know how they were and for simple guidance. Although not having a specific protocol for such end, patients in general reported the importance of the contact and of the brief emotional support they received.

So, the team started to investigate ways to enhance this type of remote assistance. Literature surveys and visits to other institutions were carried out to understand the models used. In addition, in this investigation, two specific methodologies were used:

I) for telephone follow-up, 15 interviews were carried out with specialists working with this tool to monitor patients' evolution;

II) for the analysis of online discussion groups, a participative ethnography was used. A fibromyalgia support community was followed-up for three months, which was very active and present on Facebook, with weekly immersions to evaluate elements such as: usual interests, engagement, behaviors and reported difficulties.

Both described remote follow-up methods have promising results, with evidences of clinical, financial and institutional image benefits. Each approach has outstanding features, but a common element is the need for a better defined protocol, because practical conduction of such initiatives significantly varies as a function of organization capacity, available infrastructure and dedication of people involved.

## DISCUSSION

### I) Telephone follow-up

Those working for decades with such approach are groups specialized in chronic patients management<sup>8</sup>, who record calls, work with goals to decrease absenteeism, audit interaction, work with around-the-clock centers and softwares pointing to the periodicity needed for each phone call. These phone calls are usually made by nursing teams. Even so, the director of one of those groups has reported that unfortunately the focus of many of these programs in Brazil ends up being just hypertension, diabetes and cancer, and that unfortunately there is no project directed to autoimmune diseases, mental health and pain.

In the 15 interviews with specialists, it was identified that major Brazilian hospitals have this type of intervention to follow-up some patients, but are just able to offer such initiatives to small groups or specific diseases.

Some hospitals have reported that are starting this service to build a loyalty relationship with their patients. In this sense, nurses following up patients during the hospitalization period even give their personal phone number, have post-discharge call protocols and use the tool to visualized parts of patient's body. For such, technologies such as Skype (to promote better contact and visualization, in addition to voice) are used. Integrated communication interfaces, such as personal medical charts to follow up the evolution, and warning messages for medical consultations are also used.

The answers of two senior nurses portraying part of the described scenario are presented below.

**Q:** - "How does the hospital work with patients after discharge (Monitoring via phone call, new technologies and social media)?"

**A:** - "Hospitals' Outcomes Cell was created for the first time in Brazil in 2011. Objectives are: get information about clinical outcome, adherence to treatment and assuring the continuity of care. Currently, patients inserted in strategic programs of cardiology, locomotor, neurology, surgery and oncology are followed-up. Contacts are made via telephone or e-mail, with periodicity of 30, 90 days, six months, 1, 2, 3, 4 and 5 years".

**A:** - "Until the beginning of this year, continuity of post-discharge care was made by phone contact. However, the hospital has acquired in January a communication platform that works as videoconference. For such, it is necessary that patients have a computer with access to the internet and a camera or smartphone. This resource has been currently the most widely used, but if patients prefer they may be contacted by telephone. The system offers encryption to assure secrecy and safety standards". Major target audience of this program are oncologic and oncohematologic patients (hospitalized and in ambulatory treatment), being that for hospitalized patients the contact is made after one week and for ambulatory patients it is made during the week and before the next visit to the ambulatory. In robotic gastroenterology, urology and gynecology surgeries the contact is made after 1, 2, 4 weeks, 2 months, 4, 6, 9 and 12 months. Diabetes mellitus patients (insulin-dependent and oral hypo-

glycemic agents) were contacted three days after hospital discharge or even the day after, if necessary – continuity depends on patients' needs. Patients with complicated wounds and osseotomies are contacted according to individual needs". Although having contacted hospitals with pain management reference centers, none of the 15 institutions where interviewed professionals worked had a specific group for chronic pain. Some respondents talked about the importance of such programs with regard to preventing new hospitalizations. Reports showed that protocols vary a lot according to the disease. It is possible to mention other studies with the same goal. Chaves & Oyama<sup>9</sup> stress the need for more specific protocols for such programs. In their study, the interval between calls was between one and two months, with the special aim of changing behavior. In another review<sup>10</sup>, authors mention studies with quite different protocols, one of them with an active telephone exchange where calls are made in general every three months, with major objective of supporting weight control, the practice of physical activities and of generating adherence to drugs. These might be relevant data for applicability in chronic pain cases, where exercise is a structuring therapy. It is also stressed the need for future guidelines for telephone approach in cases of pain, such as that existing for cardiology<sup>11</sup>.

## II) Online discussion groups

In previous surveys, with query filter just for fibromyalgia, more than 50 virtual support groups via Facebook were found, with more than 8 thousand members. In face of such data, the question was raised about the challenge of offering a good support to so many users. How to improve the impact on those groups and promote further engagement among participants? Following one of those groups, it was identified that there environments are numerous times mentioned by different participants as the only place they can disclose their feelings. Such communities are considered also important support and information sources, with characteristics similar to those described for face-to-face support groups. Disease aid is one of the most requested topics for discussion. Among studies suggesting possible initiatives for the success of such virtual communities, there is the study of Uden-Kraan et al.<sup>12</sup> which mentions that moderators must dedicate 10 to 15 weekly hours for the group to have a better chance of being successful. Camerini, Camerini & Schultz<sup>13</sup> have mentioned the importance of tailored contents and individualized attention. There are still contradictory data about the relationship among more active individuals being directly related to higher satisfaction with the group or better clinical results<sup>14,15</sup>. As encouragement to this line of care, a Cochrane systematic review has shown that the mere identification of similar cases

or symptoms among patients with similar problems in discussion groups could be an excellent tool to handle chronic conditions<sup>16</sup>, offering health improvements and promoting better autonomy and proactivity. In this line of action, there are also benefits such as improved social life, decreased hopelessness, better knowledge about the disease, expansion of behavioral strategies and better clinical results in diseases such as fibromyalgia, rheumatoid arthritis and cancer<sup>16,17</sup>. Many consulted studies have mentioned the importance of further studies in this area.

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## REFERENCES

1. Guanaes C, Japur M. Grupo de apoio com pacientes psiquiátricos ambulatoriais em contexto institucional: análise do manejo terapêutico. *Psicol Reflex Crit.* 2001;14(1):191-9.
2. Scheffer JC, Fialho IM, Scholze AS. Itinerários de cura e cuidado de idosos com perda auditiva. *Saúde Soc.* 2009;18(3):537-48.
3. Campos EA. Nosso remédio é a palavra: uma etnografia sobre o modelo terapêutico de alcoólicos anônimos. Rio de Janeiro: Fiocruz; 2010.
4. Valero Sanz J, Veiga J. As organizações de pacientes como atores emergentes no espaço da saúde: o caso de Portugal. *R Eletr Com Inf Inov Saúde.* 2007;1(1):107-10.
5. Moscheta MS, Santos MA. Grupos de apoio para homens com câncer de próstata: revisão integrativa da literatura. *Ciênc Saúde Coletiva.* 2012;17(5):1225-33.
6. Moretti FA, Zucchi P. Caracterização dos grupos de apoio e associações de pacientes portadores de doença reumatológica no Brasil. *Rev Bras Reumatol.* 2010;50(5):516-28.
7. Jacopetti A. Práticas sociais e de comunicação de pacientes renais no Facebook da Fundação Pró-Rim. *Rev Estud Comum.* 2011;12(27):81-9.
8. Silva TN, Santana FR, Santos GL, Silva LF, Bastos GM, Garcia TD. Intervenções de Enfermagem no programa de gerenciamento de crônicos: mapeamento cruzado. *Rev Rene.* 2014;15(6):998-1006.
9. Chaves EC, Oyama SM. Aconselhamento telefônico para cessação do tabagismo. *Rev Gaúcha Enferm.* 2008;29(4):513-9.
10. de Vasconcelos HC, de Freitas RW, Marinho NB, Damasceno MM, de Araújo TL, Lima FE. Eficácia de intervenções que utilizam o telefone como estratégia para o controle glicêmico: revisão integrativa da literatura. *Texto Contexto Enferm.* 2013;22(1):239-46.
11. Oliveira Junior MT, Canesin MF, Marcolino MS, Ribeiro AL, Carvalho AC, Reddy S, et al. [Telemedicine guideline in patient care with acute coronary syndrome and other heart disease]. *Arq Bras Cardiol.* 2015;104(5 Suppl 1):1-26. Portuguese.
12. Uden-Kraan CF, Drossaert CH, Taal E, Seydel ER, Laar MA. Patient-initiated online support groups: motives for initiation, extent of success and success factors. *J Telemed Telecare.* 2010;16(1):30-4.
13. Camerini L, Camerini AL, Schultz PJ. Do participation and personalization matter? A model-driven evaluation of an internet-based patient education intervention for fibromyalgia patients. *Patient Educ Couns.* 2013;92(2):229-34.
14. van Uden-Kraan CF, Drossaert CH, Taal E, Seydel ER, van de Laar MA. Participation in online patient support groups endorses patient's empowerment. *Patient Educ Couns.* 2009;74(1):61-9.
15. Wicks P, Massagli M, Frost J, Brownstein C, Okun S, Vaughan T, et al. Sharing health data for better outcomes on patients like me. *J Med Internet Res.* 2010;12(2):e19.
16. Murray E, Burns J, See TS, Lai R, Nazareth I. Interactive health communication applications for people with chronic disease. *Cochrane Database Syst Rev.* 2005;19(4):CD004274.
17. de Andrade GR, Vaitsman J. Apoio social e redes: conectando solidariedade e saúde. *Ciênc Saúde Colet.* 2002;7(4):925-34.

# Acute effect of Kinesio Taping on knee pain and stability. Case report

## *Efeito agudo da Kinesio Taping na dor e estabilidade do joelho. Relato de caso*

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** Knee stability is critical for the execution of functional tasks, maintaining the joint within physiologic limits and preventing possible mechanical loads. A type of taping being increasingly used in recent years is Kinesio Taping, which is often used as resource to improve joint stability and decrease pain. This study aimed at evaluating the acute effect of Kinesio Taping on stability and pain in a patient with chronic knee instability.

**CASE REPORT:** Male patient, 46 years old, with chronic knee instability due to late postoperative period of Anterior Cruciate Ligament injury, was evaluated during two functional activities (up/ down a stair and squat), before and immediately after Kinesio Taping. Evaluation tools were visual analog scale and videometry to evaluate knee varus angle peak during functional activities. There has been significant decrease ( $p < 0.001$ ) in mean knee varus angle peak during functional activities up/ down a stair (Pre-Kinesio: 189.4; Post-Kinesio: 186.2) and squat (Pre-Kinesio: 198.2; Post-Kinesio: 189.6). There has also been decrease in the visual analog scale for up/down a stair (Pre-Kinesio: 4; Post-Kinesio: 0) and squat (Pre-Kinesio: 3; Post-Kinesio: 0).

**CONCLUSION:** Our results suggest that Kinesio Taping was effective to improve knee dynamic stability and decrease pain during functional activities of going up/down a stair and squat.

**Keywords:** Anterior cruciate ligament, Joint stability, Physiotherapy, Rehabilitation.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A estabilidade do joelho é fundamental para a execução de tarefas funcionais, mantendo a articulação dentro dos limites fisiológicos e evitando possíveis sobrecargas mecânicas. Um tipo de bandagem que vem ganhando destaque nos últimos anos é a Kinesio Taping, que é frequentemente usada como um recurso para melhorar a estabilidade articular e diminuir o quadro algico. O objetivo deste estudo foi avaliar o efeito agudo do uso da Kinesio Taping na estabilidade e dor em paciente com instabilidade crônica de joelho.

**RELATO DO CASO:** Paciente do sexo masculino, 46 anos, com instabilidade crônica de joelho, decorrente de pós-operatório tardio de lesão do ligamento cruzado anterior foi avaliado durante duas atividades funcionais (subida/descida no degrau e agachamento), antes e imediatamente após a Kinesio Taping. Os instrumentos de avaliação usados foram a escala analógica visual e a videometria para análise de pico do ângulo varo do joelho durante as atividades funcionais. Observou-se diminuição significativa ( $p < 0,001$ ) da média do pico de ângulo varo do joelho durante as atividades funcionais, subida/descida no degrau (Pré-Kinesio: 189,4; Pós-Kinesio: 186,2), e agachamento (Pré-Kinesio: 198,2; Pós-Kinesio: 189,6). Também houve diminuição da escala analógica visual, subida/descida no degrau (Pré-Kinesio: 4; Pós-Kinesio: 0) e agachamento (Pré-Kinesio: 3; Pós-Kinesio: 0).

**CONCLUSÃO:** Os resultados do presente trabalho sugerem que a Kinesio Taping se mostrou eficaz na melhora da estabilidade dinâmica do joelho e diminuição da dor durante as atividades funcionais de subida/descida no degrau e agachamento.

**Descritores:** Fisioterapia, Instabilidade articular, Ligamento cruzado anterior, Reabilitação.

### INTRODUCTION

Knee stability is critical for the performance of functional tasks, maintaining the joint within physiological limits and preventing possible mechanical overloads<sup>1,2</sup>. The anterior cruciate ligament (ACL) helps knee stability acting as major stabilizer and especially preventing excessive anterior translation of tibia with regard to femur, in addition to limiting tibial rotational movements and excessive knee varus and valgus<sup>3-7</sup>.

ACL injury is very prevalent in the knee, with incidence of approximately 80 thousand injuries per year<sup>8-10</sup>. A major complication of this injury is joint instability which, in the long run, may favor knee cartilage wear and generate early

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arthritis and possible functional changes, such as difficulties during gait and relatively simple tasks such as going up and down stairs<sup>11,12</sup>.

Some authors have suggested that biomechanical changes in lower limbs, especially in the knee, may influence joint cartilage degenerative process<sup>1,13</sup>. Knee alignment plays important role on joint mechanical overload and may influence cartilage degenerative process, especially in medial compartment, cases when there is increased knee varus angle<sup>13</sup>.

In search for effective techniques to improve joint stability, proprioception and alignment, some therapeutic intervention proposals have been used, such as the use of therapeutic tapings, especially rigid and elastic<sup>14-17</sup>.

A taping becoming popular in recent years is Kinesio Taping (KT) which is often used as resource to improve segmental stability in different joints, with the advantage of not limiting functional movements, in addition to helping improving pain and resolution of edema<sup>14,15,18-21</sup>.

KT was developed during the 1970s by Dr. Kenso Kase, aiming at providing patients with constant therapeutic stimulation which would help muscles and other tissues to search for homeostasis in the intervals between chiropractic sessions. Today it is widely used in ambulatory and sports settings by different health professionals<sup>14,22,23</sup>.

This study aimed at evaluating the acute effect of KT on stability and pain of a subject with chronic knee instability caused by late postoperative period of ACL injury.

## CASE REPORT

Male patient, 46 years old, in outpatient follow up by the physiotherapy department, Clínica Escola Amarina Motta (CLESAM), Centro Universitário Augusto Motta (UNISUAM) - RJ, with chronic right knee instability caused by late postoperative period (7 years) of ACL injury, confirmed during evaluation with anterior drawer and Lachman tests, in addition to presenting level II arthritis in right knee medial compartment, confirmed by X-rays. Patient was evaluated during two specific functional activities, up and down a 15-cm step with evaluated lower limb fixed on step, and free squat. Evaluation tools were visual analog scale (VAS) to measure pain level and videometry for angular cinematic analysis.

Images were captured in the frontal plane with a Sony model HDR-SR10 HD, compact digital camera with frequency of 60 frames per second, positioned on a leveled tripod with distance of 3.00m and height of 92cm. Anatomic points used for knee varus angle measurement were anterior-superior iliac spine, anterior tibial tuberosity and center of joint interline of the tibiotarsal joint, characterized with red Styrofoam round passive markers with diameter of 30mm. Patient was oriented to perform a series of five repetitions of each task and then mean knee varus angle peak for both activities was measured, in addition to being oriented to report pain level during each task.

Both measures (VAS and varus angle) were performed before and immediately after the application of therapeutic elastic taping.

Technique of choice to apply KT (Kinesio® Tex Gold 5cmx5m – color beige) was ligament correction with tape tension between 75 and 100%, with three “I” cuts to promote assistance for joint stabilization<sup>14</sup>. Some care was taken before applying KT, such as application site trichotomy and skin cleaning with 70% alcohol. Participant was positioned in supine position, with knee flexed to 90°, with the foot resting on the stretcher during KT application. A tape was transversally applied to patellar ligament, with tape ends over knee collateral, medial and lateral ligaments. The other two tapes were applied on the skin with distal ends of each one on anterior knee and proximal ends on medial and lateral thigh, with therapeutic zone on the region corresponding to collateral, lateral and medial ligaments.

Knee varus angle cinematic analysis was performed with the software Kinovea 8.15 and program Sigma Stat 3.5 was used for statistical analysis, through a comparison study (test-t) of analysis parameters of tasks before and after treatment. Safety margin was 95% reliability and tests were according to sample and proposed objectives.

Comparison of variables before and after KT application has shown changes with applied intervention. Values of each variable are shown in table 1.

**Table 1.** Variables (varus angle and visual analog scale before and after Kinesio Taping during functional tasks (up/down step and squat)).

Tasks	Pre-KT	Post-KT	p value
Step (Mean±SD)	189.4±0.55	186.2±1.30	<0.001*
Squat (Mean±SD)	198.2±1.30	189.6±0.55	<0.001*
VAS (Step)	3	0	--
VAS (Squat)	4	0	--

KT = Kinesio Taping; VAS = visual analog scale; SD = standard deviation; \* = statistically significant value.

There has been significant decrease ( $p < 0.05$ ) of mean knee varus angle peak in both functional activities, especially during squat (pre-KT: 198.2±1.30; post-KT: 189.6±0.55). There has also been VAS decrease during both activities up/down step (pre-KT: 4; post-KT: 0) and squat (pre-KT: 3; post-KT: 0).

## DISCUSSION

Our results give subsidies that the therapeutic intervention proposal with KT has possibly had a positive influence of knee alignment and decreased pain during functional activities of going up/down stair and squat.

It was possible to observe that knee varus angle peak has decreased both during up/down step and squat, thus suggesting improvement in knee stability and alignment during functional tasks with KT. This might have influenced pain improvement but considerations induced by such results should be evaluated with caution.

Joint instability and pain are common findings in individuals with ligament injuries<sup>4,24,25</sup>. KT has been frequently used, alone or in combination with other techniques, to provide external support, thus helping joint stability and decreasing pain in individuals with different types of injuries<sup>24-26</sup>.

Evidences about the use of KT and its applicability in the clinical practice are still far from being a consensus, still with many studies with contradictory results<sup>25-28</sup>.

Our results are similar to other authors who have also observed benefits with the use of KT. A study by Campolo et al.<sup>18</sup> has evaluated the effects of two different taping techniques, KT and McConnell Taping (MT), in patellofemoral pain syndrome during functional activities of going up and down stairs and free squat. Subjects were divided in three groups (KT, MT and placebo) and evaluation tool was VAS. Results have shown that both groups (KT and MT) had significant VAS difference ( $p < 0.05$ ) during tasks as compared to the placebo group.

These data are in line with our study, considering that significant VAS difference was also observed during functional activities with KT<sup>27</sup>. However, it is important to stress that study samples<sup>18</sup> and those of this report are different. In our study, participant was a patient with joint stability caused by late postoperative period of ACL, and in the mentioned study<sup>18</sup> sample was made up of subjects with patellofemoral pain syndrome.

With regard to joint stability, Nakajima & Baldrige<sup>29</sup> have observed the effect of KT on vertical jump and dynamic postural control in young and healthy individuals. Participated in the study 52 healthy individuals without ankle or lower limbs injury. Participants were randomly distributed to experimental group (KT with injury) and control group (KT without injury). Vertical jump was measured with the VertiMetric device and dynamic postural control was evaluated with Balance Test Star Excursion (BTSE).

Results have shown that, in general, there were no differences between groups in maximum vertical jump height, mean vertical jump height or BTSE scores. Follow-up analyses, however, have indicated that females of the KT group have significantly increased BTSE scores as compared to control group.

Authors have concluded that KT application on ankle has neither increased or decreased vertical jump height in young and healthy individuals, but has improved dynamic postural control in females.

Although being different segments (ankle and knee) and different health conditions (healthy individuals and injured individuals), our results may somewhat be compared

to those of Nakajima & Baldrige<sup>29</sup>. In this study<sup>29</sup>, KT has influenced body dynamic stability of female participants during BTSE. In our report, by means of angular analyses before and after KT, there has been positive influence on knee joint segmental stability, with significant decrease of varus angle peak during functional tasks. This might be attributed to sensory KT effects, such as improved proprioception due to sensory stimulation by means of the tape<sup>30</sup> as well as mechanical effects, giving external support and stabilizing the joint<sup>14</sup>.

Conversely, Shields et al.<sup>26</sup> have evaluated acute and late effects of KT on postural control in healthy individuals and those with ankle instability. Study results have not shown relevant changes after application of KT on the ankle. This suggests that, although KT is a popular clinical intervention resource, results do not justify its use on individuals with postural control deficits due to ankle joint instability.

So, it is clear that the use of KT is still far from agreement about its use in the clinical practice.

Within this context, our study has shown satisfactory results, both with clinical relevance (decreased pain during functional activities), and statistical significance, thus confirming the good use of therapeutic elastic taping in the clinical practice.

## CONCLUSION

KT was effective to improve knee joint stability, decreasing varus angle peak during functional activities of going up/down step and squat, in addition to having decreased pain level during the performance of tasks.

## REFERENCES

1. Lee SH, Lee JH, Ahn SE, Park MJ, Lee DH. Correlation between quadriceps endurance and adduction moment in medial knee osteoarthritis. *PLoS ONE*. 2015;10(11):e0141972.
2. Deep K, Picard F, Clarke JV. Dynamic knee alignment and collateral knee laxity and its variations in normal humans. *Front Surg*. 2015;25(2):62.
3. Dagnoni CI, Bilibiu J, Stiebler S, Preis C, Bertassoni Neto L. Flexor-extensor relationship knee after reconstruction of the anterior cruciate ligament. *Fisioter Mov*. 2014;27(2):201-9.
4. Kim DK, Park WH. Sex differences in knee strength deficit 1 year after anterior cruciate ligament reconstruction. *J Phys Ther Sci*. 2015;27(12):3847-9.
5. Tamura A, Akasaka K, Otsudo T, Sawada Y, Okubo Y, Shiozawa J, et al. Fatigue alters landing shock attenuation during a single-leg vertical drop jump. *Orthop J Sports Med*. 2016;4(1):2325967115626412.
6. Han F, Benerjee A, Shen L, Krishna L. Increased compliance with supervised rehabilitation improves functional outcome and return to sport after anterior cruciate ligament reconstruction in recreational athletes. *Orthop J Sports Med*. 2015;3(12):2325967115620770.
7. Hall MR, Paik RS, Ware AJ, Mohr KJ, Limpisvasti O. Neuromuscular evaluation with single-leg squat test at 6 months after anterior cruciate ligament reconstruction. *Orthop J Sports Med*. 2015;3(3):2325967115575900.
8. Silva Júnior OM, Ohashi BN, Almeida MO, Gonçalves MR. Resultado funcional relacionado ao posicionamento do enxerto na reconstrução do ligamento cruzado anterior. *Rev Bras Ortop*. 2015;50(1):57-67.
9. Shi D, Li N, Wang Y, Jiang S, Li J, Zhu W. Gait modification strategies of trunk over left stance phase in patients with right anterior cruciate ligament deficiency. *Int J Clin Exp Med*. 2015;8(8):13424-34.
10. Buller LT, Best MJ, Baraga MG, Kaplan LD. Trends in anterior cruciate ligament reconstruction in the United States. *Orthop J Sports Med*. 2014;3(1):2325967114563664.
11. Samitier G, Marciano AI, Alentorn-Geli E, Cugat R, Farmer KW, Moser MW. Failure of anterior cruciate ligament reconstruction. *Arch Bone Jt Surg*. 2015;3(4):220-40.

12. Farber J, Harris JD, Kolstad K, McCulloch PC. Treatment of anterior cruciate ligament injuries by major league soccer team physicians. *Orthop J Sports Med.* 2014;2(11):2325967114559892.
13. da Silva HG, Cliquet Junior A, Zorzi AR, Batista de Miranda J. Biomechanical changes in gait of subjects with medial knee osteoarthritis. *Acta Ortop Bras.* 2012;20(3):150-6.
14. Kase K, Lemos TV, Dias EM. *Kinesio Taping: Introdução ao Método e Aplicações Musculares.* 2ª ed. São Paulo: Andreoli; 2013.
15. Chang WD, Chen FC, Lee CL, Lin HY, Lai PT. Effects of Kinesio Taping versus McConnell Taping for patellofemoral pain syndrome: a systematic review and meta-analysis. *Evid Based Complement Alternat Med.* 2015;471208.
16. Santos JC, Giorgetti MJ, Torello EM, Meneghetti CH, Ordenes IE. A influência da Kinesio Taping no tratamento da subluxação de ombro no acidente vascular cerebral. *Rev Neurocienc.* 2010;18(3):335-40.
17. Guner S, Alsancak S, Koz M. Effect of two different kinesio taping techniques on knee kinematics and kinetics in young females. *J Phys Ther Sci.* 2015;27(10):3093-6.
18. Campolo M, Babu J, Dmochowska K, Scariah S, Varughese J. A comparison of two taping techniques (kinesio and mcconnell) and their effect on anterior knee pain during functional activities. *Int J Sports Phys Ther.* 2013;8(2):105-10.
19. Simsek HH, Balki S, Keklik SS, Ozturk H, Elden H. Does Kinesio taping in addition to exercise therapy improve the outcomes in subacromial impingement syndrome? A randomized, double-blind, controlled clinical trial. *Acta Orthop Traumatol Turc.* 2013;47(2):104-10.
20. Pop TB, Karczmarek-Borowska B, Tymczak M, Hałas I, Banaś J. The influence of Kinesiology Taping on the reduction of lymphoedema among women after mastectomy – preliminary study. *Contemp Oncol (Pozn).* 2014;18(2):124-9.
21. Donec V, Krisciunas A. The effectiveness of kinesio taping after total knee replacement in early postoperative rehabilitation period. A randomized controlled trial. *Eur J Phys Rehabil Med.* 2014;50(4):363-71.
22. Choi YK, Nam CW, Lee JH, Park YH. The effects of Taping Prior to PNF treatment on lower extremity proprioception of hemiplegic patients. *J Phys Ther Sci.* 2013;25(9):1119-22.
23. Zanchet MA, Del Vecchio FB. Efeito da Kinesio Taping sobre força máxima e resistência de força em padelistas. *Fisioter Mov.* 2013;26(1):115-21.
24. Solecki TJ, Herbst EM. Chiropractic management of a postoperative complete anterior cruciate ligament rupture using a multimodal approach: a case report. *J Chiropr Med.* 2011;10(1):47-53.
25. Ho YH, Lin, CF, Chang CH, Wu HW. Effect of ankle kinesio taping on vertical jump with run-up and countermovement jump in athletes with ankle functional instability. *J Phys Ther Sci.* 2015;27(7):2087-90.
26. Shields CA, Needle AR, Rose WC, Swanik CB, Kaminski TW. Effect of elastic taping on postural control deficits in subjects with healthy ankles, copers, and individuals with functional ankle instability. *Foot Ankle Int.* 2013;34(10):1427-35.
27. Lee JH. The Kinesio Taping technique may affect therapeutic results. *J Physiother.* 2015;61(4): 231-2.
28. Nunes GS, Vargas VZ, Wageck B, Haupenthal DP, da Luz CM, de Noronha M. Kinesio Taping does not decrease swelling in acute, lateral ankle sprain of athletes: a randomised trial. *J Physiother.* 2015;61(1):28-33.
29. Nakajima MA, Baldrige C. The effect of kinesio® tape on vertical jump and dynamic postural control. *Int J Sports Phys Ther.* 2013;8(4):393-406.
30. Callaghan MJ, McKie S, Richardson P, Oldham JA. Effects of patellar taping on brain activity during knee joint proprioception using functional magnetic resonance imaging. *Phys Ther.* 2012;92(6):821-30.

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- 1 author - Wall PD. The prevention of postoperative pain. *Pain* 1988;33(1):289-90.
- 2 authors - Dahl JB, Kehlet H. The value of pre-emptive analgesia in the treatment of postoperative pain. *Br J Anaesth* 1993;70(1):434-9.
- More than 6 authors - Barreto RF, Gomes CZ, Silva RM, Signorelli AA, Oliveira LF, Cavellani CL, et al. Pain and epidemiologic evaluation of patients seen by the first aid unit of a teaching hospital. *Rev Dor*. 2012;13(3):213-9.

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Sousa AM, Cutait MM, Ashmawi HA. Avaliação da adição do tramadol sobre o tempo de regressão do bloqueio motor induzido pela lidocaína. Estudo experimental em ratos Avaliação da adição do tramadol sobre o tempo de regressão do bloqueio motor induzido pela lidocaína. Estudo experimental em ratos. *Rev Dor*. 2013;14(2):130-3. Erratum in: *Rev Dor*. 2013;14(3):234.

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Walker LK. Use of extracorporeal membrane oxygenation for preoperative stabilization of congenital diaphragmatic hernia. *Crit Care Med*. 1993;2(2Suppl1):S379-80.

### Book: (when strictly necessary)

Doyle AC, editor. *Biological mysteries solved*, 2nd ed. London: Science Press; 1991. 477 80p.

### Book chapter:

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