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The psychologist role in the multidisciplinary clinic

A atuação do psicólogo em clínica multidisciplinar

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TAKING CARE of people who suffer from chronic pain is a great challenge. This is mainly due to the fact that in most health education courses, individuals are trained and qualified to treat and cure. And not always this assumption can be applied to the patient with pain. Fortunately, this perspective is changing gradually in Brazil, and the professionals involved in the treatment realized the need to work in teams to offer a more attentive, understanding and integrated listening to patients with chronic pain¹.

When pain becomes chronic, it is no longer a symptom and is defined as a disease. This forces subjects, already away from their routine, to connect with themselves and with the world, from the history of their suffering. A continuous and daily pain brings a very negative impact on quality of life of these people; affects the sleep pattern, eating habits, emotional relationships, work capacity, functionality, and other aspects of their life². The close association of psychiatric disorders, including anxiety and depression in people with chronic pain, makes integral and interdisciplinary care necessary, aiming at the better possible control of symptoms.

Evaluate the patient who suffers from chronic pain implies in developing an active listening; because pain is always assessed based on the information provided by the patient. The history of pain is inserted in the story of life, in the course of the disease, in the relationships established with the work, and this is a network of complex meanings wrapped in cultural, social and physiological factors³.

It is of extreme importance to have a multidisciplinary team is the Pain Center to provide holistic care. Our Outpatient Pain Clinic at C-HUPES/UFBA was created in January, 1999¹ with the interdisciplinary approach. After one year of study and elaboration of the project, the service was created by a doctor, a psychologist, a physiotherapist and a nurse, with the purpose to provide assistance to people from all over the State of Bahia, with a diagnosis of chronic pain. After the enrollment of the in the service, the professional team starts with the GP to confirm the diagnosis of pain and to establish the treatment approach best suited to each individual. Then, the patient is referred to a psychiatric evaluation to assess the functional impairment and intense psychological stresses disproportionate with the clinical results, or for patients that make exaggerated use of health services, psychotropic drugs or alcohol. In psychology, we use a specific protocol, from the psychodiagnostic assessment using interviews to collect data about the history of life and pain, as well as the use of psychological techniques and application of various scales, in addition to the clinical monitoring based on cognitive-behavioral therapy.

The psychological care aims at to minimize the suffering perceived and caused by the disease. The subject, almost always, goes from one doctor to another in search of the right diagnosis and treatment. When, in spite of the treatments, the subject does not respond positively with no symptoms relief, he/she often has a speech of anger and disgust by the persistence of pain. The psychologist can offer a careful listening with the objective to mitigate and guide the subject about the effects of the pain process in the family, marital, social, sexual and work relations. Besides treating the patient, it is important that the psychologist interviews the family to develop a psychoeducation and guidance concerning the limitations and possibilities of the new meaning. In this case, the family becomes an active partner in the patient's recovery and reinsertion in the world⁴.

Being an integral part of the health team, the psychologist divides the technical knowledge with the other professional, and the sharing of this knowledge is what creates an effective communication. The autonomy of each team member and the good communication among them is the great differential to the success of the proposed therapies and the patient's compliance with the treatment⁵.

The objective of the psychological care, in the cognitive-behavioral referential for the patient with pain, is to educate the subject about the pain pathophysiology, encourage the practice of physical exercises, self-confidence, establishment of goals, leisure activities, relaxation techniques, a more assertive communication, development of *coping and confrontation* strategies, teach the patient to make a cognitive reorganization to facilitate changes in more painful behaviors and a more active participation in the treatment².

It is necessary that this team establishes a careful look with one another so that the difficulties arising from the care of patients with pain can be minimized. The health team needs to "learn" to listen to what the patient says, fully respecting their beliefs, the attitudes taken for pain control, and be very tolerant of their speech and confrontation because, after all, this was our choice.

The careful listening of the psychology team makes it possible to, little by little, know the history of the life of the patient and, just as in a puzzle, reorganize part of the pieces so that, arranging in another way, we can weave a new path that is functional. And then we can reshape the process the patient is going through, giving a new meaning to his story.

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Indexes of anxiety, depression and disability in patients with myofascial pain, with and without the additional diagnosis of migraine

Índices de ansiedade, depressão e incapacidade em pacientes com dor miofascial com e sem o diagnóstico adicional de enxaqueca

Rodrigo Lorenzi Poluha¹, Rafael dos Santos Silva¹, Paulo Cesar Rodrigues Conti², Somsak Mitirattanakul³, Robert Merrill⁴

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ABSTRACT

BACKGROUND AND OBJECTIVES: The aim of this study was to compare anxiety, depression and disability indexes in patients with myofascial pain with and without additional diagnosis of migraine.

METHODS: We included 203 patients of the Orofacial Pain Clinic of the University of California, Los Angeles, USA. Patients were over 18 years of age, both genders, with a primary diagnosis of myofascial pain. The patients were also evaluated for the presence of migraine according to the criteria of the International Headache Society. The sample was divided into two groups: 120 patients with only myofascial pain (Group 1) and 83 patients with myofascial pain and with an additional diagnosis of migraine (Group 2). The Beck Anxiety Inventory, Beck Depression Inventory and Migraine Disability Assessment questionnaires were applied. The Mann-Whitney test was used to compare the groups at a significance level of 5%.

RESULTS: Patients in group 1 presented significantly higher indexes in the Beck Anxiety Inventory ($p=0.005$), Beck Depression Inventory ($p=0.025$) and number of days lost and/or impaired (56.4 days) than those in group 2. The Migraine Disability Assessment Questionnaire scores for groups 1 and 2 were, respectively, 48% and 24.1% for grade I; 9.2% and 3.6% for grade II; 8.2% and 22.9% for grade III; and, 34.7% and 49.4% for grade IV.

CONCLUSION: Patients with myofascial pain and migraine had significantly higher anxiety, depression and disability in-

dexes ($p<0.05$), as well as moderate and severe disability levels considerably higher than those with only myofascial pain.

Keywords: Orofacial pain, Migraine, Temporomandibular disorders.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O presente estudo visou comparar os índices de ansiedade, depressão e incapacidade em pacientes com dor miofascial, com e sem o diagnóstico adicional de enxaqueca.

MÉTODOS: Foram incluídos 203 pacientes da Clínica de Dor Orofacial da Universidade da Califórnia, Los Angeles, EUA, com idade acima de 18 anos, ambos os sexos, com diagnóstico primário de dor miofascial. Os pacientes também foram avaliados quanto à presença de enxaqueca, segundo os critérios da Sociedade Internacional de Cefaleias. A amostra foi dividida em dois grupos: 120 pacientes com somente dor miofascial (Grupo 1), e 83 pacientes com dor miofascial e diagnóstico adicional de enxaqueca (Grupo 2). Foram aplicados os questionários: Inventário de Ansiedade de Beck, Inventário de Depressão de Beck e *Migraine Disability Assessment Questionnaire*. O teste de Mann-Whitney foi utilizado para comparar os grupos a um nível de significância de 5%.

RESULTADOS: Os pacientes do grupo 1 apresentaram índices de Inventário de Ansiedade de Beck de $p=0,005$, Inventário de Depressão de Beck de $p=0,025$, e número de dias perdidos e/ou prejudicados (56,4 dias) significativamente maiores que os do grupo 2. Os escores *Migraine Disability Assessment Questionnaire* para os grupos 1 e 2 foram, respectivamente, para o grau I de 48% e 24,1%; grau II de 9,2% e 3,6%; grau III de 8,2% e 22,9%; e, grau IV de 34,7% e 49,4%.

CONCLUSÃO: Os pacientes com dor miofascial e enxaqueca apresentaram índices de ansiedade, depressão e incapacidade significativamente maiores ($p<0,05$), além de níveis de incapacidade moderado e grave, consideravelmente superiores em relação ao grupo de pacientes com somente dor miofascial.

Descritores: Disfunção temporomandibular, Dor orofacial, Enxaqueca.

INTRODUCTION

Orofacial pain encompasses diseases represented by temporomandibular disorders (TMD), headache and other conditions, which reduce patients' quality of life and involve billions of dol-

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lars in health care annually^{1,2}. TMD are musculoskeletal disorders, affecting temporomandibular joint (TMJ), masticatory muscles and associated structures³. Among the TMDs, myofascial pain (MFP) stands out, which singly corresponds to 45.3% of the diagnoses⁴. It is defined as regional muscle pain associated with palpation sensitivity, characterized by the presence of hypersensitive points of muscle tissue (trigger points)^{1,3,5}. MFP-patients are significantly more likely to depression and anxiety when compared to patients with joint dysfunction⁶. About 55% of MFP-patients report migraine episodes⁷. Migraine is defined as a primary headache, with 4 to 72 hours attacks, and characterized by unilateral pulsatile pain of moderate to intense intensity, aggravated by routine physical activity, associated with combinations of nausea, vomiting, photophobia, phonophobia, and aura⁸. Migraine-patients are more likely to have depression (2.2 to 4.0 times) and anxiety disorders (3.5 to 5.3 times)⁹.

Although MFP and migraine present distinct pathophysiologies, the masticatory muscles receive trigeminal sensory innervation, which is also responsible for the nociceptive impulses conduction of the cranial blood vessels involved in the migraine genesis, allowing a possible overlap of nociceptive stimuli in cases of comorbidities¹⁰. TMD-patients experience increased headache frequency and severity in addition to a 10-fold higher migraine prevalence¹¹. Although it is reported that the concomitant occurrence of MFP and migraine leads to higher levels of pain at palpation, subjective pain perception and sleep/rest problems¹², studies investigating the psychological and emotional conditions in these cases are still scarce. This knowledge can contribute to the understanding of these conditions.

This study aimed to compare the anxiety, depression and disability indexes in MFP-patients, with and without an additional migraine diagnosis.

METHODS

A cross-sectional observational analytical study was carried out, following the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (Strobe)¹³, in accordance with the Declaration of Helsinki. All participants signed the Informed Consent Form (ICF). Patients who presented themselves between August 1, 2005, and July 1, 2006, at the Orofacial Pain Clinic of the University of California (UCLA)'s School of Dentistry, Los Angeles, USA, complaining of facial pain were examined. The sample was calculated considering a 95% of confidence level, a sampling error of 5% and a minimum percentage of 40%, based on the MFP and migraine frequency, obtained from the pilot sample. Thus, the minimum number proposed for the analysis was 198 patients. It started with n=424 consecutive individuals, considering absenteeism and data loss, for a safety margin of the analysis.

Patients older than 18 years, both genders, primary MFP, with one or more trigger points (TP) in the masticatory and/or cervical musculature were included, according to the criteria of the American Academy of Orofacial Pain¹. Migraine diagnosis followed the criteria of the International Headache Society⁸.

Evaluations were performed by four trained examiners regarding patient examination and diagnostic criteria under the supervision of an experienced professional.

Patients with neuropathic diseases were excluded from the sample, as those with other primary headaches such as cluster headache or paroxysmal chronic headache, as well as occasional secondary headaches. Individuals with systemic conditions such as rheumatoid arthritis, fibromyalgia, among others, as well as those with mental or neurological problems were also excluded. From 424 patients evaluated, only 203 met the inclusion criteria. The remaining patients (n=221) were excluded from the following analysis. The sample was divided into two groups: patients with MFP only (Group 1) and MFP-patients and migraine additional diagnosis (Group 2).

Beck's Anxiety Inventory (BAI)¹⁴, composed of 21 items, was used to assess the anxiety level. Patients were told to indicate, among the symptoms described, how often they were perceived during the last week, including the evaluation day. The answer sheet contained four grades: absolutely not, slightly, moderately, and severely, which actually constitute a scalar series, from zero to 3 points. The sum of the individual scores represents the total score, which could range from zero to 63. After this sum, a conversion table, standardized by the inventory, classified the anxiety level into mild (zero-21 points) moderate (22-35 points) and severe (36-63 points).

The depressive state was analyzed according to the Beck's Depression Inventory (BDI)¹⁵, composed of a 21-items questionnaire with graded affirmations from zero to 3, reflecting the symptom's intensity. The maximum score is 63, denoting the highest level of depression. Depression levels were classified as: absent (zero-9 points), mild to moderate (10-18 points), moderate to severe (19-29 points) and severe (30-63 points).

In order to assess headache-related disability, patients were invited to answer the Migraine Disability Assessment Questionnaire (MIDAS)¹⁶. This questionnaire presents 7 questions, the first 5 of which determine the final score and are based on 3 activity spheres. Questions 1, 3, and 5 evaluate the number of days lost due to headache pain at school or work, homework, and social, family, and leisure activities in the last three months. Questions 2 and 4 evaluate the number of additional days, with a significant decrease in the activity (at least 50% reduction in productivity), either in paid or domestic work, in the last three months. Still, two additional questions assess the attacks frequency and the pain intensity. As these last two do not contribute to the final score, they were not included in the questionnaire in the present study. The sum of the days, reported in the first 5 test questions, ranks the individual in one of the following 4 disability degrees: absence (I: zero-5 points), mild (II: 6-10 points), moderate (III: 11-20 points) and severe (IV: >21 points).

All Inventories were used in their official English version, following their specific recommendations. The application and interpretation of these tests were done by a responsible psychologist, pain psychology specialist.

The present study was approved by UCLA's Ethics Committee on 07/27/2005.

Statistical analysis

In order to detect possible differences between groups 1 and 2 in relation to BAI, BDI, and MIDAS, the non-parametric Mann-Whitney test was used at a significance level of 5%. All analysis in this study were performed using SPSS software version 13.0.

RESULTS

The sample consisted of 203 patients, with 181 women (89.2%) and 22 men (10.8%), with an average age of 40.3±15.44 years. Group 1 was composed of 120 patients (59.11%), and group 2 was composed of 83 patients (40.89%). Regarding the BAI and BDI levels, the averages obtained comprised both groups in the mild anxiety score and in the mild to moderate depression score. In addition, group 2 presented values statistically higher than those of group 1 (p<0.05) in both questionnaires. Table 1 presents the descriptive measures and the comparison between groups of anxiety and depression levels.

Table 1. Descriptive measures and the comparison between groups of anxiety and depression levels

	Groups	Minimum	Maximum	Average (Standard deviation)	p value
BAI	1	0	63	10.68 (10.24)	0.005*
	2	0	55	14.87 (11.5)	
BDI	1	0	55	9.79 (9.48)	0.025*
	2	7	44	12.77 (10.22)	

BAI = Beck's Anxiety Inventory; BDI = Beck's Depression Inventory; *: statistically significant (p<0.05).

The MIDAS questionnaire's results analysis showed that group 2 presented a greater number of lost and/or impaired days in relation to group 1 in all questions, with statistical significance in the first 4 (p<0.05) (Table 2). The total number of lost and/or impaired days was also statistically higher in group 2 (p <0.05). Group 2 patients lost or had their production impaired in 56.40 days and the group 1 in 35.33 days. The patients' percentage distribution in relation to the final score obtained by

the MIDAS questionnaire, in each group, are shown in table 3. Absent or mild levels of disability were higher in group 1, while moderate and severe levels were higher in group 2.

Table 3. Patients' percentage distribution in relation to the final score obtained in the Migraine Disability Assessment Questionnaire in both groups

MIDAS' score	Group 1 (%)	Group 2 (%)
Absent (I)	48	24.1
Mild (II)	9.2	3.6
Moderate (III)	8.2	22.9
Severe (IV)	34.6	49.4

DISCUSSION

Pain is an individual experience of high complexity, involving different aspects of life¹. Comparing the anxiety, depression and disability indexes, MFP-patients with an additional diagnosis of migraine presented significantly higher indexes (p<0.05) than patients with only MFP, supporting the null hypothesis rejection.

The sample consisted of 203 patients, with a woman:man ratio of 8.2:1. This proportion is expected since women seek for TMD-treatment seven times more than men³. This result is also close to that found by Zebenhölder et al.¹⁷, who in their multicenter study on the depression and anxiety impact on the burden and management of episodic and chronic headaches, had their sample composed of 84.1% of women in the episodic headache's group, and 79.1% in the chronic headache's group. Still, in relation to the sample, 59.11% of the patients presented an additional migraine diagnosis, close value to 56.5% found in a study with Brazilian population¹⁸. Among the numerous comorbidities of painful, especially chronic conditions, including migraine and TMD, anxiety and depression are prominent due to their high prevalence and their impact^{6,19}. In this study, significant differences were found in the anxiety and depression levels between

Table 2. Descriptive measures and comparison between groups of each item of Migraine Disability Assessment Questionnaire

Questions	Groups	Minimum	Maximum	Average (SD)	p value (Mann-Whitney)
1- How many days of work or school have you lost in the last three months due to your headaches?	1	0	90	3.06 (13.33)	p<0.001*
	2	0	90	6.06 (17.47)	
2- How many days in the last 3 months did you notice that your performance at work or school was reduced by half or more due to your headaches?	1	0	90	5.01 (16.63)	p<0.001*
	2	0	90	9.70 (20.91)	
3- How many days in the last 3 months have you been unable to perform homework due to your headaches?	1	0	90	9.39 (19.51)	0.009*
	2	0	90	13.24 (19.35)	
4- How many days in the last 3 months did your performance at homework was reduced by half or more due to your headaches?	1	0	90	9.99 (19.85)	0.021*
	2	0	90	15.45 (23.45)	
5- How many days in the last 3 months have you lost family, social or leisure activities due to your headaches?	1	0	90	7.93 (18.97)	0.095
	2	0	90	10.84 (20.79)	
Total	1	0	450	35.33 (65.34)	0.004*
	2	0	540	56.40 (89.83)	

SD = standard deviation; *: statistically significant (p<0.05).

the groups ($p < 0.05$), and group 2 presented higher averages in both cases (14.87 for anxiety and 12.77 for depression) in relation to group 1 (10.68 for anxiety and 9.79 for depression). This difference can perhaps be explained by the positive correlation between pain intensity and anxiety and depression levels, that is, the more intense the pain (as in cases of concomitant comorbidities), the higher the levels of anxiety and depression²⁰. Using the same assessment tools (BAI and BDI), depression anxiety scores in group 2 share the results of Santos, Sandin and Sakae²¹, who found a positive correlation ($p = 0.031$) between anxiety and the headache prevalence in Brazilian university students; and with the results of Falavigna et al.²², who found a higher prevalence of depression ($p = 0.001$) in Brazilian adults with headache than in those without headache.

Approximately one-third of patients with migraine and anxiety have depression signs; and two-thirds of patients with migraine and depression exhibit anxiety signs, with the anxiety and depression combination associated with a higher headache frequency and anxiety attacks related to headache intensity exacerbation²³. However, the higher values did not mean, at least in this study, more depression and anxiety. Although statistically different, both groups were included in the mild anxiety score and the mild to moderate depression score. It can be affirmed, therefore, that group 2 presented more intense depression and anxiety symptoms, without this necessarily meaning a worse picture of depression and anxiety.

One of the most used instruments to assess headache-related disability is the MIDAS questionnaire^{16,24}. It captures the headache impact over a three months period, considered long enough to represent the actual patient's experience, and short enough to allow a reliable and accurate resumption of headache's history²⁵. In this research, there was no study of the results according to gender, or the presence or not of employment for this questionnaire's data, since it is not influenced by these factors²⁴.

After comparing the MIDAS questionnaire's results, group 2 presented significantly more disability than group 1, in four of the five questions ($p < 0.05$). The only question that did not present significant statistics was No. 5, which measures the lost days in social, family, and leisure activities. This can be explained by the fact that patients tend to lose more days in domestic service (questions 3 and 4) than in leisure, social or family activities (question 5)²⁶. In the present study, this fact was verified, with both groups having less lost days, or impaired in question 5 in relation to 3 and 4.

Although in this study the average number of days in both groups placed them on the IV score (severe disability) of MIDAS¹⁶, the patients in group 2 lost or had their production significantly more impaired (56.40 days) in relation to group 1 (35.33 days). Total values of MIDAS are similar to previous ones in the literature, in which TMD and primary headache patients had a total of 49.3 days lost or impaired, whereas patients with only TMD had 23.42 days²⁷. These results are expected since, in TMD-patients, disability is significantly increased when associated with primary headache²⁸. In addition,

patients in group 1 presented higher scores than those in group 2 for grades I (48 and 24.1%, respectively) and II (9.2 and 3.6%, respectively). On the other hand, group 2 presented higher disability scores compared to those in group 1 for grades III (22.9 and 8.2%, respectively) and IV (49.4 and 34.6%, respectively). The distribution in MIDAS grades in group 2 was similar to that found in the study by Di Paolo et al.²⁹, in an Italian population evaluating TMD and migraine (I: 28%; II: 8%; III: 8%; IV: 56%), But differs from studies of Corrêa, Santos and Galato³⁰ (I: 80.6%; II: 9.0%; III: 5.2%; IV: 5.2%) and from Queiroz and Silva Junior³¹ (I: 55.4%; II: 18.1%; III: 13.5%; IV: 13%), with Brazilian populations. Possibly, these differences are because Brazilian studies are epidemiological and consider a larger population (not only TMD-patients), and evaluate more than one type of headache (not just migraine).

MFP and migraine alone are associated with increased levels of anxiety, depression, and disability, which exacerbate painful conditions^{6,23}. The worsening of these indexes (anxiety, depression, and disability) found in group 2 (coexistence of MFP and migraine comorbidities) suggests that, clinically, the treatments of these conditions should be multiple and also include the psychological/emotional factors to obtain satisfactory results. Future studies may help clarify this issue. All the results of this research should be analyzed with caution, since there are limitations, as it is a cross-sectional, monocentric and restricted population study. It would be interesting to replicate such research, with longitudinal follow-up, in order to better understand the interrelation between comorbidities, as well as to study which patient's characteristics predisposes him or are related to a greater occurrence of the MFP and migraine concomitance.

CONCLUSION

Patients with MFP and migraine presented significantly higher indexes of anxiety, depression and number of days lost and/or impaired, as well as moderate and severe levels of disability considerably higher than the group of patients with only MFP.

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Assessment and correlation between subjective and physiological variables of chronic spinal pain

Avaliação e correlação entre as variáveis subjetivas e fisiológicas da dor crônica na coluna vertebral

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ABSTRACT

BACKGROUND AND OBJECTIVES: Chronic pain on the spine has a high prevalence. The assessment of subjective and physiological parameters over time, and how they relate is important to check changes in people's health status who suffer from this condition. The objective of this study was to evaluate and correlate the subjective and physiological variables of chronic pain on the spine.

METHODS: Observational, prospective study of repeated measures, carried out from September 2015 to January 2016, with 99 people registered on the waiting list of a University physiotherapy clinic of Minas Gerais. Four evaluations were performed with a 15-day interval.

RESULTS: It was found statistically significant reductions over time in pain intensity ($p < 0.001$), in its interference with daily activities ($p < 0.001$), in pain threshold ($p < 0.001$) and physical impairment ($p < 0.001$). There were negative correlations between pain threshold and pain intensity in evaluations three ($p = 0.003$) and four ($p = 0.001$); a positive correlation between pain intensity and physical impairment in all evaluations ($p < 0.001$); and a negative correlation between pain threshold and physical impairment in evaluations one ($p = 0.001$), three ($p = 0.043$) and four ($p = 0.004$). There are also positive correlations between pain intensity and its interference with daily activities ($p < 0.001$); and a negative correlation between pain threshold and these activities, especially in evaluations three and four.

CONCLUSION: There are correlations between subjective variables and physiological characteristics of chronic pain on the spine.

Keywords: Chronic pain, Pain measurement, Spine.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor crônica na coluna vertebral possui uma prevalência elevada. A avaliação de parâmetros subjetivos e fisiológicos ao longo do tempo, e como se relacionam, é importante para verificar as mudanças no estado de saúde das pessoas que sofrem com essa condição. O objetivo deste estudo foi avaliar e correlacionar as variáveis subjetivas e fisiológicas da dor crônica na coluna vertebral.

MÉTODOS: Estudo observacional, prospectivo de medidas repetidas, realizado entre setembro de 2015 e janeiro de 2016, com 99 pessoas registradas em fila de espera da clínica de fisioterapia de uma universidade de Minas Gerais. Foram realizadas quatro avaliações, com um intervalo de 15 dias entre elas.

RESULTADOS: Verificou-se reduções estatisticamente significativas, ao longo do tempo, na intensidade da dor ($p < 0,001$), na sua interferência nas atividades cotidianas ($p < 0,001$), no limiar de dor ($p < 0,001$) e na incapacidade física ($p < 0,001$). Houve correlações negativas entre o limiar e a intensidade da dor nas avaliações três ($p = 0,003$) e quatro ($p = 0,001$); correlação positiva entre intensidade da dor e a incapacidade física em todas as avaliações ($p < 0,001$); correlação negativa entre o limiar de dor e a incapacidade física nas avaliações um ($p = 0,001$), três ($p = 0,043$) e quatro ($p = 0,004$). Também existem correlações positivas entre a intensidade da dor e a sua interferência nas atividades cotidianas ($p < 0,001$); e correlação negativa entre o limiar de dor e essas atividades, principalmente nas avaliações três e quatro.

CONCLUSÃO: Existem correlações entre as variáveis subjetivas com as fisiológicas da dor crônica na coluna vertebral.

Descritores: Coluna vertebral, Dor crônica, Mensuração da dor.

INTRODUCTION

Chronic back pain, especially in the lumbar region, has a high prevalence¹. Many are the impacts that pain may cause in people's lives, such as physical and functional disability, which leads to limitations in daily activities (difficult to get dressed, sit, stand, walk and lift objects), changes in sleep and constant concerns². Changes in pain threshold can also occur since the individuals with back pain have a higher nociceptive sensitivity compared with healthy people³.

Both subjective and physiological assessments are important because they provide a deeper view of the health state of these people and the changes that occur over time⁴, facilitating the analysis of treatment response⁵. Such evaluations, when they

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are not considered, restrict the understanding of the course of the pain and the influence of clinical and demographic factors⁶. However, we noticed that such investigations emphasize the lumbar region⁷. Evidence involving the cervical region, and especially the thoracic region, are not yet well established in the literature and, up to now, no studies were found that propose to study the behavior of these variables related to chronic pain in all the three regions of the spine, by repeated measures.

Based on the above, this study aims to assess and correlate the subjective and physiological variables of chronic back pain.

METHODS

Observational, prospective study of repeated measures, carried out from September 2015 to January 2016, with 436 people registered on the waiting list of a University physiotherapy clinic of Minas Gerais. The eligibility criteria of the sample were the presence of pain in the cervical, thoracic and/or lumbar regions, from any source, and existing for three months or more⁸. In this phase, 111 volunteers were screened by telephone.

In order to determine the proper size of the sample for the study, we used the Stata software, version 12.0, for the test of averages with repeated measures. Pain intensity was considered the main variable (considering one point of variation in the numerical scale of 11 points), and it was adopted the statistical power of 95% and level of significance of 5%. Fifty-seven individuals were estimated to compose the sample of this study. As inclusion criteria, we considered the age (≥ 18) and intensity of pain \geq three, according to the Numerical Pain Rating Scale⁹. People who did not respond to three contact attempts, who did not accept to participate in the study and people with neuropathic or mixed pain were excluded. Therefore, the sample of the study had 99 subjects.

Four evaluations were performed, by the same assessor, with a 15-day interval (day zero, 15, 30 and 45). In the meantime, the volunteers remained to wait for physical therapy, and/or continued the pharmacological treatment.

For data collection, we used subjective and physiological pain assessment tools. For the subjective measurement, we used the Brief Pain Inventory (BPI)¹⁰ and the Roland Morris Disability Questionnaire (RMDQ), for pain in General¹¹. For the physiological variable, we took the pain threshold.

The BPI¹⁰ has a diagram where the patient marks the site of the pain, as well as numerical scales used to measure the intensity of pain (zero - an absence of pain / 10 - unbearable pain), and its interference in daily activities (zero - no interference / 10 - total interference). Two final scores are obtained, related to the average of the four items that assess pain intensity, and the average of the seven items that assess pain interference with daily activities¹². This instrument was translated and adapted to the Brazilian culture¹³. It has adequate psychometric characteristics since it presents high reliability in test-retest whether the pain is stable or not¹², and good sensitivity over time¹⁴.

The RMDQ assesses the level of functional disability in daily activities in people with general pain¹¹, asking dichotomic questions, and a total that varies from zero (no disability) to 24 points (severe disability). The final score is the sum of all 'yes' answers¹¹. It was translated, adapted and validated for the Brazilian version¹⁵ and it has adequate psychometric properties¹¹ (62% sensitivity; 55% specificity, and 64% accuracy)¹⁶, and it is a sensitive measure to detect the differences among groups or different conditions¹¹.

A Kratos® digital algometer was used to quantify the pain threshold when a mechanical stimulus was applied. The patient was placed on a stretcher, in the prone position. The assessment followed a standard in 14 tender points, defined by the researchers and always performed in the same order: insertions in the suboccipital muscles; descending trapezius to the level of the 5th and 6th cervical vertebrae; midpoint of the descending trapezius – between the acromion and the 7th cervical vertebra; ascending trapezius at the level of the inferior angle of the scapula; posterosuperior iliac spine; paravertebral muscle at the 4th and 5th lumbar vertebrae and gluteal muscle at the in the eminence of the sciatic nerve. The compression was gradually increased at a rate of 1kg/sec. Patients were told to press the interruption cable of the unit as they felt that the mechanical stimulus had become painful, it was then interrupted and the value marked on the device, referred to as the latency of the nociceptive threshold, was registered. Each of the 14 tender points was measured, and the average points per area (cervical/lumbar/thoracic) was used for data analysis. This study was approved by a Committee of Ethics in Research (Report number 1.041.266 of 2015) and followed the principles established in the Declaration of Helsinki from the World Medical Association¹⁷.

Statistical analysis

The data collected were analyzed using the Statistical Package for the Social Sciences, version 23.0, using descriptive statistics. The Kolmogorov Smirnov test was conducted to determine data normality, and for comparison, we used the Cochran and Friedman Q tests, followed by the Wilcoxon test, when necessary, and the Spearman Correlation at each assessment time. The level of significance adopted was 5%.

RESULTS

Amongst the 99 people who concluded the study, 77 (77.8%) were women. The average age was 49.87 and a standard deviation (σ) of 14.17 years. Most of the individuals ($n=59$; 59.6%) were married with complete secondary education ($n=30$; 30.3%). The presence of pain by spinal region was assessed longitudinally and is presented in table 1.

Table 2 shows the longitudinal behavior of pain.

Correlations between pain intensity and pain threshold; pain intensity and physical disability, and pain threshold and physical disability are shown in table 3.

Correlation between daily activities with pain intensity, and daily activities with pain threshold are shown in table 4.

Table 1. Presence of pain by region over time, Minas Gerais, 2017 (n=99)

Regions	AV 1	AV 2	AV 3	AV 4
	f (%)	f (%)	f (%)	f (%)
Cervical	35 (35.40)	26 (26.30)	19 (19.20) [*]	20 (20.20) ^{**}
Thoracic	27 (27,30)	25 (25.20)	27 (27.30)	22 (22.20)
Lower back	68 (68.70)	64 (64.60)	51 (51.50) ^{##}	56 (56.60) ^{**}

According to Cochran's Q test: ^{*}Assessment 1 ≠ Assessment 3; ^{**}Assessment 1 ≠ Assessment 4; ^{##}Assessment 2 ≠ Assessment 3.

Table 2. Behavior of pain as for intensity, interference, threshold, and disability over time, Minas Gerais, 2017 (n=99)

	AV 1	AV 2	AV 3	AV 4	p value
	$\mu \pm \sigma$	$\mu \pm \sigma$	$\mu \pm \sigma$	$\mu \pm \sigma$	
	CI	CI	CI	CI	
Pain intensity	4.70±2.11 4,55-5,39	3.98±2.4 [*] 3,48-4,48	3.15±2.6 ^{**#} 2.62-3.67	4.00±3.0 ^{***&} 3.38-4.62	<0.001
Interference of pain in daily activities	4.82±2.69 4.28-5.35	3.07±2.75 [*] 2.52-3.61	2.36±2.84 ^{**#} 1.79-2.92	2.96±3.21 ^{***&} 2.32-3.60	<0.001
Pain threshold	2.87±1.46 2,58-3,16	1.96±0.84 [*] 1,79-2,12	2.00±0.82 1,84-2,17	2.03±0.86 1,85-2,20	<0.001
Physical disability	12.24±6.14 11.01-13.46	9.97±6.64 [*] 8.64-11.29	9.10±6.92 7.71-10.48	9.83±7.55 ^{&} 8,32-11.33	<0.001

μ = average; σ = standard deviation; CI: confidence interval at 95%. According to the Friedman test followed by the Wilcoxon test: ^{*}Assessment 1 ≠ Assessment 2; ^{**}Assessment 1 ≠ Assessment 3; ^{***}Assessment 1 ≠ Assessment 4; ^{##}Assessment 2 ≠ Assessment 3; [&]Assessment 3 ≠ Assessment 4.

Table 3. Correlations between pain intensity and pain threshold; pain intensity and physical disability, and pain threshold and physical disability, Minas Gerais, 2017 (n=99)

		AV 1	AV 2	AV 3	AV 4
Pain threshold / pain intensity	p value	0.018	0.019	0.003 [*]	<0.001 [*]
	R	-0.283	-0.235	-0.298	-0.408
Physical disability/pain intensity	p value	<0.001 [*]	<0.001 [*]	<0.001 [*]	<0.001 [*]
	R	0.499	0.465	0.600	0.067
Physical disability/pain threshold	p value	0.001 [*]	0.143	0.043 [*]	0.004 [*]
	R	-0.339	-0.148	-0.204	-0.029

^{*}p<0.05; Spearman's rank correlation.

Table 4. Correlation between daily activities with pain intensity, and daily activities with pain threshold, Minas Gerais, 2017 (n=99)

Daily activities	Assessment	Pain intensity		Pain threshold	
		p value	R	p value	R
General activity	1	<0.001 [*]	0.497	0.009 [*]	-0.260
	2	<0.001 [*]	0.596	0.185	-0.134
	3	<0.001 [*]	0.763	0.016 [*]	-0.243
	4	<0.001 [*]	0.777	0.002 [*]	-0.304
Mood	1	<0.001 [*]	0.374	0.001 [*]	-0.257
	2	<0.001 [*]	0.434	0.115	-0.159
	3	<0.001 [*]	0.705	0.035 [*]	-0.212
	4	<0.001 [*]	0.672	<0.001 [*]	-0.400
Ability to walk	1	<0.001 [*]	0.407	0.069	-0.184
	2	<0.001 [*]	0.557	0.066	-0.185
	3	<0.001 [*]	0.705	0.007 [*]	-0.269
	4	<0.001 [*]	0.701	0.005 [*]	-0.281

Continue...

Table 4. Correlation between daily activities with pain intensity, and daily activities with pain threshold, Minas Gerais, 2017 (n=99) – continuation

Daily activities	Assessment	Pain intensity		Pain threshold	
		p value	R	p value	R
Work	1	<0.001*	0,653	0,127	-0.154
	2	<0.001*	0,541	0.017*	-0.240
	3	<0.001*	0,454	0.037*	-0.210
	4	<0.001*	0,481	<0.001*	-0.402
Relationship with other people	1	<0.001*	0,324	0.075	-0.180
	2	<0.001*	0,381	0.005*	-0.278
	3	<0.001*	0,551	0.039*	-0.207
	4	<0.001*	0,572	<0.001*	-0.399
Sleep	1	<0.001*	0,482	0.510	-0.067
	2	<0.001*	0,553	0.246	-0.118
	3	<0.001*	0,593	<0.001*	-0.359
	4	<0.001*	0,676	<0.001*	-0.439
Enjoy life	1	<0.001*	0,387	0.194	-0.132
	2	<0.001*	0,480	0.030*	-0.218
	3	<0.001*	0,531	0.133	-0.152
	4	<0.001*	0,497	0.002*	-0.301

*p<0.05; Spearman's rank correlation.

DISCUSSION

When assessing chronic pain in the spine during the four assessment times, using subjective and physiological variables, it was observed statistically significant reductions in pain intensity, its interference in daily activities, in the pain threshold, and physical disability, as well as the correlations among these variables at each time, making it possible to observe its negative impact on people's lives.

The lumbar region is considered the most affected site by pain, and in a more intense way¹⁸, also seen in the present study. The assessment by repeated measures allowed to follow the frequency of people affected by pain at this site, with a decrease until the third assessment, and then a statistically significant increase. The lumbar spine is part of the lumbo-pelvic-hip complex, the gravity axis of the spine, where several movements initiate and load transmission between the vertebrae occurs. This region is, therefore, more susceptible to pain¹⁹.

The pain that involves the cervical region also presented a similar behavior to that observed in the lumbar region, which was statistically significant. One in every two people may experience neck pain throughout their lives²⁰. The persistent deterioration of the neuromuscular control of the neck muscles contributes, in part, to the chronicity and recurrence of the problem²¹.

It is believed that the reduction in the number of people who have reported pain in these two regions during the assessments, can be related to behavior changes because they are being observed, a phenomenon known as Hawthorne effect²²; or due to the adherence to pain control strategies during the follow-up period.

It was also found, statistically significant reductions over time in pain intensity, in its interference in daily activities, in pain

threshold, and physical disability. These changes reinforce the importance in assessing these variables for a multidimensional follow-up of chronic pain.

Pain intensity, obtained using the numerical scale, can be considered the gold standard to measure this phenomenon²³. Moreover, since musculoskeletal disorders of the spine are the most common cause of persistent and intense pain, and physical disability, it is paramount to assess the factors impacted by pain, such as functional capacity, fatigue, sleep, general well-being, among others⁹.

In addition to these factors, the assessment of physiological variables is also important to help to understand the behavior of chronic pain, as well as its threshold, a quantitative variable that is reduced in people with persistent pain²⁴. This can be related to the mechanisms of central sensitization that modify the normal processing of nociceptive and non-nociceptive information²⁵. This neuroplasticity causes hyperalgesia and allodynia²⁶, with painful responses to normal stimuli²⁴.

When verifying the existence of correlations between the threshold and the intensity of pain during the four evaluations, we found statistically significant values in AV 3 and AV 4, as also observed in the study of Imamura et al.⁷. Given that, in order to establish a reliable assessment of chronic pain, it is imperative to confront subjective variables (pain intensity), with physiological variables (pain threshold), so that the assessment process over time is not only focused on the individual's report, allowing more concrete inferences.

It was also observed a significant correlation between pain intensity and physical disability in all the assessments, showing that physical disability increased proportionally to the intensity of pain. By limiting movements, impairing daily activities and

hurting social interactions, the intensity of the pain has a direct influence on the physical disability indexes²⁷. Thus, the longitudinal assessment combined with the intensity of pain and disability is essential to establish pain prevention and control measures since one variable is directly influenced by the other. This same relation also occurred between the pain threshold and the disability, however inversely proportional, in AV 1, AV3 and AV 4, as also found by Imamura et al.⁷. The correlation between these physiological and subjective variables strengthens even further the association between the threshold of pain and disability, and therefore they should be part of the parameters to assess chronic pain in individuals with pain in the spine.

It is also known that physical disability, besides the intensity of pain, is influenced by other factors, such as the received health care, the rehabilitation, the social and physical environment, the life style and the psychological attributes^{18,28}. As for the threshold, pain modulation may be related to individual variation. Thus, patients with the pain threshold compromised are more susceptible to disability and, consequently, they tolerate less painful stimulus²⁹.

It was also found positive correlations between pain intensity and its interference in daily activities, showing that an increase or reduction in these variables is directly proportional. Specifically, there were found statistically significant correlations in general activities, mood, the ability to walk, work, relationship with others, sleep and enjoying life, in all assessments related to pain intensity. Similarly, negative correlations were found between the pain threshold and these activities, mainly in the AV 3 and AV 4. The existence of a correlation between these variables and the observation of its behavior over time also allows for verifying the importance of their associations to establish an adequate pain assessment.

In the face of the association between pain intensity, its interference in daily activities and its threshold we see that when chronic pain is no longer just one symptom and becomes a disease, it brings a series of changes in people's lives, limiting attitudes and decisions and defining behaviors. In the study by Sahu et al.³⁰, the authors pointed out that the aspects most influenced by pain are general activities, followed by impacts on mood, the ability to walk and work. In this scenario, the chronic low back pain is an important cause of disability and functional limitation since it directly impacts the performance of daily activities³¹.

Among the limitations of the present study, we highlight the short follow-up period, the Hawthorn effect, and the fact that some variables that interfere with pain sensitivity were not controlled, as the menstrual cycle. For future studies, we suggest the assessments be performed for a longer period of time, controlling possible confusing variables, such as the menstrual cycle.

CONCLUSION

There are correlations between subjective and physiological variables characteristic of chronic pain on the spine.

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Elaboration of a booklet for individuals with chronic pain

Desenvolvimento de uma cartilha educativa para pessoas com dor crônica

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ABSTRACT

BACKGROUND AND OBJECTIVES: Chronic pain is considered a public health problem. The best way to deal with it is still a challenge. However, socio-educational interventions have been recommended in national and international guidelines that deal with it. The objective of this study was to develop an educational booklet written in the Brazilian Portuguese language for people who face the problem of chronic pain.

METHODS: This study on the development of a light technology was conducted in three phases: the narrative of the literature review to identify the appropriate content; the approach of target audience through structured interviews; and the elaboration of a booklet by professionals specialized in the treatment of chronic pain.

RESULTS: The study resulted in the production of a booklet named “EducaDor,” ludically illustrated with 18 pages, divided into the following sections: 1. What is pain? 2. Acute pain: useful pain; 3. Chronic pain: the persistent pain; 4. Living with the pain; 5. False ideas about chronic pain, do not believe them; 6. Strategies to deal with the pain. Using plain language, the booklet provides data on neurophysiology and psychological and behavioral aspects related to chronic pain. The booklet can contribute to modifying misbeliefs about pain and bad behaviors, as well as to provide strategies to cope with chronic pain.

CONCLUSION: This study has successfully developed a light health technology which offers inputs for socio-educational programs to handle chronic pain.

Keywords: Chronic pain, Health education, Self-management.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor crônica é considerada um problema de saúde pública. A melhor forma de enfrentá-la ainda é um desafio. Contudo, intervenções socioeducativas têm sido recomendadas por diretrizes nacionais e internacionais que tratam do seu manejo. O objetivo deste estudo foi elaborar uma cartilha educativa escrita na língua portuguesa brasileira para pessoas que vivenciam o problema da dor crônica.

MÉTODOS: Este estudo de desenvolvimento de tecnologia leve foi realizado em três fases: revisão narrativa da literatura para identificar o conteúdo adequado; aproximação da população alvo, por meio de entrevistas estruturadas; e construção da cartilha por profissionais especializados no tratamento da dor crônica.

RESULTADOS: O estudo resultou na confecção de uma cartilha nomeada de “EducaDor”, ilustrada ludicamente, com 18 páginas, divididas nas seguintes seções: 1. O que é dor? 2. Dor aguda: a dor útil; 3. Dor crônica: a dor persistente; 4. A convivência com a dor; 5. Falsas ideias sobre a dor crônica, não acredite nelas; 6. Estratégias para lidar com a dor. Por meio de linguagem acessível, a cartilha fornece dados sobre neurofisiologia e aspectos psicológicos e comportamentais envolvidos com a dor crônica. A cartilha pode contribuir para a modificação de crenças errôneas sobre a dor e de comportamentos mal adaptativos, além de fornecer estratégias para o enfrentamento da dor crônica.

CONCLUSÃO: Este estudo desenvolveu com sucesso uma tecnologia leve em saúde que fornece subsídios para programas socioeducacionais para o manejo da dor crônica.

Descritores: Automanejo, Dor crônica, Educação em saúde.

INTRODUCTION

Pain is the main reason why people seek health services¹. Even though it is a physiological phenomenon when in the acute stage, as soon as it morphs into a chronic condition it becomes a morbidity, which produces negative impacts on contemporary societies². Estimates of the prevalence of chronic pain (CP) range from 12 to 30% at a world level³, while in Brazil it affects about 40% of the population^{4,6}. This is a complex condition, and the handling of this condition remains a challenge. Biomedical care is not enough to control CP. To understand CP, one must consider the relationships between biological changes and philosophical, social and emotional aspects⁷⁻⁹. CP is influenced by thoughts, beliefs, attitudes and expectations¹⁰. Incorrect and poorly adaptive beliefs are normally associated with the worst progression of the pain situation. These beliefs can be such as pain is a sign of a lesion; it is not possible to control pain; there is a need to avoid activities that could cause pain; it is disir-

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able to have the help of family and friends; there is no relation between emotions and pain; pain is incapacitating; pharmaceutical products are the best treatment; and there is a medical cure^{7,11-13}. The biopsychosocial approach implies a change in the relationship between the health professional and the patient. The behavior of the person with CP in his or her therapeutic process is essential, so that the patient may take up an active posture¹⁴. In this regard, social and educational interventions have been recommended by international guidelines for dealing with CP¹⁵⁻¹⁷.

A study performed, with regard to the prevalence of CP in the city of Salvador, in the Brazilian state of Bahia, motivated the development of a light technology, aimed at people who experience the CP problem. Interventions based on education proved effective for the control of CP among the Australian population¹⁸. However, the direct application of an intervention of this type in another culture is not recommended. The scarce resources available in the Portuguese language have motivated the development of an own resource, ideal for the social, environmental, economic and educational conditions peculiar to Brazil.

Printed socio-educational materials, including books, booklets, and leaflets, can be considered as types of light technology. These materials expand the possibility of communication between the interested parties, also providing the uniformization of guidance as provided. They may also be taken home and referred to whenever necessary^{19,20}.

Aimed at different target publics, we recommend that the preparation of such materials shall be preceded by a wide study of specialized literature, including an approximation to get closer to the target public, in order to get to know the social and cultural context, the expectations, the interests and concerns. Apart from the content to be addressed, criteria such as the language used, illustrations, and the layout of the material shall be followed, to make reading and understanding easier. There is also a need to consider social and cultural barriers, especially when associated with the level of schooling, which could make it more difficult to read and understand the instrument^{19,21-26}.

The aim of the present study was that of preparing an educational booklet aimed at people with CP.

METHODS

The methodology involved three phases: 1) a narrative review of specialized literature; 2) interlocution with patients with chronic pain, and 3) the preparation of the booklet.

With the aim of making sure that the content of the material was duly updated and based on scientific evidence⁷, I decided to review the specialized literature. The search was carried out on the Pubmed virtual library between February and May 2015. The search included studies in Portuguese, English or Spanish, published between 2000 and 2015, with the results of randomised clinical trials and reviews of specialized literature, which showed at least a socio-educational intervention for cases of CP among adults. The search strategy was: *((chronic pain) AND "patient education") AND ("patient education handout" or "models educational" or self-care or guideline or self-management or "educational program" or management or education or booklet or brochure or booklet) NOT (cancer or children)*.

The articles were selected based on their titles and abstracts, with the exclusion of those that did not address socio-educational inter-

ventions; those that were duplicated; those that were still under development; and those that addressed exclusive educational practices without any possibility of application by the multidisciplinary team. The second phase of the study involved getting closer to the main target public, which comprised patients from a reference center for the treatment of chronic pain, from the city of Salvador, State of Bahia, Brazil. Patients were registered with the Brazilian Society for the Study of Pain (SBED) and funded by the Brazilian Public Unified Health System (SUS).

The qualitative approach was considered the most appropriate to allow the expansion of the meanings of the health-disease process. An option was made, in favor of the strategy of a structured interview with closed questions, in a pre-set sequence²⁷. Through the interviews, we sought to find out about the needs, the knowledge, the gaps, and the correct and incorrect beliefs about CP²⁸.

Based on themes considered necessary for understanding the pain phenomenon by the IASP²⁹, four different outlines were used in the thematic studies: concept, perception, processing, and control of pain. The interviews were recorded and transcribed, and their content was treated based on an analysis of content, by thematic analysis^{27,30}.

A trained team applied the interviews. The collection of the information took place between June and August 2013. Although this environment was not reserved or quiet, the waiting room was chosen as the venue for the interviews since it is the place where patients normally exchange experiences.

There was the inclusion of patients aged over 18, with a diagnosis of chronic musculoskeletal pain, according to the criteria established by the IASP. There was the exclusion of some cases: those who reported that they were being monitored for oncological pain, and those who showed difficulty in communicating. Cases, where the patients were called for an appointment during the interview, were considered as lost cases.

During the planning of the survey, we estimated that we should interview 10 people using each outline; however, the collection of information was halted when the saturation criterion was reached³⁰. The thematic analysis of the content comprised three steps: 1) prior analysis; 2) exploitation of the material, and 3) treatment, inference, and interpretation of the data.

In the first stage (prior analysis), there was a fluctuating reading of all the material. The goals of the study were taken up once again, and questions were then selected, among those that belonged to all four outlines that structured the content of this study. The reading of the selected questions was taken up again, and the raw data was organized in a table and grouped by similarity of themes to which they referred. The patient reports were encoded with the letter 'R' and an Arabic numeral for each patient.

In the second stage, the material was explored through categorization, thereby allowing the reduction of the texts, into significant words or expressions, which were grouped around the thematic categories.

In the study here addressed, the categories and subcategories used were aprioristic³¹ (Table 1), established based on the narrative review of the specialized literature and related to the issues addressed in the booklet. The data was then examined and grouped into categories, no longer considering the pre-established questions and outlines.

In the third stage (treatment and analysis of data) interpretations of data were performed. This phase of the study was approved by

Table 1. Thematic categories and subcategories

Categories	Subcategories
1. What is pain?	Meanings of pain Causes of pain
2. Acute pain	Meanings of acute pain Processing of acute pain
3. Chronic pain	Meanings of chronic pain Processing of chronic pain The (co)existence with pain Associated factors Mistaken beliefs Strategies for tackling pain

Source: the authors

the Ethics Committee for Research with Human Subjects of the Climério de Oliveira Maternity Unit at the Federal University of Bahia (UFBA) as according to directives 098/2012 and 108/2011. All the recommendations set by Resolution No. 466/12 of the Brazilian National Health Council (CNS) were strictly followed.

Based on the data obtained in specialized literature and the interviews, a team consisting of six researching physiotherapists got together for the development of the booklet (third phase), which involved the definition of the goals; selection of content; writing and formatting.

The role of the illustrations was that of favoring interest in Reading, also creating a feeling of identification and relaxation^{23,26}. During the production of the booklet, some pictures available on electronic pages were selected, pictures that could be a base for the preparation of the final illustrations, as we have observed the need to create our own illustrations, that could allow identity with the material produce and the notion of continuity.

As a way of aiding the understanding of the concepts presented, and to promote the identification of the reader, we have included some sections of the words of those interviewed. We have selected excerpts that show feelings and beliefs regarding pain, experiences of coexistence with chronic pain, and strategies to tackle pain. We have taken special care not to include sections that show catastrophic thoughts, or any kind of prejudice.

The public most affected by CP, both based on data collected from specialized literature as also based on the profile of the people inter-

viewed, consists mainly of people with a low level of schooling and low social and economic level. Among the written media, the booklet was most adequate for the proposal, as it allows the presentation of the content in an attractive form that the target public can understand.

The main recommendations, set out in scientific literature and used in the preparation of the booklet, were related to written language, illustrations and general layout (Table 2).

RESULTS

In the first phase, the review of the specialized literature identified 704 studies, selected by title. Out of these, 179 were selected for reading the summary, and 43 were selected for the reading of the entire text. Out of these complete articles, eight were review studies, and 35 were clinical trials (Table 3).

The studies were very heterogeneous with regard to scientific methodology, didactics of the professional resources involved, duration and frequency of meetings, model of health approach, nomenclature, and content presented. Due to the need to choose the appropriate content for the preparation of the booklet, it was decided to focus on the themes addressed rather than on methodology.

The models of socio-educational approach were split between biomedical, biopsychosocial, and a mixed model. The main issues addressed, guidance and the main results are shown in table 4.

The studies that showed a predominance of biomedical content had the main themes of anatomy, biomechanics, epidemiology, and physiopathology of pain. The guidance given to the patients was mainly related to posture and correct movements during routine daily activities; about taking physical exercise; and about the importance of staying active. The reduction in the intensity of pain and incapacity were the most reported results.

Studies aligned with the biopsychosocial model addressed issues such as management of pain, medication, nutrition, physiology of pain, ergonomics, stress management, dysfunctional beliefs, and strategies to tackle pain. The guidance provided involved the taking of physical exercise, encouragement of movement, acceptance of pain, relaxation exercises, and active participation. As the main results, we identified a reduction in pain and disability,

Table 2. Recommendations used in the elaboration of the booklet

Written Language

- Use of simple language, easy to understand and not technical, so that the content may be understood regardless of the reader's level of schooling^{19,20,22,24,26,32}
- Ideas presented in a logical order^{20,22,26}
- Use of analogies that are familiar to the target public^{20,22,32}
- The tone shall not be childish or alarmist, but rather constructive, positive and encouraging²⁰
- Information written as a conversation^{20,22,26}
- No use of discriminatory expressions or words (or expressions) with double meaning²⁴

Illustration

- Images familiar to the target public, allowing the reader to gain identification to the message^{20,26}
- Images used to relax the reader, to enliven, and to make the Reading lighter¹⁹

Layout

- Black printing on a pale background^{20,32}
- A legible font, larger than usual and with good definition^{20,22,26,32}
- Information presented with maximum brevity, replacing long, verbose phrases by shorter ones^{20,26,32}
- Good spacing between lines and paragraphs^{20,26}
- No use of upper case or text with stylised fonts^{20,22,32}
- Bold fonts used only for titles and highlighted points^{22,26,32}
- Use of titles and subtitles, to make learning easier^{26,32}

Table 3. Used articles

Biomedical model				
	Population	Intervention/comparison	Follow-up measures	Results
Udermann et al. ³²	Individuals with chronic low back pain	They received a copy of an educative book, written examination of its content, and two interviews by telephone.	Intensity of pain, episodes of pain, self-care behaviors, knowledge and opinion on the book.	Improvement in pain, in the understanding of the content and opinions on the text were positive in general. In 9 months of follow-up: significant improvement in pain, number of episodes and perceived benefit. After 18 months of follow-up, these benefits were maintained or have further improved.
Garcia et al. ³³	Individuals with chronic low back pain non-specific	Back school in groups / McKenzie individually. Both performed a set of daily exercises at home.	Pain intensity (visual analog scale (VAS)), disability (Roland-Morris), trunk flexion movement, quality of life (BREF)	The McKenzie method was slightly more effective than the Back school method for disability, but not for pain intensity immediately after the treatment. There was no untreated control group.
Hodselmans, Jaegers and Göeken ³⁴	Individuals with chronic low back pain	IG (intervention group): Back school program - somatic cognitive CG (control group): waiting list	Physical function and disability (RAND-36), ROM of the lumbar region,	The IG had a significant improvement in the functional status and perceived disability, probably attributable to appropriate perceptions of the physical symptoms.
Shirado et al. ³⁵	Individuals with chronic low back pain	Phase 1. A program run by an interdisciplinary team performed in groups with a 3-hour duration.	Pain intensity (VAS), the flexibility of the trunk and hamstrings (finger-floor distance, leg elevation), muscle strength and trunk endurance, and patient satisfaction.	The result was considered satisfactory for the treatment of patients with chronic low back pain. Teaching the mechanics of the body and perform therapeutic exercises, through a multidisciplinary team approach is essential for the management of chronic low back pain.
Tavafian et al. ³⁶	Women with chronic low back pain	Groups 1 and 2 were assessed and received treatment. Group 1 participated in the Back school program	Short Form Health Survey (SF-36)	The Back School" program was effective in the improvement of the quality of life of the patients. In the G2, the improvement was observed in three domains (pain, vitality and mental health), but these improvements were smaller than in G1.
Gaskell, Enright and Tyson ³⁷	Individuals with non-specific chronic low back pain	Nine group sessions of 2 hours each over 5 weeks.	Pain (VAS), disability (Roland Morris), anxiety and depression (HADS), perception of pain control, Fitness test and a 5-minute walking test	Levels of pain, disability, anxiety, and depression were significantly reduced. Fitness levels and perceived control improved significantly, suggesting that participants were more able to manage their low back pain. Limitations: There was no control group, and there was a high drop-out rate during the study.
Cecchi et al. ⁴¹	Women with non-specific chronic low back pain	Back school, individual physiotherapy, and manipulation. All participants received a booklet with information about the anatomy and biomechanics of the spine, posture and ergonomics guidelines.	Disability Roland Morris Disability Questionnaire) and pain (Pain Rating Scale).	Spinal manipulation was better associated with functional improvement and long-term pain relief than back school or individual physiotherapy but received more additional treatment during the follow-up. Pain recurrences and drug consumption were also reduced in comparison to back school or individual therapy.
Sahinet al. ³⁸	Individuals with chronic low back pain	IG: performed exercises, physical treatment modalities, and a back school program. CG: performed exercises and received physical treatment modalities.	Pain intensity (VAS) and functionality (Oswestry Low Back Pain Disability Questionnaire)	Improvement in pain and functionality in both groups, but the difference between the scores at the end of the treatment and after 3 months of treatment was not significant.
Sadeghi-Abdollahi et al. ³⁹	Workers with chronic lower back pain	Back school Program	Pain intensity (VAS); quality of life (Short Form (SF-36).	Improvement, but not significant, of pain intensity. Three months after the end of the sessions, improvement became significant. No improvement in the quality of life was observed.
Andrade et al. ⁴⁰	Individuals with chronic low back pain	IG: Theoretical and practical program of the Escola de coluna (Spine School). CG: waiting list.	Pain intensity (VAS), functional capacity (Roland-Morris) and lumbar spine mobility (Schöber index).	Statistically significant improvement in pain intensity of pain, functional capacity and mobility of the lumbar spine in IG. A statistically significant difference was observed intragroup in the second and third assessments of the functional capacity and mobility variables of the lumbar spine.

Continue...

Table 3. Used articles – continuation

Abourazzak et al. ⁴²	Individuals with rheumatoid arthritis	Theoretical and practical education program	Knowledge of AR (self-questionnaire), disease activity (DAS 28), functional capacity (HAQ) and quality of life	Patient's knowledge 3 years after the education program has significantly improved. Disease activity was significantly lower in the education group after 3 years than at the beginning of the study.
Biopsychosocial Model				
	Population	Intervention/comparison	Follow-up measures	Results
Pieber et al. ⁴⁹	Individuals with chronic low back pain	Program: 40 sessions including endurance training, psychological interventions, ergonomics sessions and healthy eating habits.	Painless ROM, the strength of the spinal extensor muscles, pain (VAS), disability (Roland-Morris) and quality of life (SF-36).	All measurements improved significantly in the post-rehab assessment and remained in the 18 months after the intervention. There was no control group.
Buchner et al. ⁵⁶	Individuals with cervicalgia or chronic low back pain.	Multidisciplinary bio psychosocial therapy during 3 weeks of internment and 6 months of follow-up.	Return to the work, Quality of life (SF-36), pain intensity (VAS), functional capacity (Hannover back capacity score), and satisfaction with the therapy.	Both treatment groups had significantly improved all criteria. At the end of the follow-up period, there were no significant differences between the group with chronic neck pain and chronic back pain regarding the criteria to return to work, improvement in the quality of life, functional capacity, satisfaction with the therapy and pain reduction.
Morone et al. ⁴⁶	Patients with chronic low back pain	IG: Back school: Brief education and active exercises for the spine. CG: medical care. The medication was the same in both groups.	Pain intensity (VAS) quality of life (SF36) and disability (Oswestry Disability Index).	Quality of life and disability have significantly improved over time in the IG. The result of the perception of pain showed a reduction in both groups but was significantly lower in the IG at the end of the treatment and the two follow-ups.
Sorensen et al. ⁵²	Individuals with chronic low back pain	Educational program/ individual physical training program based on the symptoms.	Pain (Numerical Rating Scale), disability (Roland Morris), attitudes facing pain Fear-Avoidance Beliefs Questionnaire and Back Beliefs Questionnaire, quality of life, sick leave, use of medical services.	There was an improvement in disability and also in the beliefs of fear and avoidance in the education group. All the other variables were almost equally influenced by the two treatments
Rundelle Davenport ⁵⁷	70-year old woman with chronic low back pain.	Patient education based on the cognitive-behavioral theory.	Disability (Oswestry Disability Questionnaire), beliefs about pain (Fear-Avoidance Belief Questionnaire), symptoms of depression (Beck Depression Index) and self-efficacy (The Low Back Activity Confidence Scale).	Improvement in disability, fear-avoidance behaviors, depressive symptoms, and self-efficacy.
Coudeyre et al. ⁵⁸	Patients with subacute or chronic low back pain	IG: Back book and frequent physiotherapy. CG: frequent physical therapy along with non-standard oral information (restricted to the questions asked by patients)	Satisfaction, functional capacity; pain intensity (VAS), beliefs of fear and avoidance (Fear-Avoidance Questionnaire) and knowledge.	Receiving the "back book" had a significant impact on disability within 3 months, and also had a significant impact on the patients' knowledge and satisfaction, but little effect on the beliefs of fear and avoidance.
Wu et al. ⁵³	Individuals with knee osteoarthritis	The program provided information about osteoarthritis and coping skills.	Arthritis Self-efficacy Scale (ASE); The Survey of Pain Attitude (SOPA-35), consultations with healthcare professionals, number of days with pain and disability.	Significant differences were found in the beliefs of pain and days with pain after the intervention. After 8 weeks, there has been a significant improvement in self-efficacy, pain episodes and number of unplanned medical visits.

Continue...

Table 3. Used articles – continuation

Coleman et al. ⁴⁸	Patients with osteoarthritis	Specific self-management educational program together with written material.	Pain, physical function and mental health scales (WOMAC and SF-36)	There was an improvement in pain, function and mental health indexes.
Goeppinger et al. ⁵⁰	Patients with osteoarthritis	Specific intervention for people with arthritis (Arthritis Self-Help Course - ASHC) and other generic, Chronic Disease Self-Management Program (CDSMP).	Quality of life, self-management behaviors and self-efficacy for arthritis.	The ASHC group showed significant improvement in self-efficacy, stretching and muscle strengthening and general health. The CDSMP group showed significant improvement in self-efficacy, disability, pain, and general health. The CDSMP group produced better results.
Watson, Cosioe Lin ⁴⁷	Veterans with chronic idiopathic pain.	Classrooms Back School + handouts	Opinion, satisfaction and overall effectiveness of the program survey.	Participants reported learning new and useful “information”, they considered the program “easy to understand”, used the information learned, and recommended the program to others.
Salveti et al. ⁵¹	Individuals with chronic pain due to different diseases	A program that included physical exercises, psycho-educational group, sessions with an occupational therapist and a nutritionist.	Pain (VAS), disability (Oswestry Disability Index and Beck’s Depression Inventory).	It was observed a significant reduction in pain intensity, disability, and depressive symptoms. These effects remained for a 6-month period.
Steihaug, Ahlsene Malterud ⁵⁴	Women with chronic muscle pain	From education to interaction: Eight treatment groups, each with 12 weeks duration, and three groups with 10 months duration.	Qualitative data analysis from field notes, focus groups, training videos, and discussion groups.	The training program is now focused on some simple exercises and is characterized by the awareness of the relationship between breathing and muscle tension. The groups become the main pillar of the program, characterized by safety and a feeling of belonging, reflection, and development.
Man et al. ⁴⁵	Patients with chronic pain	A program that includes education on pain, training in communication skills and coping strategies, physical exercises and functional activities.	Pain, catastrophism, self-efficacy, functional capacity and use of drugs.	Improvement in pain, quality of life, catastrophization, self-efficacy, functional capacity and improvement in employment rate.
Thorn et al. ⁴⁴	Heterogeneous group with chronic pain. Rural area	Cognitive behavioral therapy (CBT): addressed thoughts and feelings in response to pain and stress. Education (EDU): addressed facts about the body, pain, and learning.	Pain intensity (Wisconsin Brief Pain Inventory), disability (Roland-Morris), catastrophism, depression, satisfaction, and quality of life.	Patients in both conditions reported significant improvement in all results related to pain. A non-significant trend was found for depressive mood with better improvement in CBT than EDU. Treatment gains were kept at 6 months of follow-up.
Quintneret al. ⁵⁵	People with persistent pain.	Educational workshops Self-Training (STEPS): group educational program for 8 hours during two days, followed by optional medical visits initiated by the patient.	The number of patients who completed, costs per new patient, use of health care, perceived changes and pain management strategies.	The introduction of STEPS was associated with the reduction of public health services costs, increased use of pain management strategies and patient satisfaction.
Combined model - Neurophysiology				
	Population	Intervention/comparison	Follow-up measures	Results
Moseley ⁵⁹	Patients with chronic low back pain	Weekly, each patient had two physiotherapy sessions and one individual educational session on the neurophysiology of pain for four weeks.	Pain and disability (numeric pain scale and Roland Morris Questionnaire)	The physiotherapy program reduced pain and disability, and the effect of the treatment remained for one year.
Moseley ¹⁶	Patients with chronic low back pain	An individual educational session on the lumbar spine and pain physiology.	Attitudes facing pain (SOPA), catastrophism (PCS) and physical performance.	There was a strong relationship between cognitive change and change in physical performance, mainly explained by the change in the catastrophic belief that pain means tissue damage.

Continue...

Table 3. Used articles – continuation

Van Oosterwijck et al. ⁶⁶	Patients with whiplash-associated chronic diseases.	Two educational sessions of 30 minutes each and a leaflet on the neurophysiology of pain.	Pain, kinesophobia, attitudes vis-à-vis the pain, cervical extension test, and brachial plexus test.	A significant decrease in kinesophobia and passive coping strategies.
Van Oosterwijck et al. ⁶⁰	Patients with fibromyalgia	IG: Education on the physiology of pain CG: self-management	Effectiveness of the inhibitory mechanism of pain, pressure pain threshold and questionnaires to assess pain cognitions, behavior, and health.	IG: improvement in the knowledge of pain neurophysiology, less concern with their short-term pain. Long-term improvements were observed in physical functioning, vitality, mental health and general health. In addition, the IG reported lower levels of pain and improvement of endogenous pain inhibition in comparison with the control group.
Ryan et al. ⁶²	Individuals with chronic low back pain	Education in the biology of pain and group exercise classes (EDEX) and pain biology learning in a single group (ED)	Pain (numerical scale) and disability Roland Morris), self-efficacy, tests of physical performance and monitoring of activities in daily life.	More favorable results in the ED group. In the short term, the teaching of the biology of pain was more effective than the combination of teaching the biology of pain and group exercise classes.
Louw, Puentedura and Mintken ⁶¹	Individuals with chronic low back pain	Education in neuroscience; and refresher training before and during exercises and water therapy.	Pain (VAS), beliefs and fears facing pain (Fear Avoidance); depression (Zung Depression Scale) and disability (Oswestry Disability Index)	One patient reported improvement in the four measures, mainly in the beliefs and behaviors facing pain. In a 7-month follow-up, all the measures continued to improve.
Moseley, Nicholas and Hodges ⁶³	Individuals with chronic low back pain	IG: one individual session on the neurophysiology of pain. CG: a class on anatomy and physiology of the spine. At the end of the session, each participant received an exercise book with 10 sections.	Attitudes facing pain (SOUP); catastrophism (Pain Catastrophizing Scale); disability Roland Morris; physical performance tasks.	In the IG, it was observed a normalization in the attitudes and beliefs regarding pain, a reduction of the catastrophism and an improvement in the physical performance. Patients were less likely to seek care from other people, more likely to believe that they could control their own pain, that pain is influenced by emotional states, less likely to believe that pain is an indication of tissue damage, and perceived themselves as less disabled.
Moseley ⁶⁴	Case Study. A 36-year-old woman with chronic back pain.	Education in the physiology of pain: The initial physiotherapy session aimed at teaching the patient how to perform a task. Daily practice	McGill Pain Questionnaire, Roland Morris Questionnaire, Fear Avoidance Questionnaire and self-efficacy pain questionnaire.	A sharp reduction in cortical activation in areas usually involved in pain. Education on pain physiology can be an effective strategy to overcome the barriers to acquire normal trunk muscle control in patients with low back pain _
Gallagher, McAuley Moseley ⁶⁵	Individuals with chronic pain	Protocol: Two interventions, both using a booklet. Booklet 1 (IG): Metaphors and stories to help understand the biology of pain and concepts about pain management. Booklet 2 (CG): Advice on handling pain.	Questionnaire about pain biology, catastrophism, pain, and disability.	An increase of knowledge on the biology of pain in IG, but not in the CG. Higher reduction of catastrophic thoughts related to pain in IG than in the CG. Although both groups have improved over time, there was no differential effect on pain and disability.

and an improvement in the general state of health, quality of life, self-efficiency, and strategies to tackle pain. There was also a reduction in poorly adaptive beliefs.

The studies considered as mixed address content related to the neurophysiology of pain (characteristics, purpose, and processing of acute and chronic pain), sustenance factors, behavior, beliefs, and cultural values. As a strategy, we observed the use of illustrations, examples, and metaphors; delivery of an exercise book to take home; a log book of pain; an informative leaflet, and application of a questionnaire about the neurophysiology of pain. We also observed the inclusion of the practice of physical exercise and guidance for doing exercises at home.

In the second phase, 60 people with CP were interviewed. Out of this universe, 52 (86.6%) were female. The ages of the interviewees ranged

from 28 to 67 years old. One of the patients had to be removed from the study as this patient was called over for medical treatment. This meant that the answers of 59 patients were analyzed (Table 4). The four outlines were answered as shown in the flow chart (Figure 1).

A summary of the results of the interviews, divided into scripts A, B, C and D is shown in table 5. The main findings of the interviews are presented in the following subcategories:

1. Meanings of pain, in which we noticed that pain was understood as being a kind of sensitive stimulus: *“everyone feels pain the same way”* (R27), *“Pain is always Pain”* (R35).
2. Causes of pain, where most patients established a link to physical causes: *carrying heavy weight; sitting down or standing up for long periods* – R2, R11, R12; and emotional causes: *pressure at work, and difficulty with interpersonal relationships* – R4, R6, and R14.

Table 4. Models with respective themes and guidance as addressed and results found

Models	Themes	Guidance/Strategies	Main Results
Biomedical	Anatomy and biomechanics ³²⁻⁴⁰ ; Epidemiology and pathophysiology of pain ^{33,37,38,40,41} .	Correct posture and movements in daily activities ^{33,35-39,41} ; Physical Exercise ^{33,34,37,41} ; Stay active ^{35,37,41} .	Reduction of pain ^{32,33,35,37-40} ; Reduction of incapacity ^{34,37,38,40} ; Improvement to quality of life ³⁶ ; Awareness of the problem ⁴² ; Satisfaction ⁴² ; Improved spinal mobility ⁴⁰ ; Reduction of anxiety and depression ³⁷ ; Perceived Control ³⁷ ; Improved physical ability ³⁷ .
Biopsychosocial	Management of pain ^{43,47} ; Pharmaceuticals ^{47,48} ; Nutrition ^{47,49-51} ; Sleep ^{44,47} ; Anatomy and pathology ^{47,49,53,53} ; Basic physiology of pain ^{44,51,54,55} ; Ergonomics ^{46,49,51,54,56} ; Response to pain, management of stress and mental health, dysfunctional beliefs, poorly adaptive behaviours, and capacity to tackle pain ^{43,45,51,53,56} .	Physical exercise ^{46,51,53,55} ; Encouragement of spontaneous movements ⁵² ; Acceptance of pain and use of relaxation during routine daily activities ⁵⁶ ; Stopping smoking ⁴⁷ ; Weight control ^{47,48} ; Mapping of the problem ⁵² ; Counselling sessions ⁵³ ; Principles of behavioral cognitive therapy ^{48,50,51,55-57} ; Explanatory leaflets ⁴⁸ ; Activity sheets ⁵⁵ ; Techniques for motivation and self-regulation ⁴³ .	Reduction of intensity of pain ^{44,46,48-51,56} ; Reduction of physical incapacity ^{44,46,47,49-51,53,56-58} ; Improvement in general health and quality of life (QoL) ^{44,46,47,49,50} ; Improvement to self-efficiency and strategies for management and tackling of pain ^{43,50,53} ; Reduction of catastrophism and poorly adaptive beliefs ^{44,52} ; Reduction of symptoms showing depression and anxiety ^{44,51} ; Improved awareness ^{43,58} ; Satisfaction ^{55,56,58} ; Reduction of health expenses ^{53,55} ; Increased rate of return to work ⁵⁶ .
Neurophysiology of pain	Characteristics, purpose, and processing of acute pain, and processing and sustenance factors for chronic pain, including emotions, stress, cognition, and behaviour ^{16,59,60-66} .	Use of illustrations, examples and metaphors ^{61,64,66} ; Exercise booklets for home ^{59,63} ; Pain log book ⁶⁴ ; Informative leaflet ^{60,66} ; Questionnaire on the neurophysiology of pain ^{65,66} ; Practice of exercises ^{59,61} .	Pain education ⁵⁹⁻⁶² ; Greater tolerance to pain ^{62,66} ; Reduction of incapacity ^{59,61,61} ; Normalization of attitudes and beliefs with regard to pain ^{16,61-63} ; Improvement in vitality and mental health ⁶⁰ ; Reduction of catastrophism ^{16,61-63,65} ; Improvement to physical performance ^{60,61,65,66} ; Increased awareness about the biology of pain ⁶⁵ ; Reduction of concern about pain in the short term ⁶⁰ ; Improved endogenous inhibition ⁶⁰ ; Changes to brain activities ⁶⁴ .

(Prepared by the authors)

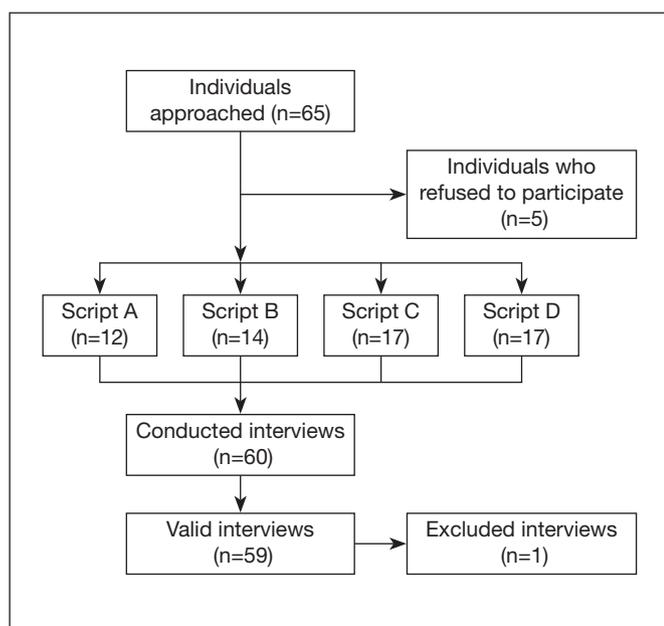


Figure 1. Flow chart for data collection
(Prepared by the author).

3. Processing of pain, showing lack of awareness by most of the interviewees, as shown by the answer given by R23: “*this is a big question mark in our heads*”.

4. Mistaken beliefs. It was observed that, even among people who coexist with pain, there is a strong association between pain and lesions. “*Surely, this is why I say this is a warning light for us*” (R10); “*When you feel pain, it is a warn to you to stop*” (R1).

The ‘*EducaDor*’ booklet (<http://www7.bahiana.edu.br/ljspuil/handle/bahiana/540>) was designed in A5 size (14,8cmx21,0cm) with 18 pages. The sections were subdivided thus: 1) What is pain? 2) Acute Pain; Useful Pain; 3) Chronic Pain; Persistent Pain; 4) Coexistence with pain; 5) False ideas about Chronic Pain; Don’t Believe Them; 6) Strategies to deal with Pain.

An illustration of the brain (Figures 2 and 3) was created to clarify aspects related to neuromodulation and central pain sensitization.

At the end of the booklet there are the following recommendations: “be curious”, “observe the pain” and also “look beyond pain”, giving a positive reinforcement to any adjustments as may be necessary for a better quality of life, less disability, and less suffering, even if coexistence with pain is indeed necessary.

Table 5. Synthesis of the interviews scripts

Script A - Theme: What is pain?

Do you think that the size of the body injury determines how much the person will feel pain?

The association between the size of the injury size and the pain presence was reported by 5 of the 12 interviewees, as can be observed in the speech of R12, which related the size of the injury to the greatest pain: *"I think the intense injury will generate a greater pain.... and in fibromyalgia you have to learn how to live with it, otherwise you get desperate ... sometimes I am feeling well, but at other times I cannot even get up. So, this is not compared to a small injury, it's compared to a big one"*. As for four individuals, this association does not exist, as exemplified by the report of R10 on its experience after a surgical procedure: *"When I did my heart surgery I felt a lot of pain, I got to take morphine. There were patients there who did the same surgery I did, and the pain was not such intense. So, no matter the size of the hurt, or injury, it has nothing to do"*.

Do you think there is a possibility of a non-painful injury on the body?

Most of the interviewees (8) stated that there is no possibility of an injury not to cause pain; some of them were emphatic, while others were not so sure. Two patients interviewed mentioned herniated disc as an example of an injury where pain relieves but does not cease with the use of medication. R12, however, referred to the herniated disc to justify her understanding that there may be an injury that does not cause pain, which is visible in her statement: *"It's possible once I've heard reports from several people saying they have three, four hernias and feel nothing"*. Another respondent, R2, mentioned leprosy, to exemplify the existence of a painless injury.

Do you think pain can work as a warning system so that you stop doing what you're doing?

Only one interviewee does not believe that pain can work as a warning system for the individual to stop what he is doing. The other interviewees, despite the chronic pain, stated that pain can act as a warning. One of them, R11, was emphatic in reporting: *"For sure, that's why I say it's a warning sign for us"*.

Do you think that the amount of money or study of a person has influences in how much pain he/she feels?

The question that investigated whether there is a relationship between the amount of money or study and the amount of pain that the person feels divided opinions. The interviewees related the financial condition to the possibility of seeking resources for their relief and even to discover the cure, but also related to increased stress and concerns. These data can be observed by the reports of two of them: R7 stated that *"no money can stop the pain ... not the chronic pain, as the chronic pain is even horrible"* and R11, when reflecting on his own history complained: *"I spent so many hours sitting, working, and then I harmed my own health. So today I look back and see the evil I've done to myself"*.

Do you use the same treatment method when you feel a momentary pain or when this pain lasts for several months?

When asked if they would use the same treatment method when experiencing both momentary pain and pain lasting for months, most of the answers were negative. Momentary pain, as has been made clear, has a short duration. The R12 speech exemplifies well this representation since she points that it is a pain that *"comes and goes"*. Regarding the handling of momentary pain, the responses indicated two strategies: the use of medications and the visit to the emergency. In turn, the pain that lasts has been considered to be the one that merely gets better, but it does not cease. Several methods were used for its handling, namely acupuncture, physical therapy, blockade, RPG, water aerobics, physical conditioning, chiropractic, swimming and also the ambulatory treatment of pain.

Is there a discomfort difference between the pain that comes and goes and the one that lasts?

Only one person said there is no difference between pain that comes and goes and another one that lasts, but she did not explain the reason. The lasting pain was mentioned as the pain that is not forgotten, that decreases its intensity, but it remains forever. It was also related to desperation, sleep disturbance, and drug dependence. For R12, the difference consists of the following: *"the pain that comes and goes, a headache that you take an analgesic and it ceases instantly. The pain that comes sneaky makes you nervous, stressed, you have to learn how to live with it, so to live well I have to get used to the pain"*.

Script B - Theme: How does the body perceive and process pain?

How do you think an aggressive stimulus turns into a pain in our body?

The great majority of the individuals interviewed stated that they did not know how the transformation of an aggressive stimulus into pain happens, as can be seen in the R23 speech: *"It's a questioning in our mind"*.

Are you able to differentiate a nerve, the marrow, and the brain? How could each be related to pain?

Few interviewees knew differences between nerve, marrow, and brain. There have been some attempts, observed in speeches such as: *"each one hurts in one place"*, *"our body is a whole"*; *"everything is connected to the nervous system"*; *"may be linked to the emotional system that triggers pain throughout the body"*. Three of the interviewees highlighted the brain. One of them, R15, said: *"when we work our brain we can improve; when we put in our mind that we can, that we are capable of, we strive and we can improve"*. One of the interviewees attributed the pain he feels to the nerve: *"I think it hurts because of the nerve"*.

Do you think that in the body there is some form or substance to decrease the pain felt by a person?

Most interviewees believe that in the body there is some form or substance that can decrease the pain felt by a person. Some strategies for pain reduction were mentioned, such as: do exercises, stretches, rest, being joyful and being calm. One interviewee conditioned the improvement to the presence of a professional: *"if there is a professional who can guide us and say what we have, and what we can improve, and how we can collaborate"*. One person attributed the role of decreasing pain to antibodies, while another one mentioned the hormones. R26 was more specific: *"Endorphin, right? That stimulates us... when we are more joyful the pain decreases"*.

How long have you been in pain? Do you think the painful information could be recorded in the body?

The interviewees reported a varied time of pain coexistence. Most of them said they felt pain between 2 and 12 years. As for the questioning about the possibility of recording the painful information, opinions were divided. Among those who believe that the pain is recorded, R19, who has been living with chronic pain for 10 years, mentioned suffering as a cause: *"because we suffer so much that it gets marked"*. R16, who also has been suffering for 10 years, related the pain presence to the belief: *"And everything comes from the mind, right? If I say that the hand is aching and put it in my mind, it will hurt"*. R17 agreed about the pain record and explained as follows: *"because we see that place and looks like we're already in pain"*.

Continue...

Table 5. Synthesis of the interviews scripts – continuation**Do you believe that your emotional state influences your pain? Why?**

Only one interviewee said he did not believe that his emotional state influenced his pain: *“I do not think so, I think everything is the same”*. Other interviewees expressed the influence of the emotional state in many ways, as can be observed in the following speech: *“When I get nervous, I feel my whole body aching”*. Two interviewees commented that thinking influences the pain they feel. One of them was emphatic: *“Sure ... the more you think about pain, the more it hurts”*.

Script C - Theme: How do I influence my pain?

Do you think a person's intellectual level influences how they feel the pain?

The questioning about the intellectual level's influence on the way the pain is felt has divided opinions. Some aspects have been mentioned as favorable to those with a higher intellectual level, such as: having other means of dealing with their problem, knowing how to act, knowing how to care themselves, asking for help and being distracted. R33 believes that most important is how to deal with pain: *“If you're weak, you just think about your pain, that has no solution, and then it ends up getting worse. If you do not take it too seriously, think it will end up soon”*.

Do you think culture affects pain?

The great majority of interviewees (13) stated they do not believe that pain was influenced by culture. The way of treating pain, access to natural resources and receiving guidelines were mentioned as aspects influenced by culture. R37 highlighted the importance of how a person deals with the problem: *“I think pain is pain, it depends on how you look. I live like this for 20 years. Either you learn to live with this difficulty, or you die. And I rather live, because I've been almost dead. And my positive attitude influences other close people who do not know how to face the pain. We have to fight to live. There are people who give up living. The poorest people are more likely to deal with this situation”*.

Have you ever missed school or work because of the pain?

Most people interviewed (9) reported difficulty in reconciling work with pain. Difficulties relating to the working environment, the necessity of returning home, stress and visits to the emergency were the mentioned aspects. R38 attributed his absence from work to the pain: *“Today I do not work because of the pain, I'm away from work. It was very bad, I could not do my job properly, any movement would increase the pain, and that would steal my joy”*. Four people reported they never missed a day of work because of the pain. One of them, R30, despite saying that *“it was horrible”*, considered, *“it's the way I face my life”*. One interviewee reported she had stopped studying because she could not stand still. Another one, however, noted that during the classes she was distracted and forgot the pain.

Do you believe that fat influences the pain a person feels?

Only two people interviewed said they do not believe there is a relationship between obesity and pain. One of them, R29, justified her opinion with her own example: *“I guess it does not influence, because I was fat and now I'm not, and I still feel pain”*. However, most interviewees (15) believe that there is an association between obesity and pain. The justifications were related to the difficulty of walking, moving and carrying out daily activities. R33 considered: *“It's already difficult to bear the pain, let alone the weight”*.

Who feels pain the most, man or woman?

As for the questioning about the relationship between gender and pain, the great majority believes that women feel more pain than men. One of them, R34 justified the fact by the multiple activities developed by women: *“Because the woman works at home, in the field, she has sons. The woman's work exposes her more to the pain, because she falls, cuts the finger on the ax”*. Men were identified as having the lowest threshold and also a lower pain tolerance, as can be observed in the speech of R36: *“Because men feeling a little pain spend all day in bed. Most men are like that. I'm 'dying' of pain, and I'm always doing things”*. R37, who shares the same opinion, adds: *“When a man has pain he goes on saying he is 'dying'”*.

Can physical activity influence pain?

Almost all interviewees (15) stated that they believe that the practice of physical activity contributes to the pain improvement. R28, however, made a reservation: *“If physical activity is done properly, it improves pain”*. Interviewee R37 stated her doctor advised her to do physical activity, but realizes that she has no condition: *“I have arthritis, I cannot walk”*. One interviewee (R40) presented a point of view different from the others: *“There are people who do physical activity and report a pain worsening right after”*.

Do you think that alcohol consumption influences the pain people feel?

Alcohol consumption is associated with increased pain, in the opinion of the majority of interviewees to this question. Three people reported that they drink to temporarily relieve pain, stating that it *“softens”* (R30), *“dozes off”* (R37), *“anaesthetize”* the pain (R38). Some interviewees stated drinking is pointed out by others as associated with pain relief, as noted in R32's speech: *“I've seen a lot of people say that they drink to get better”*. It was observed a position opposite to the consumption of alcohol by some interviewees: *“Alcohol affects everything! It affects the judgment, the heart”*. (R35) *“I do not drink anymore, and I am against who drinks because I think it affects everything, morals, the body”* (R39).

Do you think that smoking influences the pain people feel?

Smoking is associated with increased pain, in the opinion of most of the interviewees. Many of them even made observations on other ravages caused by cigarettes. As with alcohol consumption, one interviewee considered that use of the cigarette *“anaesthetize”* the pain (R30). There was a strong rejection of cigarette use by some interviewees: *“Cigarette causes disease, worsens pain”* (R33); *“Smoking is not good. You get that itch in your throat, throat clearing, harming your lungs”* (R35); *“Smoking is bad for health, it causes several problems”* (R40).

Do you think that spiritual practices influence the pain people feel?

The relationship between spiritual practices and pain divided opinions. Interviewees who believe that spiritual practices contribute positively were more detailed in their observations, as noted in R39: *“I think it improves, we feel safer, we have to believe in something; otherwise things get worse”*. Prayers and beliefs were mentioned as pain relief factors. R42 believes that spiritual practices do not influence the pain's improvement or worsening, but they promote comfort, and he concludes: *“It gives us support, a peace of mind for us to be calm”*.

Continue...

Table 5. Synthesis of the interviews scripts – continuation**Script D - Theme: How to control pain?****What do you do when you are in pain?**

When asked about pain control, the main reference was the medication, mentioned by all interviewees. Some, like R42, have mentioned venous blockade as a form of pain control. *“It’s a palliative that is great for me! If I could, I would take it every day, so I did not have to feel ‘it’ (the pain)”*. *Because when we leave, we come out renewed, sleep is calmer*. In addition to medication, other practices have been mentioned for pain relief, such as prayer, rest, relaxation, physical activities, embroidery, massage, acupuncture, and physiotherapy.

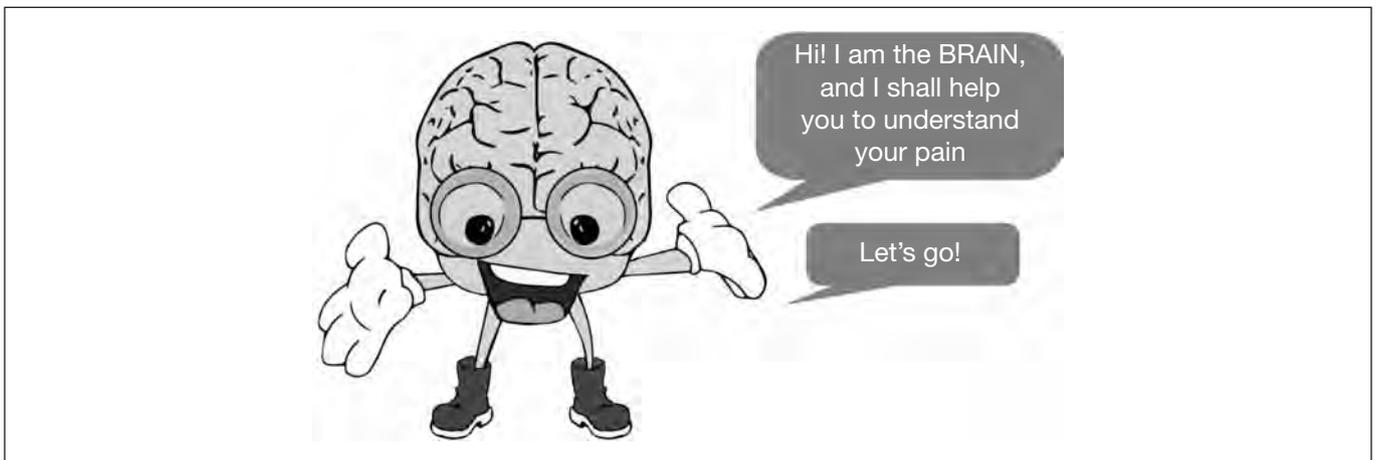
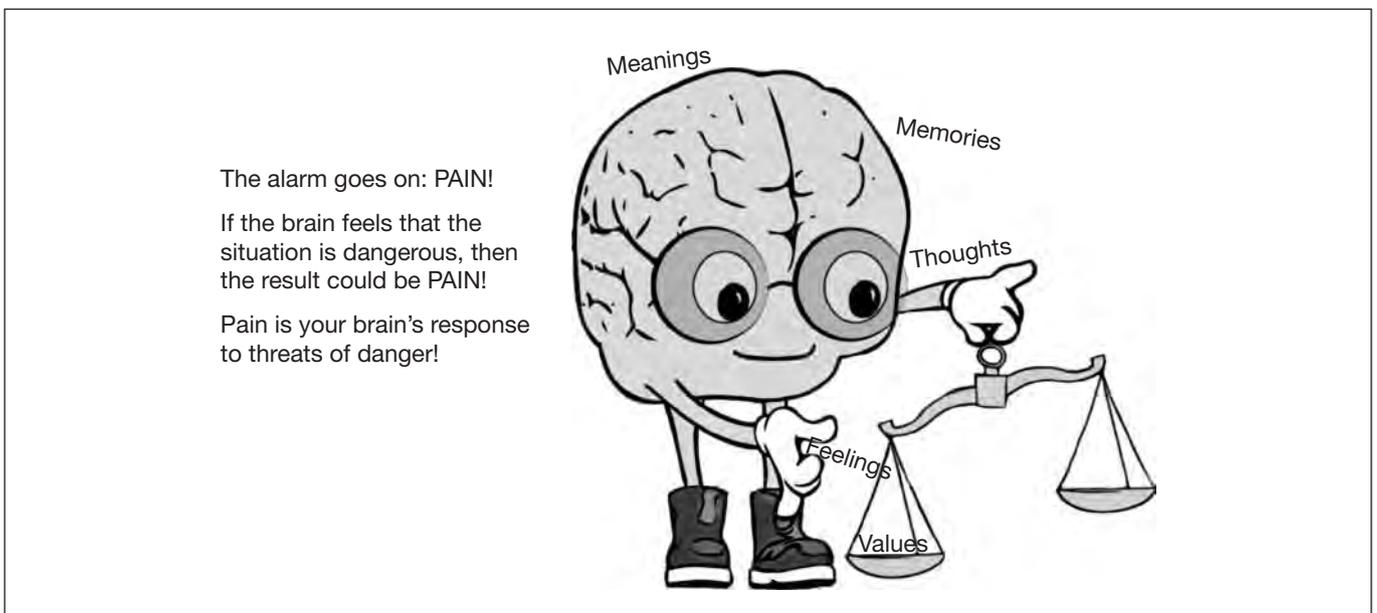
Do you think there is a relationship between movement and pain?

Most interviewees related the pain they feel to the movements they perform, as can be seen in the speech of R46: *“when I start to move, I start to feel pain”*. Some note that despite this, they need to move: *“I think when I stop it worsens, that’s where I have to move myself”* (R50). The same understanding was reported by R52: *“you have to keep doing things, I do, I’ve done all my life, I do not mind, I do them even when I feel pain, it ceases, then it comes back, it happens again, I live my life like this”*.

Do you believe you can re-educate yourself so that you can move in spite of the pain?

The great majority of interviewees stated they believe they can re-educate themselves to keep on moving in spite of the pain. Only R44 did not believe this possibility: *“no, only if I take medicine, for me it’s the medicine because I have not seen anything else to make it better, I do not see anything”*. R54 said he believed in re-education, although he did not have this experience: *“I know that for some people it works, I’ve never tried to do it myself”*.

Source: prepared by the authors

**Figure 2.** The brain, the leading actor of our booklet**Figure 3.** The brain, faced with a threat of danger

DISCUSSION

The development process led to a booklet for people who live with CP. Its content, with both text and illustrations, sought to establish a new concept for chronic pain, and also to change mistaken beliefs about pain and poorly adaptive behavior when facing the problem. With the theoretical backing of scientific literature, together with the experience of physiotherapists specialized in the treatment of CP, the approximation of people who have lived through the problem and the analysis of similar resources available in other languages, we arrived at the final product as shown in the final study.

International guidelines recommend social and educational programs for dealing with CP¹⁵⁻¹⁷. The lack of understanding of the meaning of steady pain has been suggested as the factor responsible for the exacerbation of the symptom⁶⁰. Lack of appropriate knowledge means that the subject regards pain as a threat, thus maintaining poorly adaptive behavior patterns²⁸ and preventing the development of strategies for effective strategies for tackling this problem. For this reason, socio-educational interventions have been tested, and have shown promising results for the treatment of people with CP^{7,16,67}.

Aligned with the biopsychosocial model, this booklet sought to shed light on the subjective and individual character of CP, thereby proving the inability to generalize the problem¹⁰. In addition, socio-cultural aspects that perpetuate CP, and also the relevance of the person's change of behavior for more effective results of the control process^{68,69}. Regarding the biological aspects of CP, there has been the inclusion of content about neurophysiology and neuromodulation, for which we have found evidence in the specialized literature that could justify their recommendation⁶⁰.

The concepts were presented in a simple and objective manner, with the use of metaphors. Similar methodologies were applied in other studies, and have shown the positive impact regarding knowledge of, and level of satisfaction with, the information at hand. However, they mention very little effect upon beliefs, fear, and evitation⁵⁸. These results suggest a need for widespread testing of the several bio psychosocial aspects, with outcomes that could be modified by this intervention model.

The group of specialists considered the density of the issues addressed as being appropriate for the target public. Studies that have assessed similar tools^{70,71} have confirmed the importance of having the material suitable for the target public. Accessible language, written as if it were a conversation, with color illustrations and cuttings of the utterances of the patients: these have been just some of the resources that were used to make reading easier and more attractive^{19,21,26,71}.

The 'meaning of pain' sub-category showed a need to expand the concept of pain, thereby reinforcing its subjective and individual character and showing the roles played by society and culture in this painful experience⁶⁹. Characters in the booklet make it clear that pain is not synonymous with nociception and show the subjectivity of the painful experience. This aspect has the backing of the influence of social and cultural domains, and of feelings experienced in the processing of information by the central nervous system, with regard to CP. Knowledge of how pain is processed has been suggested as a strategy for its resignification⁷². Acute pain has been shown as a brain response to the threat of danger, while the CP was connected to the mistaken interpretation of information. The consequences are the amplification of sensory stimuli and the fact that fewer inputs would be sufficient for its activation, which could lead to pain⁷³.

Nijs et al.⁷² suggest that the phenomenon of central sensitization should be taught based on the book *Explain Pain*¹⁸, with dense content. Hence, there was the selection of essential topics that could be understood by the target population. A study carried out in 2013 by the Brazilian Ministry of Education identified 17.8% of functionally illiterate people in Brazil. This dire reality is even worse in the Brazilian Northeast, the region that has the highest levels of functional illiteracy⁷⁴.

With regard to mistaken beliefs, we see that poorly adaptive behavior and the persistence thereof could lead to physical deconditioning and to the difficulty to resume domestic and work activities⁷. The understanding of the attitudes necessary for pain control and non-exposure to predictive factors have been widely recommended^{4,15,17}.

The expectation of a medical cure and attribution of religious aspects for the problem or for its solution are the greatest factors for the perpetuation of the symptoms¹⁸. The control and management of CP require a complete awareness of reality and a positive attitude with regard to the problem.

One limitation shown by the work is the lack of social and demographic data about the patients. However, as this is a segment of the population seen to in a SUS outpatient center, most of the patients are people of a low social and economic level, with a low level of schooling, as has been shown in other studies based on this same population⁷⁵. A systematic review in the future could provide better grounds for the development of light technologies, such as the one proposed in the present study.

CONCLUSION

The 'EducaDor' booklet is an example of light technology in health-care, which provides grounds for social and educational programs to address chronic pain. Future studies shall validate and appraise its efficiency through a randomised clinical trial.

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Prevalence of musculoskeletal pain in climacteric women of a Basic Health Unit in São Paulo/SP

Prevalência de dor musculoesquelética em mulheres climatéricas em uma Unidade Básica de Saúde de São Paulo/SP

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ABSTRACT

BACKGROUND AND OBJECTIVES: The objective of this study was to evaluate the prevalence of musculoskeletal pain in climacteric women of a Basic Health Unit in Sao Paulo.

METHODS: This is a descriptive cross-sectional study, with the participation of 93 climacteric women with average age of 49.1±6.1 years, with medical history containing obstetric background and pain characterization, including the presence, location, and intensity of these complaints. For data collection, we used a map of pain and a visual analog scale associated with the faces pain rating scale.

RESULTS: Of the total, 87 women (93%) reported pain, with an average onset of symptoms of 5.8±7.7 years, and average pain in the visual analog and the faces scales of 6.9±3 mm. The pain was classified by most of the women (53%) as intense, and the places of greater involvement were the spine (71%), followed by the knees (58%) and shoulders (47%). Thus, the musculoskeletal pain showed to be a frequent complaint among climacteric women, involving 93% of the volunteers in this study, ranked by the majority as an intense pain.

CONCLUSION: It is important to recognize the magnitude of this complaint in primary care to elaborate preventive and therapeutic actions aiming at improving the quality of life of these women.

Keywords: Basic health care, Climacteric, Physiotherapy, Pain measurement.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O objetivo deste estudo foi avaliar a prevalência de dor musculoesquelética em mulheres climatéricas de uma Unidade Básica de Saúde do município de São Paulo.

MÉTODOS: Trata-se de um estudo descritivo transversal, no qual participaram 93 mulheres climatéricas, com idade média de 49,1±6,1 anos, submetidas a anamnese, contendo: antecedentes tocoginecológicos e caracterização da dor, incluindo a presença, o local e a intensidade dessas queixas. Para a coleta desses dados, foi utilizado um mapa de dor, e uma escala analógica visual associada à escala de faces.

RESULTADOS: Do total, 87 mulheres (93%) referiram dor, com média de início dos sintomas há 5,8±7,7 anos, e média de dor na escala analógica visual, e de faces de 6,9±3,0mm. A dor foi classificada pela maioria das mulheres (53%) como intensa, sendo os locais de maior acometimento a coluna vertebral (71%), seguido de joelhos (58%) e ombros (47%). Sendo assim, a dor musculoesquelética mostrou-se como queixa frequente entre as mulheres climatéricas, afetando 93% das voluntárias deste estudo, classificada pela maioria como intensa.

CONCLUSÃO: É importante reconhecer a magnitude dessa queixa na atenção primária em saúde para traçar ações preventivas e terapêuticas que visem melhorar a qualidade de vida dessas mulheres.

Descritores: Atenção básica em saúde, Climatério, Fisioterapia, Mensuração de dor.

INTRODUCTION

With the increase in life expectancy, most women will spend more than one third, or even half of their lives in the post-menopausal period¹. The impact on the economy and society is huge since most women undergo significant changes in their general health during the menopause, which negatively impacts their quality of life (QoL)¹. About 70% of perimenopausal women have symptoms related to estrogen deficiency, as vasomotor instability, sleep disorders, decreased bone mineral density, genitourinary atrophy, lipoprotein changes, and musculoskeletal pain², the latter being reported by more than half of perimenopausal women³.

In Brazil, the public health system, known as Sistema Único de Saúde (SUS), adopted the Family Health Strategy (FHS),

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as the crucial entry point of the care for the users of SUS. In this model, the FHS work teams work in specific geographical areas and are responsible for the implementation of actions to promote health, prevent diseases, treat common health conditions and rehabilitation^{4,5}. Despite their responsibility for identifying the risk factors and the presence and prevalence of musculoskeletal symptoms in the population they treat, there are very few records of these symptoms. Services considered as Primary Health Care must recognize the importance and prevalence of musculoskeletal symptoms in the population under their care. However, it is believed that these elements are underestimated, given that, in Brazil, they are not reported and recorded at the Primary Care Units (SUS). The professional who works at SUS must: 1) study and detect the needs and health goals of the population that use the service; 2) develop a plan and strategies to achieve their goals, to provide integrated and humanized care to the population, according to the needs and specificities of each territory. These tasks are part of their job assignment. In this context, the objective of this study was to investigate the prevalence of musculoskeletal pain in perimenopausal women of a Primary Care Unit and users of the FHS for a low-income community in the city of São Paulo, Brazil.

METHODS

This is a cross-sectional study that included women aged between 40 and 60 years, residents in the community of Paraisópolis, district of Vila Andrade, in the southern area of São Paulo, enrolled in the Family Health Strategy program of Paraisópolis I Primary Care Unit. This community has a population of approximately 80,000 inhabitants, according to the census conducted by the Brazilian Institute of Geography and Statistics⁶. Approximately 5% (3,872) of the inhabitants are in the age group above 40 years.

The inclusion criteria were: live in the community of Paraisópolis, age between 40 and 60 years, and be enrolled in the FHS program of Paraisópolis I. The exclusion criteria were: be confined to bed, use a wheelchair, neurological disorders, and presence of cognitive damage that prevents the volunteer to understand the questionnaires.

The participants in the study signed the Free and Informed Consent Term (FICT), as determined by the Report 466/12 of the National Health Council.

One researcher who did not participate in data collection was responsible for the calculation of the sample size. The volunteers eligible for the study were listed at the SUS and after randomization by the Excel software they were selected and invited to the study. The sample calculation followed the equation:

$$n = \frac{NZ_c^2 p(1-p)}{(\epsilon_p^2(N-1) + Z_c^2 p(1-p)}$$

Where **n** is the sample size, **N** is the size of the total population (perimenopausal women living in the region of the

Paraisópolis I SUS) = 3872 women, **Z_c** is the value of the normal distribution (95%), **p** is the estimated prevalence of perimenopausal women (4.8%), and **ε_p** is the estimated sample error (10%).

With this information, the estimate sample size was 93 volunteers. The women included in the study followed the same evaluation protocol, applied on a single day, in a room of the Primary Care Unit. The evaluations took about 60 minutes.

Instrumentation

The evaluation form used in this study had questions concerning personal data, lifestyle and gynecological background. An anthropometric scale (R-110 CH, Welmy) was used to obtain the body mass and height data to calculate the body mass index (BMI).

Pain location was evaluated with a body map composed of two figures of the human body with anterior and posterior views. The subjects were asked to paint the locations corresponding to the sites where they had pain. This figure was adapted from the pain map in McGill Pain questionnaire⁷. Pain intensity was assessed by the visual analog scale (VAS), the numeric scale associated with the faces of pain. The VAS allows for better assessment of the subjective feeling of pain, and the faces help the individual to understand the need to rank pain in numbers from zero to 10⁸, where 10 is considered the worse pain possible.

This study was approved by the Research Ethics Committee of the Municipal Secretariat of Health of São Paulo, under Report Nr. 292/11.

Statistical analysis

We used the Statistica software (v. 7.0, Stat Soft, USA). The Shapiro-Wilk test was used to check data normality. For comparison between categories, we used the Variance Analysis (ANOVA), and Duncan's post hoc test was applied to identify the differences. In the case of only two categories, the Student's *t*-test was used. The data are expressed as average (standard deviation) and percentage. The significance level was set at 5%.

RESULTS

Demographic, personal and general data on health are shown in table 1. The average age of the volunteers was 49.1 (6.1) years, and the average BMI was 27.7 (6.7) kg/m². Thirty-four volunteers (36%) were considered overweight, 37 (40%) reported hypertension, 13 (14%) diabetes *mellitus*, and seven (8%) cardiovascular diseases. Pain levels were higher for women with low educational level, and for those who lived with 2 or 3 generations in the same household (Table 1).

The gynecologic and obstetric characteristics are shown in table 2. It was noted that the average age for menopause was 50.8 (4.9) years.

According to table 3, the prevalence of musculoskeletal pain was 93%, associated with intense pain and gradual worsening of the symptoms. The average of reported pain was 6.9 (3.0) points.

Table 1. Characterization of the sample concerning demographic and personal data, and self-reported associated diseases

Variables	Categories	Total	VAS	p value
Age group (years)	40 - 45	30 (32.3%)	6.3±3.1	0.48
	46 - 50	29 (31.2%)	6.8±3.3	
	51 - 55	19 (20.4%)	7.7±3.1	
	56 - 60	12 (12.9%)	5.9±3.7	
	61 - 64	3 (3.2%)	5.7±4.9	
Body mass index	Underweight (<18.5)	3 (3.3%)	3.3±5.8	0.14
	Adequate (18.5 - 24.9)	27 (29.4%)	6.5±3.1	
	Overweight (25 - 29.9)	34 (37.0%)	6.3±3.5	
	Obesity (>30)	28 (30.4%)	7.5±2.7	
Profession	Housewife	35 (37.6%)	6.07±2.2	0.28
	Cleaning	21 (22.6%)	7.3±3.4	
	Caregiver	18 (19.4%)	6.66±2.2	
	General services	9 (9.7%)	6.08±2.5	
	Retail	8 (8.6%)	6.67±3.0	
	Retired	2 (2.2%)	20±1.1	
Marital status	No marital life	29 (31.2%)	7.4±2.9	0.13
	With marital life	64 (68.8%)	6.3±3.4	
Education	None	12 (12.9%)	7.83±3.2*	0.03
	Primary education	57 (61.3%)	6.95±3.0	
	High school + higher education:	22 (23.7%)	5.21±3.5	
Color/Race	White	55 (59.1%)	6.1±3.4	0.33
	Black	26 (28.0%)	7.1±3.5	
	Brown	12 (12.9%)	7.9±1.3	
Housing	Alone	14 (15.1%)	5.0±4.0	0.016
	Spouse	4 (4.3%)	8.0±2.8	
	1 generation	62 (66.7%)	6.4±3.2	
	2-3 generations	13 (14.0%)	8.8±1.3#	
Physical activity	Yes	16 (17.2%)	5.8±3.7	0.25
	No	77 (82.8%)	6.8±3.2	
Smoking	Yes	22 (23.7%)	7.6±2.6	0.09
	No	71 (76.3%)	6.3±3.4	
Systemic hypertension	Yes	37 (39.8%)	6.6±3.4	0.98
	No	56 (60.2%)	6.6±3.2	
Diabetes mellitus	Yes	13 (14.0%)	7.8±2.7	0.17
	No	80 (86.0%)	6.4±3.3	
Cardiomyopathy	Yes	7 (7.5%)	8.9±1.2	0.06
	No	86 (92.5%)	6.4±3.3	

VAS=visual analog scale; * p<0.05 versus elementary and high school + higher; # p<0.05 versus 1 generation, and alone.

Table 2. Gynecologic and obstetric characteristics of participants

Variables	Categories	Frequency	VAS	p value
Age of menarche		13.1±1.6		
Number of pregnancy		3.8±2.3		
Menopause	Yes	39 (41.9%)	6.8±3.4	0.60
	No	54 (58.1%)	6.5±3.2	
Age of the menopause		50.8±4.9		
Regular cycles	Yes	14 (25.9%)	6.1±1.8	0.59
	No	40 (74.1%)	6.6±3.6	
Sexual activity	Yes	60 (64.5%)	6.5±3.3	0.65
	No	33 (35.5%)	6.8±3.1	

VAS = visual analog scale.

Table 3. Evaluation of the occurrence and frequency of musculoskeletal pain

Variables	Categories	Frequency	VAS
Musculoskeletal pain	Yes	87 (93.6%)	6.9±3.0
	No	6 (6.5%)	-
Onset of symptoms		5.78±7.73	
Since started	Better	18 (20.7%)	6.9±3.1
	Same	20 (23.0%)	6.0±2.7
	Worse	49 (56.3%)	7.2±3.1
Pain intensity	Mild	11 (12.64%)	0.64±0.92
	Moderate	30 (34.48%)	5.80±1.40
	Intense	46 (52.87%)	9.09±0.89

VAS = visual analog scale.

Table 4 shows the site of pain reported by all the volunteers, and the more prevalent were lumbar spine, knees, and shoulders.

Table 4. Painful regions reported, and pain intensity obtained by visual analog scale

Variables	Frequency and %	VAS
Spine	66 (70.97)	6.61±3.25
Shoulder	44 (47.31)	6.54±3.32
Elbow	37 (39.78)	6.61±3.25
Wrist	28 (30.11)	6.59±3.28
Hand	29 (31.18)	6.59±3.26
Hip	14 (15.05)	6.56±3.33
Knee	54 (58.06)	6.59±3.26
Ankle	33 (33.33)	6.53±3.34
Foot	32 (34.41)	6.59±3.26

DISCUSSION

The results of the present study indicate that pain is highly prevalent in perimenopausal women, with the most affected sites being the lumbar region, knees and shoulders, and the reported pain from moderate to intense. No Brazilian epidemiological studies were found that characterized the prevalence of pain in perimenopausal women in low-income communities. This is the first study conducted in a low-income community in Brazil. Most of the studies focused on vasomotor symptoms of the post-menopause syndrome. Many studies are from the United States of America and Europe, being conducted with Caucasian women with more privileged socioeconomic status⁹. Neslihan et al.¹⁰ reported joint and musculoskeletal pain in 82% of perimenopausal women. Olaolorun and Lawoyin¹¹ noticed that pain was reported by more than 50% of perimenopausal women.

The Brazilian Society for the Study of Pain (SBED, Brazilian chapter of the International Association for the Study of Pain, IASP), states that musculoskeletal pain is the most prevalent in the world population, affecting all ages¹². A possible explanation for musculoskeletal pain in the perimenopausal period can be related to hormone alterations, especially hypoestrogenism, that can cause the wearing of the cartilage, similar to the bone mass loss that occurs in perimenopausal women¹³. On the other hand, the sexual hormones are part of the pain modulation process, which makes perimenopausal women more sensitive to pain¹⁴. The differences among the studies can be related to several aspects, such as cultural differences, economic, social, psychological, environmental, health condition, type of study, population studied, sample selection, population, the presence of misleading variables and use of different instruments to assess pain¹⁴.

Pain, especially in the level reported by the women evaluated in the present study, can be very disabling, affecting all the life dimensions of the person, leading to significant differences in interpersonal and family relations, social interaction, and the capacity to perform daily activities^{15,16}. A result that most women in this study have been facing for years; their pain can be

classified as chronic. Chronic pain has a major impact on the professional and social life, as well as on the QoL. The costs to control chronic pain can lead to a financial overload due to the increased need for medical services and drugs, especially in the public health system. The annual costs to handle chronic pain are of approximately 100 million reais, including diagnosis, treatment, factors related to work performance as well as social security services¹⁷.

Given all the changes that a person with chronic pain has to face to try to control its condition, the crisis also affects the family¹⁸. The family is the central subject of care in the Primary Health Care, the main “gateway” to SUS¹⁷. Considering the significant prevalence of chronic pain in perimenopausal women in a low-income situation, it is necessary that the Primary Health Care develop preventive and therapeutic cation focusing on musculoskeletal pain. The proper diagnosis and handling of acute pain can be extremely important to public health because it can lead to the decrease in costs and better functioning of the higher complexity levels of health care¹⁹. Another remarkable result of this study refers to the fact that women with low educational level have higher levels of pain, corroborating the results of Hoy et al.¹⁸ and Gulbrandsen et al.¹⁹. Individuals with low educational level can begin their work-life in early ages¹⁸, and may have difficulty to health care access¹⁹, which leads to a more fragile health, making these individuals even more vulnerable.

Park et al.²⁰ have found that back pain is very common in the perimenopausal phase due to the decreased levels of estrogen and bone mineral density. Hoy et al.¹⁸ correlate back pain with the aging process and the high prevalence of chronic diseases as osteoarthritis. Women in this study perform both housework activities and work outside, where they can be exposed to physical overloads such as cleaning services and caregivers. According to Dennerstein et al.²¹, the lack of professional qualification, occupation, and lower educational levels are associated with the higher prevalence and severity of the perimenopausal symptoms.

The present study has some limitations. First, it was conducted in only one district of São Paulo, and generalize the results can be difficult. However, it shows evidence of the prevalence of chronic musculoskeletal pain in perimenopausal women in regions with similar sociodemographic characteristics. Another limitation is that no objective measures to assess pain were conducted. However, the study was carried out in a real situation of the public health system in Brazil, and it is in accordance with the most common assessing methods of Primary Care Units.

CONCLUSION

The results of this study show a high level of musculoskeletal pain in women in a low-income situation, with pain being reported from moderate to intense. Taking into account the magnitude of the impact that pain can have on a person's life, it seems necessary and urgent that Primary Health Care develops preventive and curative strategies for this specific population.

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Association between temporomandibular signs and symptoms and depression in undergraduate students: descriptive study

Associação entre sinais e sintomas de disfunção temporomandibular com depressão em universitários: estudo descritivo

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ABSTRACT

BACKGROUND AND OBJECTIVES: Temporomandibular joint dysfunction is a chronic condition that affects a large part of the college population, deserving greater importance in public health due to the negative consequences in students' performance and in the quality of life of these individuals. The objective of this study is to check the association and correlation of temporomandibular dysfunction symptoms and signs with depression in students from the School of Science and Technology of Maranhão.

METHODS: Epidemiological, descriptive and cross-sectional study with the quantitative approach with 199 undergraduate students. For data collection, we used Fonseca's Anamnestic Index and the Research Diagnostic Criteria for Temporomandibular Disorders, Axis II. Data were analyzed using Pearson's Chi-square test, Fisher's Exact test, and Spearman's Correlation, considering a statistical significance of 5%.

RESULTS: 37.7% students showed signs and symptoms of mild temporomandibular dysfunction, 19.6% moderate and 9% severe. Temporomandibular dysfunction was more frequent in female students (70.2%) between the ages of 19 to 24 years (70.2%). When assessing the level of depression symptoms, it was found that 25.1% students had moderate depression and 17.1% severe. There was no statistically significant association ($p < 0.001$) and weak positive correlation ($r = 0.38$; $p < 0.001$) between the presence of temporomandibular dysfunction signs and symptoms and depression.

CONCLUSION: The results of this study suggest that there is a relationship between temporomandibular dysfunction and depression in undergraduate students, with higher prevalence in women, however, more specific diagnostic methods are necessary to confirm this relationship and the need for treatment.

Keywords: Depression, Health Sciences Students, Illness severity score, Signs and symptoms, Temporomandibular joint syndrome.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A disfunção temporomandibular é uma condição crônica que afeta grande parte da população universitária, merecendo maior importância na saúde pública, devido as consequências negativas que pode proporcionar no rendimento acadêmico e na qualidade de vida desses indivíduos. Esta pesquisa teve como objetivo verificar a associação e correlação entre os sinais e sintomas de disfunção temporomandibular com depressão em universitários da Faculdade de Ciências e Tecnologia do Maranhão.

MÉTODOS: Estudo epidemiológico, descritivo e transversal de abordagem quantitativa com 199 estudantes universitários. Para a coleta de dados, foram aplicados o Índice Anamnóstico de Fonseca e o *Research Diagnostic Criteria for Temporomandibular Disorders* eixo II. Os dados foram analisados por meio dos testes Qui-quadrado de Pearson, Exato de Fisher e correlação de Spearman, considerando uma significância estatística de 5%.

RESULTADOS: 37,7% dos acadêmicos apresentavam sinais e sintomas de disfunção temporomandibular leve, 19,6% moderada e 9% grave. A disfunção temporomandibular foi mais frequente em acadêmicos do sexo feminino (70,2%) e na faixa etária dos 19 aos 24 anos (70,2%). Ao avaliar os graus de sintomas de depressão, verificou-se que 25,1% dos acadêmicos apresentavam depressão moderada e 17,1% grave. Houve associação estatisticamente significativa ($p < 0,001$) e correlação positiva fraca ($r = 0,38$; $p < 0,001$) entre a presença de sinais e sintomas de disfunção temporomandibular com depressão.

CONCLUSÃO: Os resultados desta pesquisa sugerem que existe uma relação entre disfunção temporomandibular e depressão em universitários, com maior prevalência em mulheres, entretanto necessita-se de métodos diagnósticos mais específicos para comprovar essa relação e necessidade de tratamento.

Descritores: Depressão, Estudantes de Ciências da Saúde, Índice de gravidade de doença, Sinais e sintomas, Síndrome da articulação temporomandibular.

INTRODUCTION

Temporomandibular dysfunction (TMD) is a term that encompasses a set of chronic painful conditions, and dysfunction in the orofacial region involving the muscles of mastication, the

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temporomandibular joints (TMJ) and related structures¹. TMJ presents a range of symptoms that include pain in the joint and surrounding area, muscular fatigue, mandibular joint crackling, mouth opening limitation, optic disorders, headaches and psychological disorders^{2,3}.

More than 50% of the Brazilian population has at least one or more signals of TMD, which does not necessarily mean that these people need treatment. It is estimated that only 3.6 to 7% of the individuals seeking care need some intervention⁴. The prevalence of TMD is around 40 and 60% in the general population⁵. Among college students, this prevalence varies from 15 to 92%, depending on the origin of the students and the diagnostic method used, representing a common health problem in this population group⁶⁻⁹.

DTM can occur in all age groups, but its incidence is higher between 20 and 45 years of age. Between the ages of 15 and 30, the most frequent causes are from muscle origin and after the age of 40, joint origin. They affect more women than men, in a ratio of five women to every man (5:1)¹⁰.

Many studies mention depression as one of the main factors associated with the presence of TMD, generating investigations and innumerable inquiries regarding the influence of psychological factors, mainly depression, for the onset and/or worsening of TMD. -

Depression, disability, and changes in behavior are critical aspects of the profile of patients with TMD. However, its importance is neglected for the classification of these factors as adjuvant factors for a detailed knowledge of this condition, or to guide the clinical treatment and the evaluation of physical and psycho-social results in a long run¹¹.

In the population where there is a clinical manifestation of TMD, there is a significant psycho-social involvement and decrease in the quality of life¹². The perpetuation of TMD is due to mechanical and muscle tension, metabolic problems, and especially behavioral, social and emotional variants that lead to the spasm of the masticatory muscles caused by excessive contraction or muscle fatigue due to parafunctional habits^{13,14}.

In this context, the objective of this study was to check the association and correlation of TMD symptoms and signs with depression in students from the School of Science and Technology of Maranhão - FACEMA.

METHODS

The study observed the ethical aspects that were involved in studies of this nature, supported by Resolution 466/2012 of the National Health Council, that establishes the standard for health studies. The subject's agreement to participate in the study was obtained by signing a Free and Informed Consent (FICT).

This is an epidemiologic, descriptive and cross-section study with a quantitative approach, carried through at FACEMA, in the city of Caxias, Maranhão. The size of the sample was calculated according to the formula: $n = N \cdot z^2 \cdot p \cdot (1-p) / e^2 \cdot (N-1) + z^2 \cdot p \cdot (1-p)$, where **n** is the calculated sample, **N** is the population, **z** the confidence level of 95% (1.96), **p** the frequency the event occurs and **e** the sampling error (0.05). The population of the study

was college students enrolled in the academic year of 2015 at FACEMA (2392). A prevalence of TMD in college students of 19%, according to the study of Khan, Khan and Hussain¹⁵, sampling error of 5% and confidence level of 95%, resulting in a final sample of approximately 215 students.

Data collection occurred between the months of February and August of 2015, during class intervals and performed by two physiotherapists and two students of the Physiotherapy course. The evaluators were previously trained by the Research Coordinator on the use of the Fonseca's Anamnestic Index (IAF) questionnaire and Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD), objectives of the research and data collection. The evaluators received a list of students registered at FACEMA and copies of the IAF questionnaire, the RDC/TMD, and the FICT.

The evaluators were trained together for two days, and after this, they were divided into pairs. The teacher gave permission to approach the students in the classroom to explain the objectives/background of the study, as well as to confirm the students' interest in participating in the study. The students who agreed to participate in the research were invited to go to a reserved room during the breaks to sign the FICT and answer the questionnaires.

The inclusion criteria adopted were: students enrolled in one of FACEMA courses, with age between 18 and 45 years, of both genders. Students who were undergoing orthodontic treatment, pregnant women and those who reported the use of anti-inflammatory drugs in the last six months were excluded.

To collect the data about students' TMD signs and symptoms we used the IAF since it is a Brazilian instrument, developed in Portuguese, that assesses the severity of TMD signs and symptoms. It has 10 questions with the possibility of three answers: "Yes," which is equivalent to 10 points; "sometimes," equivalent to 5 points; and "no," which score is zero. Questions check the presence of pain in the TMJ, neck, when chewing, headache, a difficulty of mandibular movements, joint noises, parafunctional habits (clenching and grinding the teeth), a perception of malocclusion and sense of emotional stress. According to the sum of points, the index can sort participants into categories of severity of symptoms, without TMD (0 to 15 points), mild TMD (20 to 40 points), moderate TMD (45 to 65 points) and severe TMD (70 to 100 points)¹⁶.

As for the emotional state, students were evaluated within the RDC/TMD axis II of the Symptom Checklist - Revised (SCL-90-R) - question 20 (In last the four weeks, how much you have been overwhelming or worried?), a scale that has 20 items related to the evaluation of the signs and symptoms of depression that includes the 13 items of the scale of depression SCL-90-R and 7 additional items designed to evaluate the vegetative symptoms of depression. The 7 additional items were included in the depression instrument axis II due to the validity of its content as part of the construction of the Diagnostic and Statistical Manual of Mental Disorders (DSM) of depression¹⁷. The scale of depression of the RDC/TMD provides five answer options with scores from zero to 4: "not at all", which score is zero, "a little" which is equivalent to 1 point, "moderately", which equals 2 points,

“much”, which is equivalent to 3 points and “extremely”, which is equivalent to 4 points. The sum of the points ranks individuals according to the degree of signs and symptoms of depression as normal (result<0.535), moderate depression (result>0.535 and <1.105) and severe depression (result >1.105)¹⁸.

This study was approved by the Committee on Ethics in Research of the University Hospital of the Federal University of Maranhão/HU/UFMA, under number CAAE: 42793015.5.0000.5086.

Statistical analysis

The data was organized using Microsoft Excel version 2016 for Window and for the statistical analysis it was used the Stata software[®] version 12.0 for Windows.

The univariate analysis was carried through the description of all the studied variables. The Shapiro Wilk test was used to check data normality. Numerical variables were represented by mean and standard deviation (mean±SD), or medians and quartiles, and the categorical by absolute and relative frequencies, respectively. The comparison between male and female in the presence of the signs and symptoms of TMD and depression was made using the Mann-Whitney test.

In the bivariate analysis of the data, we used Pearson’s Chi-square test and Fisher’s Exact test to check associations among inde-

pendent variables (gender, age group, and depression), with the dependent variable (TMD).

The correlation between variables was evaluated using Spearman’s rank correlation, considering weak correlation (0.26-0.49), moderate correlation (0.50-0.69), a strong correlation (0.70-0.89) and very strong correlation (0.9-1^{19,22}). The significance considered for all analysis in the study was 5%.

RESULTS

Of the 300 distributed questionnaires, 221 were answered (response rate: 79.6%). Of these, 22 were excluded because the items related to depression were not completed. Among the 199 students included, 75.9% (151) were female and 24.1% (48) male. The age of the participants varied from 19 to 42 years, with an average of 24.2±4.6 years and median of 23 years (Q1 21; Q3 26), in which 69.4% (138) of students were between 19 and 24 years, 20.1% (40) between 25 and 30 years, 7% (11) between 31 and 36 years and only 3.5% (7) between 37 and 42 years (Table 1).

The prevalence of TMD signs and symptoms in its different levels was 66.3%, totaling 132 individuals with the presence of the symptoms of the dysfunction. Among those who presented TMD, 37.7% had a mild degree, 19.6% moderate and 9% severe. TMD symptoms were more frequent in females, with a prevalence of 70.2% (106), as well as the mild (39.7%), moderate (21.2%) and severe (9.3%) degrees, but there was no statistically significant difference compared to males (p=0.078). In relation to age, the presence of TMD signs and symptoms was higher in students in the age group of 19 to 24 years (70.2%), as well as the mild degree (44.3%). The moderate degree was more frequent in students in the age group of 31 to 36 years (35.7%), being absent among students in the age group of 37 to 42 years, and the severe degree had a higher frequency among those above 31 years old (28.6%) (Table 2).

The prevalence of symptoms of depression among students was 42.2%, of which 57.8% has been classified as normal, 25.1% with moderate depression, and 17.1% severe. Considering gender, the signs and symptoms of depression had a higher prevalence in

Table 1. Distribution of students regarding age and gender. Caxias-MA, 2016

Variables	f	%
Gender		
Female	151	75.9
Male	48	24.1
Age group (years)		
19 to 24	138	69.4
25 to 30	40	20.1
31 to 36	14	7.0
37 to 42	7	3.5
Total	199	100.0

f = absolute frequency; % = relative frequency.

Table 2. Distribution of students according to the degree of the signs and symptoms of the temporomandibular dysfunction. Caxias-MA, 2016

Variables	Temporomandibular dysfunction										p value*
	Without TMD		Mild		Moderate		Severe		Total		
	f	%	f	%	f	%	f	%	f	%	
Gender											0.255
Female	45	29.8	60	39.7	32	21.2	14	9.3	151	100.0	
Male	22	45.8	15	31.3	7	14.6	4	8.3	48	100.0	
Age group (years)											0.461
19 to 24	41	29.7	61	44.2	26	18.8	10	7.2	138	100.0	
25 to 30	17	42.5	10	25.0	8	20.0	5	12.5	40	100.0	
31 to 36	5	35.7	2	14.3	5	35.7	2	14.3	14	100.0	
37 to 42	4	57.1	2	28.6	0	0.0	1	14.3	7	100.0	
Total group	67	33.7	75	37.7	39	19.6	18	9.0	199	100.0	

* Fisher’s Exact test; f = absolute frequency; % = relative frequency.

women (45%), as well as the moderate degree (25.8%) and the severe (19.2%). However, no significant statistical difference was observed in relation to males ($p=0.259$). The signs and symptoms of depression were more frequent among students in the age group of 31 to 36 years (57.2%), and its absence was higher among students in the age group of 37 to 42 years (71.4%). Both the moderate degree (28.6%) and the severe degree (28.6%) were more frequent in students with ages between 31 and 36 years (Table 3). The TMD signs and symptoms most reported by the college students were: headaches (60.8%), tinnitus (40.2%), crackle when

chewing (37.7%), malocclusion (34.2%) and noise in the TMJ (31.2%), as shown in table 4.

Of the 132 students who presented TMD symptoms, 72 had depression symptoms, representing a prevalence of 54.5% of students with signs and symptoms of both diseases. There was a statistically significant association between the presence of TMD signs and symptoms and depression ($p<0.001$) (Table 5). Also, there was a weak positive and statistically significant correlation between the variables ($r=0.38$; $p<0.001$) (Figure 1).

Table 3. Distribution of students according to the degree of the signs and symptoms of depression. Caxias-MA, 2016

Variables	Depression						Total	p value
	Normal		Moderate		Severe			
	f	%	f	%	f	%		
Gender								0.143*
Female	83	55.0	39	25.8	29	19.2	151	100.0
Male	32	66.7	11	22.9	5	10.4	48	100.0
Age group (years)								0.741**
19 to 24	75	54.3	39	28.3	24	17.4	138	100.0
25 to 30	25	62.5	9	22.5	6	15.0	40	100.0
31 to 36	6	42.8	4	28.6	4	28.6	14	100.0
37 to 42	5	71.4	1	14.3	1	14.3	7	100.0
Total group	115	57.8	50	25.1	34	17.1	199	100.0

*Pearson's Chi-square, **Fisher Exact; f = absolute frequency; % = relative frequency.

Table 4. Percentage of more frequent signs and symptoms of temporomandibular dysfunction among students. Caxias-MA, 2016

Signs and symptoms	No		Yes		Total	
	f	%	f	%	f	%
	Facial pain	146	73.4	53	26.6	199
Jaw locking	160	80.4	39	19.6	199	100.0
Crackle when chewing	124	62.3	75	37.7	199	100.0
Noise in the TMJ	137	68.8	62	31.2	199	100.0
Bruxism	165	82.9	34	17.1	199	100.0
Tinnitus	119	59.8	80	40.2	199	100.0
Malocclusion	131	65.8	68	34.2	199	100.0
Headache	78	39.2	121	60.8	199	100.0

TMJ = temporomandibular joint; f = absolute frequency; % = relative frequency.

Table 5. Association of signs and symptoms of temporomandibular dysfunction and depression among students. Caxias-MA, 2016

Depression	Temporomandibular dysfunction								Total	p value	
	Without TMD		Mild		Moderate		Severe				
	f	%	f	%	f	%	f	%			
Normal	53	79.1	42	56.0	13	33.3	7	38.9	115	57.8	<0.001*
Moderate	11	16.4	20	26.7	15	38.5	4	22.2	50	25.1	
Severe	3	4.5	13	17.3	11	28.2	7	38.9	34	17.1	
Total	67	33.7	75	37.7	39	19.6	18	9.0	199	100.0	

* Fisher's Exact; f = absolute frequency; % = relative frequency.

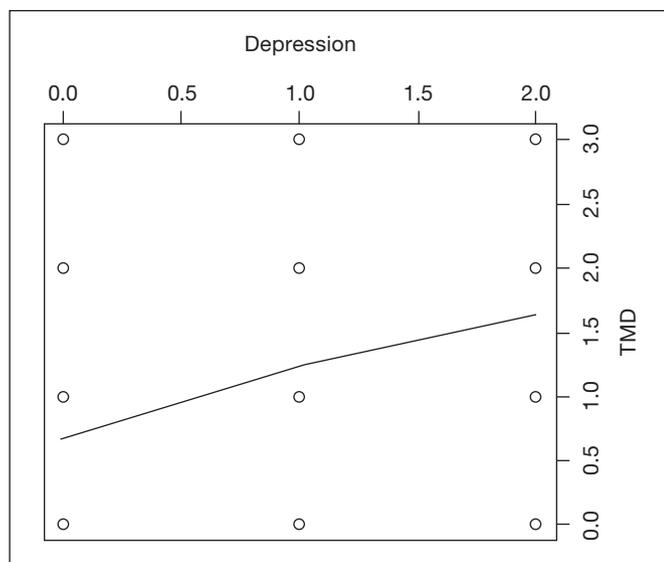


Figure 1. Correlation between signs and symptoms of temporomandibular dysfunction and depression

DISCUSSION

TMD represents a chronic picture for those with this disorder that affects the TMJ motor functions as well as the speech, breathing, swallowing, the quality of life and the social interaction of the individual. That is why it is necessary to have less elaborate evaluation processes, greater applicability covering the main clinical results, enabling its use both in epidemiological or populational studies, as well as a unique instrument to calibrate studies involving samples collections²⁰. In this study, we used the IAF and RDC/TMD questionnaires axis II since they are accurate, simple, reliable assessment tools with high reproducibility for the diagnosis of TMD.

Since it is a simple questionnaire, IAF favors its use in epidemiological and populational studies, presenting high accuracy since it has been previously tested in patients with TMD and demonstrated a correlation of 95% with the Helkimo clinical index¹⁴. We decided to use this index in this study because it is a tool of quick and easy application, and because the subjects were not looking for TMD treatment; therefore, the original intention was just to track the signs and symptoms of this disorder in college students. In addition, several Brazilian and international studies have been using the IAF to classify patients as to TMD signs and symptoms^{3,4,7-9,14,15,20-27}.

We noticed that most of the students participating in this study were female, showing that currently, the number of women attending universities is bigger than men. This is due to the increasing role women are playing in society and the labor market, creating a greater demand for their qualification which can be obtained through higher education.

According to the results, we noticed that the number of students with TMD signs and symptoms is substantial (66.3%), consistent with the results found in the studies of Goyatá et al.⁴, that present a prevalence of TMD signs and symptoms in 63.9% of the evaluated students. Bezerra et al.²¹ found a prevalence

of 62.5%, Barbosa and Swerts²², a prevalence of 66% of TMD signs and symptoms in Dentistry students, and Dantas²³, a prevalence of 64.4%. Lower results of TMD signs and symptoms were found in several studies conducted in other countries, with prevalence varying from 15 to 57.7%^{6,9,14,15,24-26}. Other authors found a higher prevalence among the students evaluated in their respective studies, varying from 74.9 to 92.3%^{7,8,10,12,27,28}.

These differences in relation to the present study can be attributed to the use of different TMD diagnostic methods, gender distribution and differences in the sample, where the origin and cultural, economic and food habits are considered. Some authors have evaluated students of Eastern and European origin, and others evaluated only male students since it is scientifically proven that the prevalence of TMD is higher in women.

College students are potential candidates for the onset of TMJ alterations, leading to disorders that affect this joint, since during their studying period they develop parafunctional habits, such as to support the jaw on the hand, bruxism, clenching, chewing gum, biting the lips, onychophagia and to biting objects^{20,22,28,29}, due to discharge of the nervous tensions on the masticatory muscles and, consequently muscle hyperactivity that in turn can be triggered by emotional alterations such as depression and stress^{11,14}, requiring more elaborate and specific investigation in order to scientifically determine the influence that depression exerts in the onset and/or worsening of TMD. Due to this overload on the masticatory muscles triggered by the adoption of harmful parafunctional habits, this group is more prone to have TMD of muscular origin than articular origin.

Parafunctional habits trigger isometric muscle contraction, inhibition of normal blood flow to muscle tissue, increase of carbon dioxide and metabolic waste in muscle tissue, culminating in fatigue, spasms, and pain. As a result, the parafunctional habits are more likely to cause changes in the muscular system and the TMJ, since the structures of the masticatory system stand a certain amount of force generated by the hyperactivity, and, after this level, tissue collapse may occur²⁰.

In relation to the degrees of severity, mild TMD was the most frequent (37.7%), followed by moderate (19.6%) and severe (9%), which corroborates previous studies carried out with university students that found a higher frequency of the mild degree of TMD signs and symptoms^{4,9,10,14,21,24-26,28}. In this study, although it was observed a higher prevalence of TMD signs and symptoms among university students between ages of 21 to 24 years, the degree of impairment that can be a possible indication for treatment (moderate and severe degrees), were more frequent among students over 31 years old, proving that TMD worsens with age, which has been already described in the literature^{10,28}.

Corroborating other studies^{12,14,15,20-22,24,26,28}, it was observed that women are more affected by the TMD symptoms than men, with a prevalence of 70.2% showing the symptoms of the dysfunction versus 55.2% of men, however, no statistically significant difference between genders was observed

($p=0,078$). Other studies have found a higher prevalence of TMD in men^{6,9}.

According to Martins et al.³⁰ women tend to have retropositioned mandibular condyles when compared with men, which probably predisposes them to anterior disc displacements. For Medeiros, Batista and Forte²⁸, this higher prevalence in females must be because women look for treatment more frequently, meaning that they are more careful and attentive to health than men. Minghelli, Kiselova and Pereira²⁴ claim that women are more susceptible to TMD due to the influence of physiological characteristics, hormonal variations and the structures of the connective tissue and muscle, and since a greater laxity of these tissues is related to estrogen levels, it explains the fact that these tissues have less capacity to support functional pressure, leading to TMD. Wahid et al.⁸ argue that women have more TMD due to greater mental stress.

In the distribution of the TMD degree in relation to gender, it was perceived that both in females and males, the mild degree was more frequent than the other degrees, with a prevalence of 39.7 and 31.3% respectively, being these results in accordance with other studies^{18,24,26,28}. Bezerra et al.²¹, Barbosa and Swerts²² and Al Moaleem et al.⁹ have also found a higher prevalence of mild TMD symptoms in both genders. However, unlike the results found in this study, and in most studies available in the literature, this prevalence was higher in men compared to women (51.7, 46.3 and 40.2%, respectively). Because it is a young population, a higher incidence of TMD is accepted since the symptoms may worsen with age, and the worsening of TMD etiological factors, such as parafunctional habits and emotional stress.

The prevalence of signs and symptoms of depression among the evaluated college students, in RDC/TMD axis II, was significant (42.2%), what it draws the attention since it is a relatively young population supposedly with good general health. Other studies have found an equivalent prevalence of symptoms of depression^{18,31,32} in 41.1, 43.9 and 41% of college students, respectively. However, most of the studies^{13,14,24,33-36} found a prevalence different from this study, with values of 50, 30.5, 18.3, 34.6, 24.2, 54.2 and 51.4, respectively.

The use of the RDC/TMD, axis II, is considered a trustworthy and valid indicator to track the symptoms of depression, somatization and psychosocial dysfunction related to pain. Even not providing a psychiatric diagnosis, it gives initial scientific support to validate the clinical decision-making based on evidence, referring these patients to a psychological evaluation and interventions in the psychosocial barriers to minimize TMD^{17,37}. Also, axis II has been used in several clinical and epidemiological studies to describe high levels of depression and somatization, as well as the high prevalence of pain-related disability in social activities in patients with TMD^{12,18,34,35,37}. However, some authors warn that the use of axis II should be used with caution because it presents high sensitivity (87%), but lower specificity (53%) in identifying patients with depression (comparing low scores with moderate/severe depression). This can generate false positive diagnoses, where serious levels of somatization may mistake the interpretation of the clinical

examination^{17,38}. In order to solve these problems, a new RDC/TMD is being elaborated to evaluate the psychological factors and their relationship with the TMD diagnosis³⁸.

When distributed by the degree of depression symptoms, we noticed that more than the half (57.9%) of the college students presented normal conditions. When analyzing the presence of depression symptom, it was observed that most of the affected students presented a moderate degree (25.1%), and 17.1% presented severe signs and symptoms. In previous studies, it was also proved that the degree of depression most present among the evaluated students was the moderate degree, and the majority had normal psychological conditions, for the presence of significant sign and symptoms of depression^{13,31,33,36}. However, it should be noted that in this study, the presence of severe symptoms was more significant compared to the studies mentioned.

When comparing the presence of symptoms of depression in both genders, the prevalence in women is higher (45%), while in men it is 33.3%, however, despite the numerical difference, there was no significant statistical difference between genders ($p=0.278$). The results obtained in this study, as well as in others^{14,18,24,31,36}, showed that women are more susceptible to depression, showing the need to investigate the causes for this higher prevalence of symptoms in women.

When classifying the degree of symptoms of depression by gender, it was observed that both women and men had a higher prevalence of the moderate degree (25.8 and 22.9%, respectively), which was also observed in the studies of Toledo, Capote and Campos¹⁸ (17.8% for women and 16.1% for men) and Iqbal, Gupta and Venkatarao³⁶ (22.7% for women and 11% for men).

The higher prevalence of symptoms of depression in women can be explained by the fact that women report depressive symptoms more frequently than men and present a higher index of psychosomatic diseases^{24,36}. Justo and Calil³⁹ explain that changes in levels of estrogen in women affect mood and cognition, working not only in the hypothalamus but also in the hippocampus and cerebellum, leaving women more vulnerable to depression. Other factors such as sexual abuse in childhood, double workday, conflicts in social and family relationships, lower educational level and motherhood may contribute to the high prevalence of depression in women.

We noticed that the symptom of depression was more present in college students with ages between 31 and 36 years (57.2%), in both the moderate and severe degrees. This can be explained by the fact that this is the most productive phase of the individual, period when the person is more exposed to stressing factors due to the demand of the professional routine. However, this affirmation requires more specific studies to provide a scientifically proven conclusion. For Jadoon et al.³¹, depression can lead to negative results, including school truancy, reduced capacity to work efficiently, deterioration of relationships, exhaustion, increased suicidal tendency and existing problems, which is part of the health care.

Healthcare professionals tend to present higher indexes of mental problems, especially depression, which usually appears in graduation years and impacts the academic performance as

well as the increase in the risk of other diseases, as TMD²¹. This can probably be explained by the high level of mental pressure and demand in obtaining high academic results and, consequently, fear to fail in their professional life, since they are daily dealing with human lives.

The signs and symptoms of TMD most reported are headaches (60.8%), tinnitus (40.2%), crackle when chewing (37.7%), malocclusion (34.2%) and noise in the TMJ (31.2%). The least reported was the presence of pain or fatigue when waking up, with a prevalence of 14.1%. Headache was also the most reported symptom in some studies^{15,24}, with a prevalence of 20 and 31.6%, respectively. In other studies^{21,29,30}, the pain in the back of the head or neck was more prevalent, with 47.3, 93 and 38%, respectively. Goyatá et al.⁴ and Toledo, Capote and Campos¹⁸ identified bruxism as the sign of TMD more present among the interviewed (41.2 and 23.2%, respectively), yet Habib et al.²⁵ found a higher frequency of malocclusion (23.2%). The possible relationship between TMD and headache can be attributed to the fact that headaches are related to muscle activity. Therefore, activities involving the head and the neck probably play an important role in the etiology of this condition²⁴.

In this study, we found a significant statistical association ($p < 0.001$) and positive correlation ($r = 0.38$; $p < 0.001$) between the presence of TMD signs and symptoms and the presence of depression symptoms. More than half of the students (54.5%) showed symptoms of both conditions, which leads to suggest that the psychological factors, especially depression, influence the clinical conditions of TMD, as described in the literature. These results are supported by the studies of Toledo, Capote, and Campos¹⁸, who found that 53.3% of the interviewed college students showed signs and symptoms of TMD and depression and Nery³², who found a prevalence of signs and symptoms of depression in 52% of individuals with signs and symptoms of TMD. Minghelli, Morgado and Caro¹⁴ and Minghelli, Kiselova and Pereira²⁴ found a lower prevalence of signs and symptoms of depression in students who also had TMD symptoms, 44 and 30.7%, respectively. Another study found a higher prevalence of signs and symptoms of both diseases (64%)³⁵.

Orhbach et al.¹⁷ report that psychiatric disorders as depression and generalized anxiety, as well as psychological disorders, are common in patients who look for treatment of TMD chronic pain and they can interfere with the response to the treatment. In many patients, there is a cycle where the TMD generates emotional disorders that increase the symptoms of the TMD, and the opposite is also true, that is, the emotional disorder generates TMD and this, in turn, aggravates the emotional distress. However, it is still unclear whether the emotional disorders, in chronic conditions, are the trigger of TMD, or if it is the worsening of TMD that leads to the onset of emotional disorders, especially depression⁴⁰.

The importance of the results of this study reassures that for the TMD treatment to be effective it is necessary a psychological follow-up of these patients with emotional alterations because only by treating the root cause it will be possible to have satisfactory results in the treatment of functional changes caused by TMD.

CONCLUSION

The results of this study showed a high prevalence of TMD signs and symptoms in college students, similar to other studies in the literature. Among them, women and those in the younger age group showed a higher prevalence of symptoms of this dysfunction.

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Prevalence of musculoskeletal pain in primary care dentists

Prevalência de dor musculoesquelética em cirurgiões-dentistas da atenção básica

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ABSTRACT

BACKGROUND AND OBJECTIVES: Dentistry is among the occupational categories that most inflicts its practitioners to a series of risk factors to develop musculoskeletal disorders, especially the maintenance of static postures, repetitive activities, long work days, poorly designed work environment, stress and handling of chemical and biological materials. The objective of this study was to analyze the prevalence of work-related musculoskeletal pain in primary care dentists.

METHODS: The sample consisted of 167 primary care dentists, who answered questionnaires relating to musculoskeletal pain, social-demographic data, lifestyle, occupational characteristics, fatigue and ability to work.

RESULTS: The prevalence of musculoskeletal pain was high for upper limbs (38.3%), lower limbs (34.7%) and on the back (27.5%). There was a statistical association in the three body segments, with family income, associated morbidities, daily and weekly working time, the perception of fatigue, and ability to work.

CONCLUSION: The studied sample showed a high prevalence of musculoskeletal pain, which serves as a warning flag to the adoption of public policies to improve the working conditions of the dentists surveyed.

Keywords: Dentists, Musculoskeletal pain, Occupational health, Working conditions.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O exercício da odontologia enquadra-se entre as categorias profissionais que mais impõe a seus praticantes uma série de fatores de risco ao desenvolvimento de distúrbios musculoesqueléticos, entre eles destacam-se, principalmente, a manutenção de posturas estáticas, as atividades repetitivas, as longas jornadas de trabalho, o ambiente de trabalho

mal projetado, o estresse e o manuseio de materiais químicos e biológicos. O objetivo deste estudo foi analisar a prevalência de dor musculoesqueléticas em cirurgiões-dentistas da atenção básica, relacionada ao trabalho.

MÉTODOS: A amostra foi constituída por 167 cirurgiões-dentistas vinculados à atenção básica, sendo aplicados questionários referentes a dor musculoesquelética, dados sociodemográficos, estilo de vida, características ocupacionais, fadiga e capacidade para o trabalho.

RESULTADOS: A prevalência de dor musculoesquelética foi elevada nos membros superiores (38,3%), nos membros inferiores (34,7%) e no dorso (27,5%) e, se associou estatisticamente nos três segmentos corporais com renda familiar, morbidades associadas, jornada diária e semanal de trabalho, percepção de fadiga e capacidade para o trabalho.

CONCLUSÃO: Na amostra estudada observou-se elevada prevalência de dor musculoesquelética, o que serve de alerta para adoção de políticas públicas para a melhoria das condições de trabalho dos cirurgiões-dentistas pesquisados.

Descritores: Condições de trabalho, Dor musculoesquelética, Odontólogos, Saúde do trabalhador.

INTRODUCTION

Among the healthcare professions exposed to work-related musculoskeletal disorders (WRMD), Dentistry fits the category most associated with these painful symptoms, especially in the cervical and lumbar regions, and the upper limbs (UL)^{1,2}. This is mainly due to static, inflexible postures, repetitive activities, long working hours, poorly designed work place, chemical and biological materials handling and fatigue³⁻⁵.

The prevalence of musculoskeletal disorders (MSD) in dentists is high¹⁻⁶, causing high rates of absenteeism, temporary or permanent disability, reduction in the production capacity, with a negative impact on the quality of life (QoL) and in the services provided to the population⁵⁻⁹.

This set of occupational diseases is not only present in the Brazilian population; they are also reported in countries such as England, Scandinavia, Japan, United States and Australia, among others. The evolution of WRMD epidemics in these countries varies greatly, and in some of them, it is still a significant problem, just like in Brazil¹⁰.

The health and social costs resulting from this problem are on the rise in recent years, reaching a considerable part of these professionals, representing a significant impact on their health and QoL^{6,7,10}. Therefore, the analysis and appropriate sizing of the problem, as well as the investigation of the associated factors, are relevant to create measures which may

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speak on this issue, primarily in dentists working in primary care who deal with concerns and expectations of patients to maintain their oral health.

Thus, the overall objective of this study was to analyze the prevalence of musculoskeletal disorders in dental surgeons (DS) of primary care and their relationship with occupational factors.

METHODS

This is an epidemiological, cross-sectional study. The dentists who participated in this study worked in the program Family Health Strategy (FHS), in the city of Teresina, Piauí, from January to March 2014.

To be included in the study the DS had to be in the professional practice in the period of data collection and accept to participate in the survey. Dental surgeons that weren't performing direct assistance activities, working in an administrative job, and/or in leave of absence for any reason were excluded from the study.

Considering a total of 220 DS in FHS working in the period surveyed, the sample calculation was estimated by a prevalence of 50% for the variables related to the outcome, an error margin of 5% for a 95% confidence interval, totaling an ideal sample of 140 dental surgeons for the development of the study. The sample was increased by 20%, estimating a 10% non-response rate, and more 10% to control confusing factors, resulting in a final sample of 167 dental surgeons.

The dependent variable, the frequency of musculoskeletal pain (MSP), was obtained from the investigation of body structures (upper and lower limbs and back), by self-report of pain in the leg, arms, and shoulders. Pain frequency was measured by a Likert-type scale: zero=never, 1=rarely, 2=not frequent, 3=frequent and 4=very frequent. MSP complaint was considered when the DS reported frequent or very frequent pain¹¹.

The independent variables investigated were:

- Sociodemographics: gender, age group, marital status, and monthly household income.
- Occupational: workplace; tenure; daily working time. Concerning to the work organization, it was applied the approved and adapted de Vasconcelos et al.¹² questionnaire concerning the organizational structure and physical work environment with answers ranging from: yes (always or very frequent), sometimes (not so frequent) or no (little frequent or never);
- Lifestyle: practice of physical activity, alcohol consumption, smoking and nutritional state according to body mass index;
- Self-reported health aspects: satisfaction with sleep, stress, health, besides the amount of morbidity reported with medical diagnosis;
- Fatigue: it was used the fatigue perception questionnaire¹³, consisting of 30 multiple choice questions with scores ranging from 30 to 150 points, corresponding to less and high fatigue respectively. Cronbach's alpha coefficient was 0.93;
- Work capacity was evaluated by the Work Capacity Index (WCI)¹⁴, being the inadequate capacity to work for individu-

als aged between 18 and 34 years (less than 40 points) and for 35 years and above (less than 37 points). The internal reliability coefficient (Cronbach's alpha) of the items was 0.79. The study was approved by the Ethics and Research Committee of the Federal University of Piauí (UFPI) under number CAAE 22135013.8.0000.5214. All respondents signed the Free and Informed Consent Term (FICT) according to Resolution Nr. 466/12 of the National Health Council and the Declaration of Helsinki of the World Medical Association.

Statistical analysis

In the univariate analysis, we applied the descriptive statistical procedures. In the bivariate analysis, for the association between MSP and sociodemographic variables, lifestyle, occupational, fatigue and capacity to work we used the Pearson Chi-square test².

For the multivariate analysis was used the Poisson regression with a robust variance of standard errors¹⁵ with all covariates of interest that presented $p < 0.20$ in the bivariate analysis. The gross and adjusted prevalence ratios were calculated with their respective confidence intervals of 95% (CI95%), and significance obtained by the Wald test for heterogeneity. In all the analyses, we used a significance level of 5%, using the SPSS software, version 18.0 for Windows (SPSS Inc., Chicago, IL 60606, USA).

RESULTS

Concerning the respondents, it was observed a predominance of females (56.9%), with ages between 23 and 40 years (57.5%), monthly income greater than or equal to 10 minimum wages (47.3%), and the majority married/domestic partnership (60.0%). Most of them practiced physical activity (70.1%), did not smoke (97.6%), did not drink (71.3%) with adequate nutritional status (70.1%) (Table 1).

As for professional insertion, the largest proportion was the public and private sectors (62.9%). As for tenure, it was observed that the majority (68.3%) has been working for 10 years, with daily work of 8 to 10 hours (62.9%) in total (Table 1).

Table 1. Distribution of professionals according to sociodemographic variables, lifestyle, occupational, health aspects, fatigue perception and capacity to work

Sociodemographic variables	n	%	Average	SD
Gender				
Male	72	43.1		
Female	95	56.9		
Age group (years)			40.3	10.7
23-40	96	57.5		
≥40	71	42.5		
Marital status				
Not married	66	39.5		
Married/domestic partnership	101	60.5		

Continue...

Table 1. Distribution of professionals according to sociodemographic variables, lifestyle, occupational, health aspects, fatigue perception and capacity to work – continuation

Sociodemographic variables	n	%	Average	SD
Family income (MW)				
4-5	11	6.6		
5-10	77	46.1		
≥10	79	47.3		
Lifestyle				
Physical activity				
Yes	117	70.1		
No	50	29.9		
Smoking				
Yes	04	2.4		
No	163	97.6		
Alcohol consumption				
Yes	48	28.7		
No	119	71.3		
Nutritional status (BMI kg/m ²)				
Eutrophic	117	70.1	24.0	3.0
Overweight	50	29.9		
Occupational				
Workplace				
Public service only (Primary Care Service)	62	37.1		
Public service (Primary Care) and private	105	62.9		
Tenure (Primary Care) (years)				
Up to 10	114	68.3	18.9	9.0
≥10	53	31.7		
Daily work (hours)				
4-8	45	26.9	7.8	2.4
8-10	105	62.9		
≥10	17	10.2		
Health aspects*				
Satisfaction with sleep				
Very dissatisfied	11	6.6		
Dissatisfied	40	24.0		
Neither dissatisfied / nor satisfied	42	25.1		
Satisfied	67	40.1		
Very satisfied	07	4.2		
Self-reported stress				
Always	04	2.4		
Often	25	15.0		
Sometimes	98	58.6		
Rarely	00	0.0		
Never	40	24.0		
Health state				
Very bad	00	0.0		
Bad	00	0.0		
Regular	30	18.0		
Good	113	67.6		
Very good	24	14.4		

Continue...

Table 1. Distribution of professionals according to sociodemographic variables, lifestyle, occupational, health aspects, fatigue perception and capacity to work – continuation

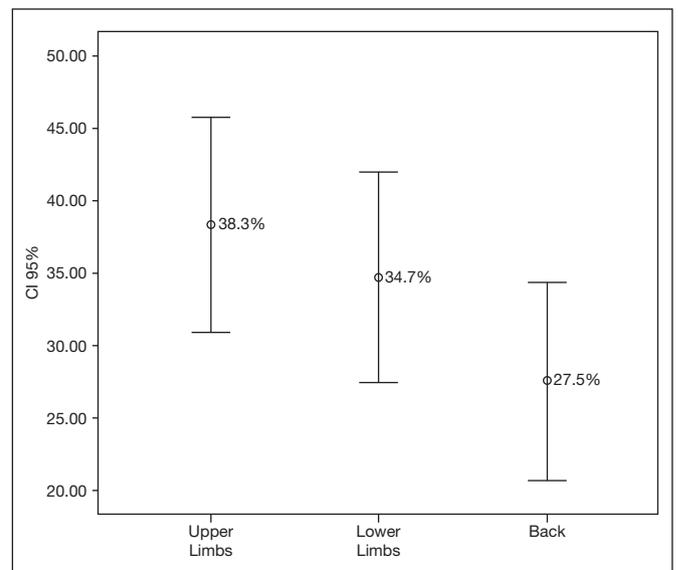
Sociodemographic variables	n	%	Average	SD
Fatigue perception**				
Low	123	73.7		
High	44	26.3		
Capacity to work***				
Adequate	89	53.3		
Inadequate	78	46.7		

MW = minimum wage (R\$: 720), BMI = body mass index. *Adapted¹² **Fatigue perception questionnaire¹³; ***Capacity to work index¹⁴.

Table 1 also shows the data regarding the relative health distribution and perception of muscle fatigue on DS, with predominance of answers concerning be satisfied with the sleep (40.1%), reporting stress sometimes (58.6%), in good health (67.6%); considerable part had high perception of fatigue (26.2%), and inadequate capacity to work (46.7%).

Table 2 shows the data about the characteristics of the workplace and its organization.

The prevalence of musculoskeletal pain was 38.3% (95% CI: 30.9-45.8) for UL, 34.7% (CI95%: 27.4 -42.0) for LL, and 27.5 (CI95%: 20.7 -34.4) for the back (Figure 1). The global prevalence for MSP related to any of the three body segments was 68.9%: 45.5% referred pain only in one of the three body segments, 15.0% in two segments, 8.4% in the three body segments.

**Figure 1.** Prevalence of musculoskeletal pain in dental surgeons, according to body location

A higher prevalence of MSP in the UL was found in the variables of individuals in the ≥40 years age group with (PR=1.04), with household income between 5 and 10 MW (PR=1.16) and, in the individuals who had associated comorbidities (PR=1.25) (Table 3).

Table 2. Distribution of professionals according to characteristics related to the work physical environment and organization

Variables*	Always or very frequent		Little frequent		Very little frequent or never	
	n	%	n	%	n	%
Proper cleaning	74	44.3	52	31.1	41	24.6
Satisfactory lighting	86	51.5	51	30.5	30	18.0
Proper cooling system	57	34.1	61	36.6	49	29.3
Humid environment	18	10.8	52	31.1	97	58.1
A lot of noise in the work environment	58	34.7	54	32.3	55	33.0
Work environment with unpleasant odor	23	13.8	60	35.9	84	50.3
Organized environment	71	42.5	63	37.7	33	19.8
Materials required for carrying out the procedures are sufficient	26	15.6	76	45.5	65	38.9
Equipment used are appropriate to the procedures	46	27.6	53	31.7	68	40.7
Excessive work pace	21	12.6	84	50.3	62	37.1
Sufficient number of oral health assistants	140	83.8	14	8.4	13	7.8
Repetitive and monotonous tasks	68	40.8	52	31.1	47	28.1
Difficult communication between the leadership and the team	33	19.8	62	37.1	72	43.1
Leadership supports professional growth	41	24.6	52	31.1	74	44.3
Autonomy to make decisions	72	43.1	60	35.9	35	21.0

* Adapted¹².**Table 3.** Prevalence of musculoskeletal pain according to the sociodemographic variables and lifestyle

	Upper limbs		Lower limbs		Back	
	%	PR (CI95%)	%	PR (CI95%)	%	PR (CI95%)
Gender						
Male	37.9	1	34.7	1	27.8	1
Female	38.9	1.01 (0.87 -1.17)	34.9	1.01 (0.88 -1.17)	27.4	0.96 (0.84 -1.10)
Age group (years)						
23 † 40	37.5	1	23.9	1	22.9	1
≥40	39.4	1.04 (0.75 -1.28)	42.7	1.27 (1.09-1.49) **	33.8	1.04 (0.88 -1.24)
Marital status						
Not married	37.9	1	27.3	1	21.2	1
Married/domestic partnership	38.6	1.03 (0.87 -1.21)	39.6	1.04 (0.89 -1.22)	31.7	1.09 (0.96 -1.26)
Family Income (MW)						
4 † 5	27.1	1	18.2	1	23.4	1
5 † 10	36.4	1.16 (1.04 -1.34) **	27.3	1.09 (1.02-1.29) **	29.1	1.01 (0.88 -1.17)
<10	49.4	1.36 (1.22 -1.54) **	44.3	1.24 (1.18 -1.46) **	45.5	1.27 (1.09-1.48) **
Physical activity						
Yes	37.6	1	33.3	1	24.8	1
No	40.0	1.03 (0.88 -1.20)	38.0	1.02 (0.88 -1.18)	34.0	1.09 (0.94 -1.25)
Smoking						
Yes	38.7	1	50.0	1.38 (1.15 -1.66) **	25.0	1
No	25.0	1.05 (0.70 -1.56)	34.4	1	27.6	1.08 (0.94 -1.25)
Alcohol consumption						
Yes	45.8	1	41.7	1.13 (0.96 -1.32)	27.1	1
No	35.3	0.92 (0.77 -1.09)	31.9	1	27.7	1.01 (0.76 -1.35)
Nutritional status						
Eutrophic	38.0	1	34.2	1	26.5	1
Overweight	38.5	0.93 (0.79 -1.09)	36.0	1.02 (0.87 -1.19)	30.0	1.03 (0.89 -1.20)
Associated morbidities						
None	31.0	1	8.8	1	19.5	1
1-4 diseases	32.4	1.02 (0.88 -1.17)	34.5	1.33 (1.16-1.54) ***	23.5	1.09 (0.94 -1.26)
5 or more	56.5	1.25 (1.01-1.55) **	54.3	1.67 (1.40-1.98) ***	45.7	1.21 (1.01-1.39) **

SM = minimum wage (R\$: 720,00), PR = prevalence ratio, CI95%: Confidence interval of 95%; *p<0.05; **p<0.01; ***p<0.001.

It was also found a high prevalence of MSP in lower limbs (LL), especially in individuals in the ≥ 40 years age group, with (PR=1.27), smoking (PR=1.38), and those with 1 to 4 and more than 5 associated comorbidities (PR=1.33 and PR=1.67, respectively) (Table 3).

In the back region, it was found significant indexes of MSP in the household income variable >10 MW (PR=1.27) and 5 or more associated comorbidities (PR=1.21). The other analyzed variables showed no significant variation in this study ($p<0.05$) (Table 3).

Higher prevalence of MSP in UL was found in individuals with tenure equal/greater than 10 years (PR=1.22), with a workday of more than 10 hours (PR=1.55), individuals who carried out monotonous and repetitive tasks (PR=1.19), with high fatigue perception (PR=1.08), and with inadequate capacity to work (PR=1.24) (Table 4).

As for the prevalence in LL, high levels of MSP were found in dental surgeons who had a day work of more than 10 hours (PR=1.59), high fatigue perception (PR=1.18) and inadequate capacity to work (PR=1.17) (Table 4).

In regards to the work characteristics, the prevalence of MSP was significantly in the back, with tenure in the primary

care equal or bigger than the 10 years (PR=1.27), workday >10 h (PR=1.37), excessive work pace (PR=1.21), monotonous and repetitive tasks (PR=1.05), high fatigue perception (PR=1.21) and inadequate capacity to work (PR=1.32) (Table 4).

DISCUSSION

Over time, the labor activity of dental surgeons became the subject of various surveys and discussions. Regis Filho, Michels and Sell¹⁶ mentioned in a study that dental professionals are part of the working class most affected by MSP, and it is ranked first with regard to temporary or permanent work disability. Grace, Araújo e Silva¹⁷ point out that preventive measures should be taken, because the work environment of these professionals exposes them to ergonomic risk factors that may lead to the development of WRMD.

The results of the present study are similar to the study of Santos and Vogt¹⁸, who noticed in their study that 58.0% of the interviewees complained about pain, with prevalence in the neck region (20.0%), followed by the shoulder (17.0%) and thoracic and/or lumbar spine (21.0%).

Table 4. Prevalence of musculoskeletal pain according to work-related variables, fatigue perception and capacity to work

	Upper limbs		Lower limbs		Back	
	%	PR (CI95%)	%	PR (CI95%)	%	PR (CI95%)
Workplace						
Public service only (Primary Care Service)	36,2	1	25,8	1	25,7	1
Public service (Primary Care) and private	41,9	1.12 (0.96 -1.32)	40,0	1.08 (0.94 -1.26)	30,6	1.12 (0.96 -1.30)
Tenure (Primary Care) (years)						
<10	32,1	1	34,0	1	20,2	1
≥ 10	41,2	1.22 (1.04 -1.47) **	35,0	1.09 (0.92 -1.30)	43,4	1.27 (1.05 -1.45) ***
Daily work (hours)						
4-8	31,1	1	26,7	1	26,7	1
8-10	39,0	1.04 (0.93 -1.32)	29,4	1.05 (0.97 -1.15)	25,7	0.98 (0.86 -1.46)
<10	52,9	1.55 (1.12 -1.71) ***	39,0	1.59 (1.35-1.86) ***	35,3	1.37 (1.10 -1.76) **
Furniture is adequate						
Yes	32,4	1	34,6	1	18,9	1
No	40,0	1.10 (0.95 -1.29)	35,1	0.99 (0.85 -1.15)	30,0	1.10 (0.96 -1.27)
Too much noise						
Yes	39,7	1.02 (0.87 -1.18)	43,1	1.08 (0.92 -1.27)	32,8	1.02 (0.89 -1.16)
No	37,6	1	30,0	1	24,8	1
Excessive work pace						
Yes	57,1	1.19 (0.95 -1.50)	47,6	1.07 (0.88 -1.30)	47,6	1.21 (1.01-1.46) *
No	35,6	1	32,9	1	24,7	1
Repetitive and monotonous tasks						
Yes	52,9	1.19 (1.02-1.39) *	44,1	1.07 (0.92 -1.26)	30,9	1.05 (1.01-1.38) *
No	28,3	1	28,3	1	25,3	1
Fatigue						
Low	35,8	1	26,8	1	18,7	1
High	45,5	1.08 (1.01-1.29) *	56,8	1.18 (1.07 -1.43) **	52,3	1.32 (1.10 -1.58) **
Capacity to work						
Adequate	28,1	1	22,5	1	18,0	1
Inadequate	50,0	1.24 (1.04 -1.47) *	48,7	1.17 (1.03-1.39) **	38,5	1.21 (1.01-1.46) *

PR = prevalence ratio, CI95% = confidence interval of 95%, * $p<0.05$; ** $p<0.01$, *** $p<0.001$.

Rambabu and Suneetha¹⁹, in a comparative study with 100 doctors practicing modern or alternative medicine, and 200 dental surgeons, found that MSP was more prevalent among dentists (61.0%). Similarly, in the study of Gupta et al.⁸ conducted in northern India revealed that of the 2,879 interviewed dentists, 80.0% had musculoskeletal disorders. They also found that of the dentists who used complementary medicine, 70.0% showed a reduction in pain symptoms compared to those who did not use.

In a study of Nokhostin and Zafarmand²⁰ conducted with 600 dental surgeons, they found that 67.5% had physical problems, especially in the neck (51.9%), wrist (93.0%), waist (11.1%) and shoulder (7.4%).

Therefore, pain becomes one of the main factors that may lead to WRMD in dental surgeons, varying in intensity from one individual to another. Gabriel et al.² showed that one of the factors that could lead to the onset of pain in dentists is the incorrect posture during labor activity, such as the rotation of the head (73.1%), rotation of the spine (41.8%) and leg angle less than 90° (91.6%).

Khan and Chew²¹ found in their comprehensive study with 575 Dentistry students, that about (95.0%) of the interviewed complained about pain in more than one body segment, with a higher prevalence of women self-reporting MSP. Another important result was that most of the respondents (92.0%) did not give importance to the posture in the performance of their profession. This is something worth to highlight because they are future dentistry professionals, who are not yet inserted into the labor market.

Sanchez et al.²² pointed out that the prevalence of pain in the lower back and neck could be associated with the fact that the lumbar region provides greater mobility to the professional when carrying out their labor activities. As they seek for a better line of sight, they put overloads and tensions in the muscles which lead to the pain in the lumbar region. Pargali and Jowkar²³ concluded in their study that the labor activities of these professionals are not a factor triggering the onset of pain in the cervical and lumbar region, but they accelerate the onset of pain and aggravation of symptoms.

Another important result observed in this study was that a considerable number of dentists had a high perception of muscle fatigue (26.2%). Corroborating with the present study, Scopel and Oliveira²⁴ in their study with dental surgeons working in private clinics of Porto Alegre, found that 34 of the 39 respondents reported muscle fatigue (74.4%) and some pain symptoms (71.8%). These results indicate that the activities performed by these professionals can result in the occurrence of lesions.

In the physiological aspect, Casarin and Caria²⁵, in a study about the electromyographic behavior and fatigue in the deltoid and bilateral trapezius muscles, found that the dentists' long working hours cause pain and fatigue in the muscles of the shoulder girdle and neck.

Souza et al.²⁶, corroborating with Nokhostin and Zafarmand²⁰ concluded in their research at the Centro Odontológico do Brasil, that the high prevalence of WRMD in dentists is due

to factors such as the poor ergonomic design of equipment and furniture, forcing these professionals to adopt inadequate postures.

Authors such as Gabriel et al.² suggest the consolidation and application of standards and guidelines to modify the working environment of these professionals and correct the inadequacies regarding posture in the dental practice in order to promote and ensure safety, high-performance, motivation, and satisfaction.

In the study of Cunha, Marques and Farias²⁷ regarding the healthiness of the workplace, 45.83% of the respondents reported as somewhat healthy and 29.2% as very unhealthy. Similarly, Ellerro and Lepera²⁸ concluded in their study that 80.0% of the professionals did not have their needs met regarding the resources to achieve an adequate working position, such as furniture and lighting.

Simões et al.²⁹ also included the temperature, which influences vasoconstriction or vasodilation, generating discomfort to the individual due to the excessive heat or cold. Also, insufficient or poorly distributed lighting can create points of reflection which can lead to vicious postures, and vibrating equipment, among other factors that aggravate the work overload.

In the study conducted by Regis Filho, Michel and Sell¹⁶, using a cross-sectional epidemiologic method, they tried to correlate the tasks performed by dental surgeons with the onset of WRMD. There was an indication of a statistical association between gender and diseases. To the authors, women were the most affected with injuries in the shoulder/arm (39.40%), wrist/hand (18.30%) and neck (17.20%). This higher prevalence of MSP in women can be explained, in part, by the fact that the modern society increasingly demands women's participation in the marketplace and the fact that women care more about their health than men and look more for medical assistance.

As for tenure, it was observed that the majority (68.3%) has been working for approximately 10 years, with daily work of 8 to 10 hours (62.9%). There was a significant association between long working hours and MSP. This result was also pointed out by Gazzola, Sarto and Avila³⁰ who observed that more than half of the dentists interviewed (56.3%) had a weekly working schedule of 30 to 40 hours, such activity goes beyond the physical/mental capacity of the worker, causing injuries.

Saliba et al.⁶ found that the MSP etiology is multifactorial and that psychosocial factors showed significant association with the occurrence of injuries.

CONCLUSION

The prevalence of musculoskeletal pain in this study was high in the body segments analyzed. There was a significant association with tenure equal/greater than 10 years, daily work of more than 10 hours, individuals who consider the work pace excessive, monotonous and repetitive tasks, associated morbidities, high perception of fatigue and inadequate capacity to work.

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Relationship between musculoskeletal pain complaints and family agriculture work

Relação entre queixas de dor musculoesquelética e processo de trabalho na agricultura familiar

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ABSTRACT

BACKGROUND AND OBJECTIVES: Musculoskeletal pain is increasingly common in the field of workers' health. When the work is characterized by rudimentary activities, as in the case of family farming, which requires the use of manual labor, intense and prolonged working journey, exposure to physical, chemical, biological, mechanical and ergonomic risks, the worker is prone to develop musculoskeletal diseases, and consequently pain. The objective of this study was to investigate the prevalence of musculoskeletal pain in family farmers, as well as to identify the body segments mostly affected and evaluate the tools used in the working process that may influence the development of musculoskeletal diseases and pain.

METHODS: A research form that includes social-demographic data, the Nordic Musculoskeletal Questionnaire, and the visual analog pain scale were used. 150 farmers participated in the study. Statistical tests were applied to the data obtained, including the Fisher Exact. The H0 hypothesis was rejected for a significance level of $p \leq 0.05$, stipulating a confidence interval of 95%.

RESULTS: The results show a high prevalence of musculoskeletal pain in surveyed farmers, whose most affected regions were the lower back and shoulders. The pain reported by farmers is associated with the activities performed and the tools used, such as the hoe and the hand spray, used at work.

CONCLUSION: Farmers are susceptible to the development of work-related musculoskeletal disorders, and the prevalence of the referred pain is high.

Keywords: Agriculture, Musculoskeletal pain, Occupational hazards, Workload, Worker's health.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor musculoesquelética é cada vez mais frequente no âmbito da saúde do trabalhador. Quando o trabalho é caracterizado por atividades rudimentares, como no caso da agricultura familiar, que exige o emprego de força física, jornada intensa e prolongada, exposição a riscos físicos, químicos, biológicos, mecânicos e ergonômicos, o trabalhador fica propenso a desenvolver doenças de ordem musculoesquelética, e, conseqüentemente, dor. O objetivo deste estudo foi investigar a prevalência de dor musculoesquelética em agricultores familiares, bem como identificar os segmentos corporais mais acometidos e avaliar as ferramentas utilizadas no processo de trabalho que podem influenciar o desenvolvimento de doenças e dores musculoesqueléticas.

MÉTODOS: Utilizou-se um formulário de pesquisa que contempla dados sociodemográficos, o Questionário Nórdico de Sintomas Osteomusculares e a escala analógica visual para dor. Participaram do estudo 150 agricultores familiares. Aos dados obtidos foram aplicados os testes estatísticos, inclusive o Exato de Fisher. A rejeição da hipótese H0 foi realizada para um nível de significância de $p \leq 0,05$, estipulando um intervalo de confiança de 95%.

RESULTADOS: Os resultados apontam alta prevalência de dor musculoesquelética nos agricultores pesquisados, cujas regiões mais acometidas foram a parte inferior das costas e ombros. A referência de dor pelos agricultores está associada às atividades desempenhadas e ferramentas, como a enxada e o pulverizador manual, utilizadas no trabalho.

CONCLUSÃO: Os agricultores são suscetíveis ao desenvolvimento de distúrbios musculoesqueléticos relacionados ao trabalho e que a prevalência de dor referida é elevada.

Descritores: Agricultura, Carga de trabalho, Dor musculoesquelética, Riscos ocupacionais, Saúde do trabalhador.

INTRODUCTION

Family farming can be defined based on three essential characteristics, described as the management of the productive unit, workforce supplied by the family members and the ownership of the means of production¹. In this group of workers prevail rudimentary activities, such as the intense and prolonged work flow, accumulation and overload of tasks, uncomfortable or ergonomically incorrect tool handling, exposure to adverse weather conditions (sun, rain, heat, cold), noise and vibrations, venomous animals, chemicals (fertilizers, pesticides), infectious

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and parasitic², handling and transport of loads, intense or continuous physical and mental efforts, and stress arising from work and incorrect postures.

These characteristics of the family farming process can contribute to the development of musculoskeletal disorders, which risk factors are multifactorial. It can be of ergonomic nature when there is high repetitiveness of the same movement, the excessive effort of muscle groups, cold environment with vibration, improper furniture, which requires the adoption of incorrect postures, static postures, and others. Alternatively, of an organizational nature, which includes the execution of monotonous tasks that require repetitive movements, prolonged work hours, accelerated pace and absence of rest breaks, as well as multi-activity in the case of family farming and work overload.

Musculoskeletal disorders are the most frequent cause related to pain syndromes, which correspond to clinical manifestations characterized by the occurrence or not of concomitant symptoms of pain, paresthesia, feeling of heaviness and fatigue, insidious onset, usually affecting the upper limbs (UL). However, it can also affect lower limbs, as a result of the excessive use imposed on the musculoskeletal system, and the lack of time to recover³. Musculoskeletal disorders account for a variety of inflammatory and degenerative conditions affecting the muscles, tendons, ligaments, joints, and synovium, such as tendinosis, bursitis, nerve compressions, low back pain and dorsalgia, among others⁴, and can develop from the labor activity.

Worker's health is a vast area. However, the scientific literature is scarce concerning the agricultural worker, especially in familiar farming. This literature, which is already scarce, meets the potential and severe risks present in the agricultural sector, such as the use of pesticides and labor accidents, and little exploring the chronic problems such as the development of musculoskeletal disorders and, specifically, the musculoskeletal pain.

Pain syndromes related to the performance of labor activities belong to the field of physical therapy, which aims to promote the quality of life, prevent and warn about possible risks and the rehabilitation of work-related diseases. The physical force required by rural work and the excessive efforts are associated with an increased risk of development of inflammations in joints, tendons, chronic degenerative processes, intervertebral disc diseases and muscle cramps, causing the painful condition⁵. In this sense, the rural worker's health is an important field for physical therapy, and these professionals need to use appropriate handling techniques for pain management and relief, and guidelines to promote postural and ergonomic changes.

The objective of this study was to investigate the prevalence of musculoskeletal pain in family farming workers, trying to identify the most affected body regions, in addition to the possible causal factors and determining sociodemographic variables.

METHODS

Transversal study with descriptive and analytical approach. For data collection, it was used a survey form including 1) the

adapted Nordic Musculoskeletal Questionnaire (NMQ); 2) the sociodemographic questionnaire and the visual analog scale (VAS). The NMQ was developed with the purpose of standardizing the measurement of reported musculoskeletal symptoms and facilitate the comparison of results among studies⁵. It includes multiple or binary choices questions related to the occurrence of symptoms in the different anatomical regions commonly referred, based on the symptoms observed in the last 12 months and seven days before the interview. Respondents must report the absence from their routine activities in the last year. As for the VAS, it is a unidimensional instrument for the evaluation of pain intensity, with a line with numbered ends from zero to 10, where zero represents "no pain" and the 10 "the worse pain imaginable." The answers between zero and 2 are considered mild pain; from 3 to 7, moderate and from 8 to 10, intense.

The sample had 150 family farming workers of both the genders, with age over 18 years, living in the rural area of the city of Floriano Peixoto (RS). The selection of the subjects met the criteria of randomness, taking into account the proportion of case by city location. The total population in the study was 1.726 people, corresponding to the total rural population of the city. The sampling procedure was the simple random type. The sample includes a maximum sampling error of 3% for a confidence interval of 95%.

The application of the form was in the houses of the selected farmers. After clarifying the purpose of the study, they signed the Free and Informed Consent Form (FICT). Data collection went from June to October 2015.

This study was approved by the Ethics Committee of the University of Passo Fundo, with the Report number 1.083.663.

Statistical analysis

The data were analyzed by the IBM SPSS Statistic Package 22. The results are presented in terms of relative frequency. The Fisher Exact test was also applied. The H0 hypothesis was rejected for a significance level of $p \leq 0.05$, stipulating a confidence interval of 95%.

RESULTS

150 individuals working in family farming were interviewed, and the detailed results reflecting the profile of these workers are shown in table 1.

The information presented in table 1 shows that the predominant age among the respondents was between 41 and 60 years (average of 48.37 years), corresponding to 64.0% of the total, of which, only 7 are between 20 the 30 years of age, and 5 are 71 or above. Gender prevalence showed no big differences, being 50.7% male and 49.3% female. As for the family situation, 88.7% of the respondents were married, 90.0% lived with the spouse and 47.3% with their children. Most of the respondents accumulated domestic functions (60.7%) with the functions in agriculture and cattle breeding (98.0%). Concerning the educational level, 87.3% did not conclude elementary school, with up to four years of study. No respon-

Table 1. Description of the sociodemographic variables (n=150). Passo Fundo/RS, 2015

Variables	n	%
Gender		
Female	74	49.3
Male	76	50.7
Marital status		
Married	133	88.7
Single	16	10.7
Divorced	1	0.7
Family composition/reside with		
Spouse	135	90.0
Children	71	47.3
Other relatives	20	13.3
Education		
Illiterate	2	1.3
Incomplete elementary school	131	87.3
Complete elementary school	8	5.3
Incomplete high school	2	1.3
Complete high school	6	4.0
Incomplete higher education	1	0.7
Years of school		
up to 4	133	88.7
More than 4	17	11.3

dent has retired due to disability, lives alone or perform other activities. In addition, the study showed the concentration of the workforce on the family members, since only 0.7% of respondents hired part-time employees to help, the vast majority of the workforce is the family members, spouse (82.0%) or children (40.0%).

Table 2 describes the use of work tools by family farmers, by gender.

As for the use of work tools shown in table 2, 63.3% of respondents used the hoe at least once a week, 56.0% used the shovel with the same frequency, 45.3% used the wheelbarrow, 39.3% backpack sprays, 64.0% cutting tools and 28.0% used

mechanized equipment, as the tractor. However, personal protective equipment (PPE) was used by only 12.7% of the respondents, which leaves the worker even more exposed to accidents at work.

Table 2 also allows identifying distribution in the use of work tools by gender, where it is noticeable that the female workers use more the hoe; 86.5% of the respondents using this tool (p<0.000), whereas male workers use more the backpack sprayer, 52.6% (p=0.001), and the tractor, 51.3% (p<0.000). Other meaningful data relate to the use of PPE, and both genders are not supporters, however, although a smaller proportion of male workers demonstrate that use more (18.4%) than female (6.8%; p=0.048).

Figure 1 shows the results obtained with the application of the NMQ in the presence of pain and most involved body regions.

As for the prevalence of musculoskeletal pain, 121 respondents (80.7%) reported pain in last the 7 days, with intensity varying from mild to moderate, mentioned by 64.7% of the respondents, distributed as follows: 17.3% grade 3; 16.0% grade 4; 18.7% grade 5 and 12.7% grade 6. As for incapacity to work over the past 12 months due to musculoskeletal pain, 114 respondents (76.0%) reported this situation. In relation to the prevalence of pain, the most affected region was the lower back (lumbar), in 71.3% of respondents, followed by the shoulder (37.3%), wrists and hands (28.7%), knees (26.7%), neck (24.7%), hips and thighs (14.0%), elbows (14.0%), ankles and feet (8.7%) and upper back (3.3%). Table 3 shows the prevalence of pain by gender.

As shown in table 3, female workers reported more pain than male workers in the region of shoulders (48.6%; p=0.007), elbows (20.3%; p=0.035) and wrists/hands (36.5%; p=0.047), whereas male workers had a higher prevalence of pain in the lower back (86.8%; p<0.001). It is worth mentioning that female workers also have a high value for lower back pain, 55.4% of the respondents.

The results indicate that low back pain is more associated with the use of some tools, such as the wheelbarrow (79.3%, p=0.029), manual planter (73.8%; p=0.017) and the tractor (90.5%, p=0.001). Pain on the shoulders is related to

Table 2. Description of the use of work tools by farmers and family member, by gender, and total (n=150). Passo Fundo/RS, 2015.

Tool used at work	Gender		Total n (%)	p value
	Male	Female		
	n (%)	n (%)		
Hoe	31 (42.0)	64 (86.5)	95 (63.3)	<0.000
Shovel	39 (51.3)	45 (60.8)	84 (56.0)	0.254
Wheelbarrow	30 (39.5)	38 (51.4)	68 (45.3)	0.189
Hand Sprayer	40 (52.6)	19 (25.7)	59 (39.3)	0.001
Cutting instrument	50 (65.8)	46 (62.2)	96 (64.0)	0.734
Manual planter	3 (3.9)	6 (8.1)	9 (6.0)	0.324
PPE	14 (18.4)	5 (6.8)	19 (12.7)	0.048
Tractor	39 (51.3)	3 (4.1)	42 (28.0)	<0.000

PPE = Personal protective equipment; Fisher's Exact test; Significant value for p<0.05.

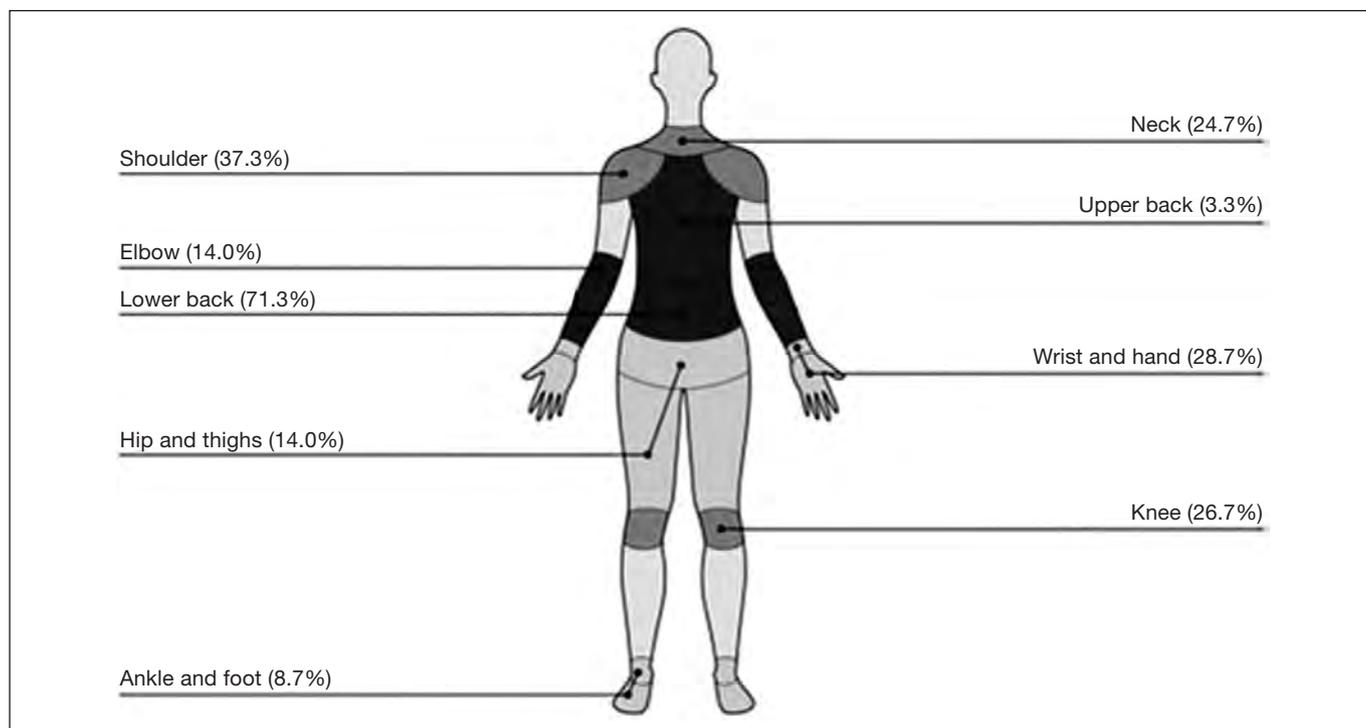


Figure 1. Prevalence of musculoskeletal pain reported to by farmers and most involved body regions (n=150). Passo Fundo, RS, Brazil 2015⁷

Table 3. Relationship between gender and musculoskeletal pain (n=150). Passo Fundo, RS, Brazil 2015

Site of pain	Gender		p value
	Female n (%)	Male n (%)	
Neck	20 (27.0)	17 (22.4)	0,572
Upper back (dorsal)	3 (4.1)	2 (2.6)	0,679
Shoulders	36 (48.6)	20 (26.3)	0,007
Elbows	15 (20.3)	6 (7.9)	0,035
Wrists/hands	27 (36.5)	16 (21.1)	0,047
Lower back (lumbar)	41 (55.4)	66 (86.8)	<0.000
Hips/thighs	10 (13.5)	11 (14.5)	1,000
Knees	23 (31.1)	17 (22.4)	0,270
Ankles	7 (9.5)	6 (7.9)	0,779

Fisher's Exact test; significant value for $p \leq 0.05$.

the use of the hoe (23.6%; $p=0.009$); pain in the hip is related to the use of the shovel (22.7%; $p=0.009$); pain in the wrist to the use of sprayers (20.9%, $p=0.010$) and the use of manual planter is related to pain in the elbow region (12.1%; $p=0.017$). One of the factors that may affect the prevalence of pain is the presence of rheumatic disease. However, it was not reported on the information provided by the respondents. Although it is not directly related to the objectives of this study, the data concerning the use of PPE show important evidence. As already mentioned in table 2, of the 150 respondents only 19 said they wore PPE, corresponding to 12.7% of the studied population, reflecting its low use. Of

them, 14 (18.4%) are male and 5 (6.8%) female ($p=0.048$). Due to the importance of this information, it was established a relationship between the use of PPE and the sprayer, as shown in table 4.

Table 4. Relationship between the sprayer and personal protective equipment (n=150). Passo Fundo, RS, Brazil

PPE	Sprayer		p value
At least once a week	84 (64.1)	47 (35.9)	0.042
Does not use	7 (36.8)	12 (63.2)	

PPE = Personal protective equipment; Fisher's Exact test; Significant value for $p \leq 0.05$.

According to table 4, the higher frequency of use of PPE is among rural workers who use sprayers, but less than once a week ($n=84$; $p=0.042$).

DISCUSSION

Family farming is essentially characterized by the management of the own production unit, family workforce, and ownership of the means of production. The results presented in this study reflect the high prevalence of musculoskeletal pain among the farmers interviewed, especially on the lower back and shoulders, indicating a relationship with the instruments used. It was found that male workers have a higher prevalence of pain on the lower back, and the most used tools were the backpack sprayer and the tractor, while female workers have a higher prevalence of pain on the shoulders, using more the hoe as a tool.

These results are in accordance with the ones of a global literature review that, using keywords for musculoskeletal disorders and agriculture, has identified a high prevalence of musculoskeletal disorders among farmers. The authors also identified that the spinal region is the most involved regarding musculoskeletal pain, followed by the UL, and then the lower extremities. It also confirms that farmers have higher prevalence rates of musculoskeletal disorders than the non-farmer controls, suggesting that farmers are at particular risk of developing musculoskeletal disorders compared to other occupations⁸.

In a study conducted with farmers in the state of Kansas/USA, the results were similar, with a prevalence of low back pain (37.5%), followed by pain in the shoulders (25.9%), pain in the knees (23.6%) and pain in the neck (22.4%)⁹. Similarly, another study identified that low back pain has a higher prevalence of musculoskeletal pain in farmers (33.2%), followed by neck/shoulders (30.8%) and elbow, hands, and wrists (21.6%). The significant statistical associations related the work of repair and maintenance of equipment and the care of animals with low back pain; milking with pain in the neck and shoulder; and material handling with pain in the elbow, wrist, and hand¹⁰. The authors of a study with workers who grow cassava point out that the planting and extraction tasks of crop are related to discomfort and body pain complaints on the dorsal region (84%), lower back (84%), forearm (84%) and elbows (68%), identifying that the curvature of the trunk angle exceeds the recommended trunk flexion angles by the literature¹¹.

Corroborating the results on the relationship between site of pain and the task or tool used, three studies outstand. The first analyzed the complaints of musculoskeletal pain in farmers who use backpack sprayers in coffee plantations, identifying that 81.81% of the respondents complained of pain in the shoulders and 54.54% pain in the lower back, results that corroborate those found in this study¹¹. Other studies have ergonomically analyzed farmers using the hoe and identified that the flexion of the arms and neck are exacerbated, which and can be stressful, requiring physical effort and use

of greater force to keep the tool positioned above the shoulders^{12,13}. Therefore, these considerations support the results for the pain in the shoulders and the use of the hoe, since the postures adopted to perform the task go beyond the physical limits. The misuse of the hoe forces farmers to adopt postures with an inclination of the trunk, which leads to the deterioration of intervertebral discs of the lower back region and can justify the painful condition that the worker reports when performing the weeding task¹². This fact can justify, in this study, the high prevalence of low back pain in the subjects interviewed.

The relationship between musculoskeletal disorders and localized pain (neck, shoulders, back, knees, among others) with the work processes and the use of tools (weight lift, abrupt movements, exacerbated flexion of the trunk and limbs, inadequate posture, among others) are identified in some studies^{8,11,14,15}. A study conducted with Irish farmers concluded that 56.0% of them had some kind of musculoskeletal discomfort in the previous year¹⁶. On the other hand, the present study shows even a higher prevalence, with 80.7% of the respondents with pain for at least in the last seven days, while 76.0% were prevented from working in the last year.

The scientific literature is poor when it comes to agricultural workers, and the majority of the studies approaches potential risks for the health, such as the use of pesticides and occupational accidents. The present study also obtained relevant information on the use of chemicals and lack of individual protection, data that corroborate other two studies^{17,18}. The first study identifies that 42% of the studied population does not use PPE, justified by the discomfort and difficulty of locomotion with its use¹⁸. The second concludes that only 63% of the interviewees use the standard PPE (cap or hat, mask, overalls, gloves, and boots), 14.8% use only gloves and mask and 22% do not use any PPE¹⁹.

CONCLUSION

The results of the study show a high prevalence of musculoskeletal pain and disorders in farmers. The most involved body segments are the lower back and shoulders, followed by wrists and hands, knees and neck.

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Epidemiological and psychosocial profile of informal caregivers of patients with chronic pain

Perfil epidemiológico e psicossocial dos cuidadores informais de pacientes portadores de dor crônica

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ABSTRACT

BACKGROUND AND OBJECTIVES: The importance to evaluate the informal caregiver profile is usually neglected in the face of the complaint of the patient with chronic pain, and because there is no data on informal caregivers in the Brazilian literature. The objective of this study was to elaborate the epidemiological and psychosocial description of caregivers of patients at the State Hospital Mário Covas in Santo André, SP.

METHODS: Application of the general epidemiological profile questionnaire and WHOQOL-BREF translated, by telephone, to 33 informal caregivers of patients treated at the Outpatient Clinic of Chronic Pain at the State Hospital Mário Covas.

RESULTS: The general evaluation of the quality of life of the studied population was from average to good (score of 64.01 - being zero = the worst quality of life and the 100 the best). With values above 60 for the physical domain (68.07), psychological (67.04), social relations (67.42) and environment (64.58). Care lasting on average for more than 5 years, with more than 8 hours per day and mostly by women, spouses, Catholic, aged between 30 and 60 years. Approximately 88% do not want another person to perform their activity.

CONCLUSION: Caregivers have a quality of life from average to good. Informal care is mostly performed by women.

Keywords: Chronic pain, Epidemiology, Informal caregivers, Psychosocial profile.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A importância de avaliar o perfil do cuidador informal, comumente negligenciado diante da queixa do paciente com dor crônica, e por não haver dados sobre cuidadores informais na literatura brasileira. O objetivo

deste estudo foi realizar descrição epidemiológica e psicossocial dos cuidadores dos pacientes do Hospital Estadual Mário Covas, Santo André, SP.

MÉTODOS: Aplicação de questionário de perfil epidemiológico geral e o WHOQOL-BREF traduzido, via telefone, para 33 cuidadores informais de pacientes atendidos no Ambulatório de Dor Crônica do Hospital Estadual Mário Covas.

RESULTADOS: Avaliação geral da qualidade de vida na população estudada foi de média para boa (pontuação de 64,01 - sendo zero = pior qualidade de vida e 100 a melhor). Com valores acima de 60 para os domínios físico (68,07), psicológico (67,04), relações sociais (67,42) e meio ambiente (64,58). Cuidados realizados em média por mais de 5 anos, por mais de 8 horas diárias e na grande maioria por mulheres, cônjuges do paciente, católicas, com idade entre 30 e 60 anos. Aproximadamente 88% não deseja que outra pessoa exerça sua atividade.

CONCLUSÃO: Os cuidadores apresentam qualidade de vida de média para boa. O cuidado informal é realizado, em sua maioria, por mulheres.

Descritores: Cuidadores informais, Dor crônica, Epidemiologia, Perfil psicossocial.

INTRODUCTION

In Brazil, a study conducted with patients with chronic pain showed that 94.9% of the patients interviewed have their professional activity compromised^{1,2}.

In more serious cases, the patients have their mobility impaired and need a caregiver, responsible for the continuous care and aid in their daily activities. The informal caregiver is usually a family member, being responsible for assisting the patient in daily activities. Informal caregivers are family members, friends, neighbors, members of religious groups and other people in the community. They are volunteers who are willing to provide care but do not have the specific professional training³.

Several reasons lead to the delegation to the informal caregiver, such as the degree of kinship, emotional relationship, the proximity of the environment where the patient is, lack of other possibilities, self-delegation, etc⁴.

The focus of attention of the professional practice, most of the time, is the sick individual, and the caregiver is set apart from the events. Even today, family caregivers are perceived as a resource for the benefit of the individual, but not as a target of attention from the health team. They are individuals labeled to help in this process of care. It is expected that they provide care "naturally" without receiving the appropriate help and support⁵.

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In this area of study about caregivers, there is a significant number of papers related to the deterioration of the health of the caregiver, both physical and psychological, with a bigger load of stress, less satisfaction with life, job loss, ruptures of bonds, isolation and reduction of social participation and loss of the purchasing power for the family over time⁶⁻⁹.

In relation to the psychosocial issues in the life of the caregiver, several studies identified cases of depression, sleep disorders, fear, greater use of psychotropics, rupture of bonds, isolation, solitude, social withdrawal, loss of social support and little life satisfaction^{9,10}.

The lack of Brazilian studies about informal caregivers and more specifically, the quality of life (QoL) of that group, justify the relevance of this study.

The objective of this study was to elaborate an epidemiological description of informal caregivers of patients treated at the Outpatient Symptoms Control Clinic of the State Hospital Mario Covas.

METHODS

The survey was conducted with 33 informal caregivers of patients treated at the Chronic Pain Clinic of the State Hospital Mário Covas (Santo André, SP), responsible for taking care of any complaint related to pain of difficult treatment. The selection criteria of the group chosen for the study was to be a caregiver who monitors chronic pain, regardless of being a member of the family or not, with the possibility of having more than one caregiver interviewed per patient. The number of invited participants was of convenience and considered the number of patients treated at the outpatient clinic with informal caregivers.

The inclusion criteria were individuals who performed the role of informal caregiver of a patient treated at the outpatient clinic after being acquainted with the objectives of the study.

All the participants in the study received information about the study, objectives, methods, risks, and benefits, as well as the secrecy of the data obtained in this study. Voluntary participation was formalized by signing the Free and Informed Consent Term (FICT) before scheduling the interview by phone.

The inclusion of more than one informal caregiver of the same patient was accepted, with no obligatorily family relation between caregiver and patient. Five interviews failed due to an error in the patient's record (wrong phone number or death of the patient in question before the date of the interview). This is an observational cross-section study, in which previously scheduled telephone interviews were conducted, 20 minutes on average, applying two research instruments. One of them has been specifically developed for this study, with questions that address sociodemographic aspects related to the caregiver's characteristics (gender, age, marital status, religion, work time, income). The other instrument was used to assess the QoL of the caregivers and, for this purpose, we chose the WHOQOL-BREF¹¹, instrument elaborated by the World Health Organization (WHO), validated for the Portuguese language¹². This questionnaire has access the QV of the interviewed ones in last the 15 days.

The WHOQOL-BREF has 26 questions. The two first ones on the general QoL and the other 24 questions composes 4 do-

main: Physical, Psychological, Social Relationships and Environment. The answers follow the Likert scale (ranging from 1 to 5, the higher the score, the better QoL). The answers of the scale vary in intensity (nothing - extremely), capacity (nothing-completely), frequency (never-always) and assessment (very dissatisfied - very satisfied, and very bad - very good). From the values found for each of the 24 facets that make up the domains, we obtained the median of responses, that is, the value that separates 50% of the responses when they are sorted.

The values establish 1 as the worse response and 5 as the best, which made it possible to see what facets received a positive or negative evaluation. For the purpose of uniformity and to allow comparison, the medians presented in facets related to pain and discomfort, drug addiction or treatment dependency, and negative feelings were inversely analyzed according to the WHO guidelines¹³.

The calculation of the QoL assessment scores was done separately in each of the four domains. The raw score was transformed into a scale from zero to 100 (score transformed according to the syntax for SPSS, proposed by the WHO). Thus, the minimum value of the scores for each domain is zero, and the maximum is 100, and the higher the score, more positive is the evaluation of the domain.

The project was submitted to the evaluation of the Committee of Ethics in Research of the School of Medicine of the ABC, CAAE: 51237315.9.0000.0082.

Statistical analysis

Data analysis was performed using IBM SPSS 30.0 (Statistical Package for the Social Sciences) and included descriptive statistics analysis of frequency, central tendency and dispersion, and inferential analysis for comparison among domains. Category variables were expressed as frequency and percentage. Numerical variables were presented with average, median and standard deviation.

The reliability of the instrument was analyzed to assess the coherence of the answers obtained in repeated measurements and the degree of independence among the results when applied on different occasions. The measurement reliability refers to consistent and accurate results. The method used to assess the reliability of the work was Cronbach's alpha. It allows you to assess whether each item of the scale measures, equivalently, the same concept, that is, if the items are positively related. Cronbach's alpha values range from zero to 1, being considered acceptable values between 0.70 and 0.90¹⁴.

RESULTS

Thirty-three caregivers of patients with chronic pain were interviewed. The sociodemographic profile of this population is shown in table 1.

Most caregivers were female (81.8%), with an average age of 50.3 years, being the youngest caregiver 21 years old and oldest 87 years. It was found that 66.7% of the caregivers are married and 54.5% have High school education. Most of the studied group claimed to be Catholic (45.5%), followed by Evangelicals (39.4%). As for the degree of kinship, 26 (78.8%) had some

Table 1. Demographic and socioeconomic characteristics of the caregivers interviewed

	n=33	%
Gender		
Male	6	18.2
Female	27	81.8
Age group (years)		
20 to 30	2	6.1
30 to 40	8	24.2
40 to 50	8	24.2
50 to 60	8	24.2
<60	7	21.2
Marital status		
Married	22	66.7
Divorced	1	3.0
Single	7	21.2
Widow	3	9.1
Education		
Illiterate	1	3.0
Elementary school	9	27.3
High School	18	54.5
College	5	15.2
Religion		
Catholic	15	45.5
Evangelic	13	39.4
Other	5	15.2
Kinship		
Father or mother	1	3.0
Son or daughter	10	30.3
Spouse	15	45.5
Other	6	18.2
None	1	3.0

degree of relationship with the patient, with 45.5% of the caregivers being spouses and 30.3% children of the patients. The characteristic of the caregivers' activities is described in table 2. It was noted that the caregivers have been performing this activity for several years, 42.4% of the population have been following the patient for more than 5 years (Figure 1). Moreover, almost all (97.0%) received no remuneration for this job, and the frequency dedicated, by and large, is daily (91.0%), with work load exceeding 8 hours a day for 78.7% of caregivers (Figures 2 and 3). In addition to the responsibilities of a caregiver, 36.4% had other activities in the workplace, and 42.4% of the caregivers performed other activities when required. Only 9.1% of the respondents would like to have someone else playing the caregiver role. Concerning the economic structure of the family, 57.6% considered that this parameter had been significantly impacted and 36.4% were responsible for bearing the cost of the medicine. Despite the high workload of the caregivers, and be performing this task for a long time, most of them do not want to have someone else taking over the role of caregiver.

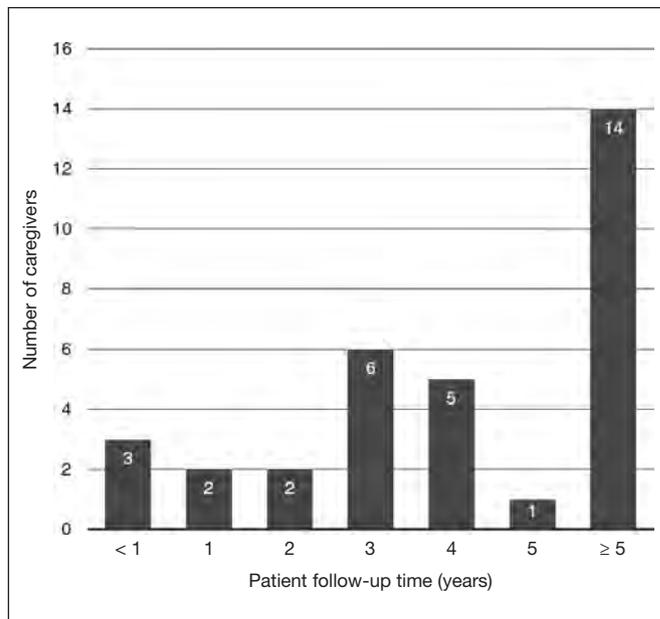


Figure 1. Distribution of caregivers regarding the time to patient care, stratified by year

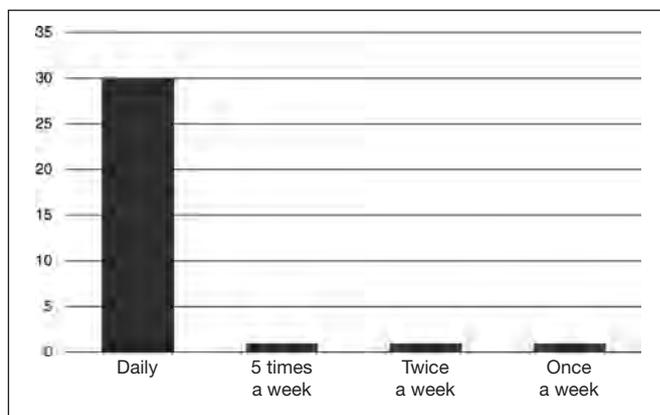


Figure 2. Distribution of caregivers regarding the time devoted to patient care, stratified by frequency per week

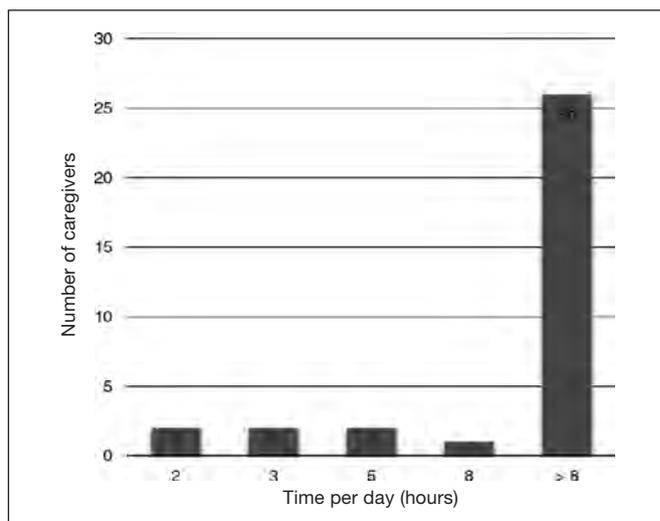


Figure 3. Distribution of caregivers regarding the time devoted to patient care, stratified by frequency per hours per day

Table 2. Characteristics of the caregiver activity

Overall evaluation	n	%
Etiology of patient's chronic pain		
Neuropathic	13	39.4
Cancer	8	24.2
Fibromyalgia	3	9.1
Others	9	27.3
How long have you been assisting the patient? (years)		
<1	3	9.1
1	2	6.1
2	2	6.1
3	6	18.2
4	5	15.2
5	1	3.0
>5	14	42.4
Are you paid for this activity?		
No	30	91.0
Yes	3	9
What is the frequency of this remuneration?		
Per hour	2	6.0
Not established	1	3.0
What is your time availability to provide care?		
Daily	30	91.0
5 times a week	1	3.0
Twice a week	1	3.0
Once a week	1	3.0
How many hours of your day are dedicated to caring?		
2	2	6.0
3	2	6.0
5	2	6.0
8	1	3.0
>;8	26	79.0
Do you share this activity with someone else?		
No	15	45.5
Yes	14	42.4
Sometimes	4	12.1
Do other family members help you?		
No	9	27.3
Yes	18	54.5
Sometimes	6	18.2
Would you like someone else taking over your role as caregiver?		
No	29	87.9
Yes	3	9.1
Sometimes	1	3.0
Why?		
No answer	29	87.9
I have other activities	1	3.0
I have long been a caregiver	1	3.0
I don't have time.	0	0.0
Other reason	2	6.1

Continue...

Table 2. Characteristics of the caregiver activity – continuation

Overall evaluation	n	%
Did the patient's disease significantly affect the economic structure of the family?		
No	8	24.2
Yes	19	57.6
Sometimes	6	18.2
In the case of a family member, are you responsible for paying the medicine?		
No	5	15.1
Yes	12	36.4
Sometimes	9	27.3
Besides being a caregiver, do you have another activity in the same place?		
No answer	5	15.2
No	2	6.1
Yes	12	36.3
Sometimes	14	42.4

The WHOQOL-BREF questionnaire had satisfactory reliability by Cronbach's alpha test result of 0.797.

The averages and standard deviations obtained from the scores with the raw values of each domain are shown in table 3. Table 4 shows the average of the values of each domain, on a scale from zero to 100, as for the WHO guidelines, for better visibility of the data. Therefore, we see that in the first two questions of the global QoL questionnaire, the studied population obtained an average score of 3.56 (64.01 in table 4, that is, a general QoL from average to good (or medium to good). Concerning the scores obtained for each domain, in general, the average is above score 3 and, on the scale from zero to 100, above 60%, suggesting that the QoL of these caregivers is between average and good. The domain with the best score was the Physical domain, with 3.72 in table 3, and 68.07 in table 4, and the worse was the Environment with 3.58 in table 3, and 64.58 in table 4.

Table 3. General analysis of the quality of life domains

References	Average	Standard deviation
Global evaluation	3.56	0.82
Physical domain	3.72	0.67
Psychological domain	3.68	0.65
Social relations domain	3.69	1.06
Environment domain	3.58	0.53

Table 4. Analysis of the quality of life domains, transforming scales to values from zero to 100, according to the World Health Organization guidelines

References	Average	Standard deviation
Global evaluation	64.01	20.43
Physical domain	68.07	16.74
Psychological domain	67.04	16.26
Social relations domain	67.42	26.69
Environment domain	64.58	13.23

Table 5 shows the domains regarding the perception of the QoL, and satisfaction in relation to health. Both evaluations had a median of 4, showing that at least half of the respondents are satisfied with the items analyzed.

Table 5. Analysis per quality of life domains

Global evaluation	Average	Median
Perception of quality of life	3.56	4
Satisfaction with the health	3.59	4

With regard to the results in each of the facets, we present the average, median and the standard deviation of the scores for each one, in its respective domain. Table 6 refers to the facets of the Physical Domain in which the item “energy and fatigue” presents median of 5, that is, at least half of the respondents assessed this aspect as very satisfied. The lowest median refers to every day’s activities (median=3). As for the Psychological, shown in table 7, all facets had a median of 4, showing that at least half of the caregivers are satisfied with their self-esteem, body image, and appearance, negative feelings, and spirituality. In this domain, it is worth mentioning that 82% of caregivers reported being satisfied or very satisfied with the physical appearance and self-esteem. Only 33.3% reported some concentration problem, and 30.3% of the respondents showed negative feelings (bad mood, despair, anxiety, and depression), very frequently or always. Table 8 shows the results of the Social Relations Domain, and we see that caregivers were satisfied with their personal relations and the support received from friends. In both, the median was 4 and average of 3.91 and 3.48, respectively. Environment, in table 9, shows the data of eight facets, and seven of them had good evaluations from the caregivers, with median score of 4: security, home environment, financial resources, availability and quality of the social and health care, opportunity for new information, opportunity for recreation/leisure, physical environment, and transportation. The only item with median 2 related to the opportunity for new information and skills. In this facet, 54.6% of caregivers considered the access to new information and skills very little or too little.

Table 6. Analysis of the physical domain

Physical Domain	Average	Standard deviation	Median
Energy and fatigue	3.91	1.33	5
Sleep and rest	3.79	0.89	4
Every day’s activities	3.03	1.40	3
Dependence on drugs, or treatments	3.94	0.61	4
Capacity to work	3.97	0.67	4

Table 7. Analysis of the psychological domain

Psychological Domain	Average	Standard deviation	Median
Self-esteem	3.12	1.41	4
Body image and appearance	4.03	0.64	4
Negative feelings	3.94	0.66	4
Spirituality, religion, personal beliefs	3.64	1.39	4

Table 8. Analysis of the social relation domain

	Average	Standard deviation	Median
Personal relations	3.91	1.40	4
Social support	3.48	1.23	4

Table 9. Analysis of the environment domain

	Average	Standard deviation	Median
Physical security and protection	3.91	0.68	4
Home environment	3.70	1.04	4
Financial resources	3.36	0.96	4
Health and social care: availability with quality	3.91	0.84	4
Opportunity to acquire new information and skills	2.67	1.43	2
Participation in recreation and leisure opportunities	3.76	0.90	4
Physical environment	3.48	0.90	4
Transportation	3.88	0.78	4

DISCUSSION

In this study, as well as in many others, the prevalence of female caregivers is higher to males¹⁵⁻²⁰. Several can be the reasons, such as filial obligation and women’s cultural condition in the society, still chauvinist¹⁵.

The general evaluation showed that about 78.8% of the caregivers have some degree of kinship with the patient, being 45.5% of them, spouse, a fact that is very frequently pointed out in the literature^{18,20}. Most caregivers assist the patient for over 5 years, and this activity is not remunerated in 97% of cases. The economic characteristic of the studied group, caregivers of patients with chronic pain treated by the public service of this hospital, can justify this fact since having a formal caregiver often means expenditure beyond the financial capacity of the family. For 91% of the respondents, patient care is daily and for more than 8 hours per day, adding up to more than 60 hours per week.

When asked about work rotation with another person, the results were very similar. Fifty-four percent of the respondents said they had the help from other family members. Caregiving is usually performed by one of the family members, with no help or recognition from the others^{23,24}, according to Pavarini et al.²⁵. Nevertheless, 87.9% said they do not want someone else taking over the role of caregiver. Despite the overload, caregivers feel satisfaction in taking care of the patient, because he/she is a member of the family and, in general, it is believed that this attitude is a moral duty and social and family responsibility^{15,26}. The fact that this questionnaire involves the ethical side of the interviewees, who may feel inhibited to show their feelings in relation to the task, should be considered a bias. Among those who would like to see someone else performing their duties, no respondent mentioned the lack of time as a reason for this desire. The reasons not mentioned could be emotional and physical fatigue, stress and motivation to perform other activities.

Significant changes in the family economic structure were pinpointed in 57.5% of the cases. The purchase of drugs was cited as one of the causes for this increase in spending since when the public health service does not provide the drug, the family has to buy it. Moreover, another factor that contributes to the change of the economic structure is the leave of absence, once the caregiver spends most of the time and day with the patient, being, in some cases, unable to perform other remunerated activities.

In the study, we saw that the work capacity item was indicated as the least affected by the caregiver function, whereas the accomplishment of the daily activities was pointed as the most harmed. This shows that caregivers maintain their capacity to work but find it difficult to perform other functions of their life. One can see the strong influence that care has in the daily life of caregivers. Many studies have shown that both caregiver and patient, live in the same place, which ultimately generates an increase in daily tasks, adding up the care to the household chores^{16,17}. In the Psychological domain, body image and appearance were pointed out as the least affected by the work of the caregiver, while self-esteem was seen as influenced by the activity. Other factors analyzed were negative feelings and spirituality, religion and personal beliefs. The lowest frequency of complaint regarding the appearance, while self-esteem was regarded as one of the most altered parameters, leads to questions about what points were considered by the respondents to characterize self-esteem. It is believed that excessive fatigue can justify this fact, because the caregiver no longer cares about the body image and starts to consider other parameters to characterize his/her self-esteem, such as confidence and competence, which are likely to be affected by the situation of stress and demand in which they find themselves.

Personal relations and social support were analyzed in the domain of Social Relations, where the great part of the interviewees is relatively satisfied with their social bonds. It was observed that going to church on the weekends is the main social interaction for most of them. Relationship with neighbors was also cited. This beneficial response on social bonds is of great importance since it is known that this contact with others helps to reduce cases of depression, for example. The participants who gave a negative response said that they do not get support from family or friends, which, on the other hand, contributes to an outcome of anxiety and negative feelings, making more difficult the task of the caregiver. It is known that anxiety can be an indication of an overload of the obligations the person needs to fulfill²². As for the Environment domain, physical security and protection were ranked as the most satisfactory, as well as health and social care, focusing on the availability and quality of these resources. As a downside, there was the opportunity to acquire new information and skills. Home environment, financial resources, participation in leisure activities and recreation, physical environment and transportation were also assessed. These points received a satisfactory answer in relation to the service provided by this hospital, which is considered of high quality in service, with competent and caring physicians. On the other hand, the complaint about the lack of opportunities to acquire new information and skills

shows that caregivers are restricted to the care routine, not having the chance to have access to other activities. It is worth pointing out that with regard to the family environment, the answer was positive, showing that even with the emotional burden of the care activity, the families maintain a healthy environment in their homes, without the relations being affected.

CONCLUSION

Contrary to what it is imagined about this stressful activity of informal caregiver, in the face of the different aspects analyzed, caregivers consider their QoL from average to good. Due to the shortage of national surveys about caregivers, as well as of innovative studies in the area, there is the need to improve policies and practices to reduce the stress and the overload perceived by this group.

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Bone pain assessment in patients with chronic kidney disease undergoing hemodialysis

Avaliação da dor óssea em pacientes renais crônicos em hemodiálise

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ABSTRACT

BACKGROUND AND OBJECTIVES: The objective of this study was to descriptively evaluate the symptom of pain and its influence on the quality of life in patients with chronic renal failure on hemodialysis treatment.

METHODS: This is a descriptive, cross-sectional exploratory, quantitative approach. We evaluated 50 chronic renal failure patients on hemodialysis treatment through the Brief Pain Inventory and the Kidney Disease and Quality of Life Short Form. The emotional factors were evaluated by the Toronto Alexithymia and Hospital Anxiety and Depression Scales.

RESULTS: The predominant age group was 40 to 60 years. 72% of the patients showed some bone changes and the majority interviewed did not have formal jobs at the time of interview. There was a noticeable increase in the intensity of pain in patients with bone alterations when compared to those without, as well as an increased ambulation impairment. The Hospital Anxiety and Depression Scale showed a slight increase in both parameters in those with bone pain. Regarding the quality of life, physical function and work status were the most affected. There was the absence of alexithymia in most of the interviewees, a positive correlation between pain intensity versus physical function ($r=-0.14$, $p=0.03$), physical function x work status ($r=-0.28$, $p=0.04$) and a negative correlation between alexithymia versus anxiety ($r=0.03$, $p=0.62$) and moderate pain versus overall health ($r=0.06$, $p=0.40$).

CONCLUSION: We found worse outcomes in hemodialysis patients who presented bone alterations, regardless of the source.

Keywords: Affective symptoms, Chronic pain, Chronic renal failure, Metabolic bone disease, Quality of life.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O objetivo deste estudo foi avaliar, de forma descritiva, o sintoma da dor e sua influência na qualidade de vida, de pacientes com insuficiência renal crônica em tratamento de hemodiálise.

MÉTODOS: Trata-se de uma abordagem descritiva, transversal, exploratória e quantitativa. Foram avaliados 50 pacientes renais crônicos em tratamento de hemodiálise, por meio do Inventário de Dor Breve e do questionário específico de doença renal. Os fatores emocionais foram avaliados pelas escalas de Alexitimia de Toronto e Hospitalar de Ansiedade e Depressão.

RESULTADOS: A faixa etária predominante foi de 40 a 60 anos. Setenta e dois por cento dos pacientes apresentaram algumas alterações ósseas, e a grande maioria entrevistada não tinha empregos remunerados no momento da entrevista. Houve um aumento notável na intensidade da dor em pacientes com alterações ósseas, quando comparado com aqueles sem, bem como um aumento da deficiência de caminhada. Através da escala de Hospitalar de Ansiedade e Depressão, observou-se que houve um ligeiro aumento em ambos os parâmetros naqueles com dor óssea. Quanto à qualidade de vida, a função física e o status de trabalho foram os mais afetados. Houve ausência de alexitimia na maioria dos entrevistados, correlação positiva entre a intensidade da dor versus função física ($r=-0,14$, $p=0,03$), função física versus status do trabalho ($r=-0,28$, $p=0,04$), e correlação negativa entre alexitimia versus ansiedade ($r=0,03$, $p=0,62$), dor moderada versus saúde geral ($r=0,06$, $p=0,40$).

CONCLUSÃO: Encontrou-se resultados piores em pacientes em hemodiálise, que apresentaram alterações ósseas, independentemente da fonte.

Descritores: Doença óssea metabólica, Doença renal crônica, Dor crônica, Qualidade de vida, Sintomas afetivos.

INTRODUCTION

Chronic kidney disease (CKD) is a metabolic syndrome that arises from a gradual and usually slow loss of the excretory capacity of the kidneys¹. What is most alarming about this disease is its visible spread throughout the world. The current situation in the USA is that the occurrence of CKD doubles every 10 years². The information obtained from the Brazilian Nephrology Society (SBN) and the Brazilian Ministry of Health shows a similar picture, with the number of patients needing kidney replacement therapy having doubled over the last 5 years³. SBN data also shows that the number of patients has increased by 9.9% per year³. In Brazil, the total sum spent on the dialysis and kidney transplant programme stands at approximately 1.4 billion Brazilian Reals per year³.

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The secondary disorders that come together with CKD are many: low blood pressure (one of the main disorders), cramp, malaise and vomiting, headaches, chest pains, lumbar pains, itching, fever and chills, diarrhoea, allergic reactions, cardiac arrhythmia, gas embolism, gastrointestinal haemorrhage, metabolic problems, convulsions, muscular spasms, insomnia, restlessness, dementia, infections, pneumothorax or haemothorax, ischaemia or oedema in the hand, and anaemia^{4,5}. Out of all these, musculoskeletal ailments appear as significant, affecting the quality of life (QoL) of the patient with chronic kidney disease¹.

Disorders in the homeostasis of calcium, phosphorus, calcitriol and parathormone occur very early in patients with CKD, and play an important role in the physiopathology of bone diseases that afflict these patients, known as mineral and bone disorder (CKD-MBD) and CKD⁶. Among the expressions of CKD-MBD, the most important are: joint pain, painful shoulders, carpal tunnel syndrome, and trigger finger, resulting from deposits of the protein B2-microglobulin on tissues, as well as arthritis caused by crystals, avascular necrosis, septic arthritis, weakness of the muscles, and muscular cramps^{1,6}.

Pain accounts for approximately 40% of the universe of complaints made by patients with CKD during haemodialysis⁷, and many of these painful symptoms have a known physiopathological mechanism, being able to be adequately treated during the course of treatment: the muscular pain which follows cramps, caused by the rapid removal of body fluids; headaches, associated with increases in blood pressure; thoracic pain which occurs in dialyser reaction syndrome, formerly known as first-use syndrome⁶. This situation shows that pain in kidney disease reduces physical and professional function, and one's perception of his or her own health also has a negative impact on levels of energy and vivacity, which could either reduce or limit social interactions and also seriously jeopardise QoL⁷.

In this context, it is very important to identify the types of pain caused by the changes that occur in patients with CKD. When these are bone alterations, grouped under the general theme of Renal Osteodystrophy, they include skeletal disorders that are secondary to changes in the metabolism of calcium and phosphorus, and the resulting bone remodelling that follows¹. These can cause diffuse pains, with the involvement of the spine, knees, ankles and thighs, and could even cause total immobility. Also as a cause of bone and muscular pain, we have musculoskeletal syndrome, which appears in patients who have been undergoing haemodialysis for many years and which could be caused by deposits of amyloid and beta-2-microglobulin^{6,7}. Other types of pain, such as expressions of neuropathic pain caused by nerve lesions, are also present; however, intensity, incapacity, physical injury, emotional factors, and occupational factors related to pain resulting from CKD have not been reported in national literature⁸. In this regard, there is a need to understand the impact of chronic pain and its consequences on CKD, which are often underestimated.

Thus, the purpose of this study was that of appraising bone pain in patients with chronic kidney disease undergoing haemodialysis, considering the global understanding of all processes, in order to also identify the quality of the emotional expression that they show.

METHODS

This is a descriptive, transversal, exploratory study with a quantitative approach. The calculations regarding the sample were made

based on the data regarding the number of patients with kidney disease currently undergoing haemodialysis, admitted in one shift.

These figures vary around 56 people. Based on this datum, a sample with a 95% level of confidence (LC), a maximum error equal to 5%, and considering a proportion estimate of 50% (maximum variance), we obtain a sample size equal to 49 patients⁹. Thus, the sample studied had 50 people interviewed, in order to meet the statistical requirement to validate the study. These patients underwent haemodialytic treatment at the Base Hospital in São Jose do Rio Preto/SP, State of São Paulo, Brazil, between October 2015 and February 2016. The criteria for inclusion were the following: people with CKD undergoing haemodialytic treatment and without any cognitive deficit; also, through consultation made to the electronic files, there was verification of comorbidities presented with regard to bone alterations (painful shoulder, cramp, osteodystrophy, bone deformities, and osteoporosis, among others).

The patients were approached during the sessions of haemodialysis, in which the researcher gave explanations about the research study and, later, carried out the interview. No patient refused the application of the questionnaire. The instruments used were the following: Brief Pain Inventory (BPI)¹⁰, for appraisal of pain, which consists of 15 items subdivided into two parts: the first part appraises the intensity of the pain, while the second assesses how pain interferes with daily life (activities in general, mood, walking ability, sleep, work, interpersonal relationships, and taking opportunities in life). The intensity and interference of pain were assessed based on a numerical scale going from 0 (no pain) to 10 (the worst possible pain). For assessment of the quality of life, the test used was the Kidney Disease and Quality-of-Life Short-Form (KDQOL-SF)¹¹, a specific instrument that assesses CKD. Emotional factors, in turn, were assessed by the Toronto Alexithymia Scale (TAS-20)¹², which makes use of 20 statements as being an instrument of self-evaluation of the difficulty to identify feelings, to describe the feelings of others, and also a style of thought aimed outwards, and also outwards, with the Hospital and Anxiety Depression Scale (HADS)¹³, comprising 14 different statements, of which 7 referring to anxiety and the other 7 to depression. The global point score ranges from zero to 21 points on each subscale.

This study has been approved by the Research Ethics Committee (REC) of the Institution here studied (statement 435,511). All participants have signed the Free and Informed Consent (FICT).

Statistical analysis

The data were registered on special spreadsheets using Microsoft software and then analysing the data through descriptive statistics. For the questions where the variables need to be answered with yes or no, the McNemar test was used to compare the situations before and after, within each group and also between the two groups, with the possible combinations of yes and no being appraised. The quantitative variables were assessed using non-parametric testing, while correlations were analysed using the Pearson coefficient.

RESULTS

The general analysis has shown that, within the population under study, the prevailing age group was that between 40 and 60 years old; the ages of the subjects in the sample ranged from 15 to 84 years old.

Most of the subjects were male. Seventy-two per cent of the sample (n=36) had renal osteodystrophy with bone alterations in the knee and in the ankle (20%), spine (23%), general muscular weakness (25%), cramp (11%), painful shoulder (11%), osteoporosis (5%) and neuropathy (5%). In addition, conditions of comorbidity, including ischaemic peripheral arterial disease, diabetic neuropathy, and osteopenia/osteoporosis (due to long-lasting hypertension, diabetes mellitus (DM) or advanced age, have led to several different types of pain (50% bone pain, 28% joint pain, and 22% muscular pain). All this data has been entered into an electronic file which includes laboratory tests, results of the bone biopsy, biochemical indicators, and radiographic changes. This data allows us to separate those patients subjected to haemodialysis who have also suffered bone changes. Other clinical, social and demographic data is shown in table 1. Table 2 shows the results of the assessment of pain, anxiety, depression, and alexithymia. Here we see a greater rate of complaints with re-

gard to sleep and also concerning the ability to walk, on separation of those individuals who have shown bone alterations (painful shoulder, osteoporosis, neuropathy, among others (n=36)). However, there was the absence of alexithymia among the interviewed majority (n=50). There was no variation within the groups, with and without bone alterations (n=50), with regard to the presence of alexithymia as appraised by the TAS. The study showed that 64% of the people in the sample (n=32) were not alexithymic. In addition, 18% (n=9) were inconclusive and 18% (n=9) self-identified themselves as alexithymic. Regarding QoL, all the patients answered the specific questionnaire for kidney disease (KDQOL-SF). The highest point scores obtained were those for the dimensions related to “stimulation by the haemodialysis team” and “sexual function,” while the lowest were for “labour situation” and “physical function”. Table 3 presents the dimensions, with their respective means and standard deviations.

Table 1. Social and demographic profiles of the patients assessed (n=50)

Variables	n	Mean and Standard Deviation (±)	% (n)
Gender	50		48 (n=24)
Female			52 (n=26)
Male			
Marital status	50		24 (n=12)
Single			64 (n=32)
Married			6 (n=3)
Divorced			8 (n=3)
Widowed			
Level of schooling (years)	50	5.8±2.5	26 (n=13)
Completed primary school			46 (n=23)
Did not finish primary school			10 (n=5)
Completed high school			8 (n=4)
Did not finish high school			8 (n=4)
University degree			2 (n=1)
Illiterate			
Age (years)	50	49.34±16.06	
Haemodialysis time (months)	50	54.5±8.6	
Labour situation	50		20 (n=10)
Active			80 (n=40)
Inactive			
Most commonly linked symptoms	50		35 (n=18)
Itching			27 (n=13)
Weakness			11 (n=5)
Cramp			35 (n=17)
Fatigue			47 (n=23)
Drowsiness			45 (n=22)
Headaches			

Table 2. Scores obtained on assessment of pain, anxiety, depression, and alexithymia in the appraised sample with bone alterations (n=36) and without (n=14)

Instruments	Mean ± DP n (=14)	Mean ± DP n (=36)	Value of p
Brief Pain Inventory			
Intensity of pain			
Interference of pain on daily activities	4.70±2.50	7.8±2.3	0.048*
Mood	4.12±3.54	5.12±3.54	0.065
Capability of walking	4.66±3.69	7.66±3.69	0.035*
Sleep	4.66±3.69	5.66±3.69	0.054
Work	3.72±4.18	5.72±4.18	0.048*
Personal relationships	1.30±2.65	2.30±2.65	0.055
Making the most out of life	2.50±3.35	4.50±3.35	0.058
Scale of Anxiety and Depression			
Anxiety	11.8±3.8	13.5±3.4	0.048*
Depression	4.7±4.5	5.8±4.8	0.065

* p<0.05 – the difference is statistically significant.

Table 3. Means and standard deviations of the dimensions on the Kidney Disease and Quality-of-Life Short-Form for patients undergoing haemodialysis treatment with bone alterations (n=36) and without these alterations (n=14)

Dimensions	Mean±SD (n=36)	Mean±SD (n=14)	Median (n=36)	Median (n=14)	p-value
Physical function	48.34±18.02	60.20±24.09	55.00	65.00	0.052
Body function	36.54±12.85	56.22±42.71	0,00	0.00	0.038*
Pain	58.95±23.40	67.30±30.12	65.00	70.00	0.045*
General health	52.45±15.08	58.88±23.52	55.00	65.00	0.062
Emotional well-being	63.55±22.35	67.92±29.01	65.00	76.00	0.055
Social function	58.46±35.80	62.59±40.04	56.25	66.67	0.065
Energy/fatigue	48.55±23.80	54.39±26.96	50.00	55.00	0.051
List of symptoms/problems Effects of kidney disease	60.50±25.30	62.56±24.60	65.00	65.63	0.067
Overload of kidney disease	45.80±12.70	51.91±31.59	52.25	56.25	0.055
Work situation	28.57±39.53	45.84±24.80	0.00	0.00	0.048*
Cognitive function	65.52±13.40	74.83±30.59	75.00	86.67	0.065
Quality of social interaction	75.80±20.55	81.63±21.97	80.25	86.67	0.058
Sexual function	74.65±12.40	88.75±21.80	82.25	100.00	0.065
Sleep	58.40±32.50	66.02±26.70	60.20	70.00	0.052
Social support	89.56±18.50	91.07±20.09	82.50	100.00	0.052
Patient satisfaction	73.58±15.80	78.57±19.25	78.50	83.33	0.062
Social function	59.46±20.55	66.94±23.38	60.25	70.00	0.055

*p<0.05 – the difference is statistically significant.

To analyse the impact of pain on patients who have shown some bone alterations (n=36), there was the application of the Pearson Correlation Coefficient for some variables, with a positive correlation being observed: between intensity of pain and physical function ($r=-0.14$, $p=0.03^*$); physical function versus labour situation ($r=-0.28$, $p=0.04^*$). In the meantime, there was an observed negative correlation for alexithymia versus anxiety ($r=0.03$, $p=0.62$) and moderate pain versus general health ($r=0.06$, $p=0.40$).

DISCUSSION

The epidemiological profile as established in the present study is in line with the Dialysis Census of 2013³, showing a mean of 49.34 years old, while the age bracket in Brazil with the greatest occurrence of patients with haemodialysis is that between 19 and 64 years old. The average age bracket also corresponds to the appearance of risk groups, and diseases considered as basic to CKD¹⁴, such as hypertension, diabetes mellitus, and cardiovascular diseases, that have become more common in adulthood^{8,15}.

In relation to gender, even though the difference is slight, there was a prevalence of the male sex in the present study, in line with other studies^{16,17}, and also in line with studies sponsored by the Brazilian Ministry of Health¹, that have also shown that the male sex is the more afflicted by chronic diseases, including kidney disease.

Stasiak et al.¹⁸ show an anxiety rate of 11.7% and a depression rate of 9.3%, among patients undergoing haemodialysis. In another study¹⁹, there was confirmation of an anxiety rate of 11.4% among women and 7.31% among men. With regard to depression, we found a rate of 11.3% for women and 11.8% for men. The results of the present study were 30% for anxiety and 9% for depression.

This high anxiety rate could be due to the place where the research collection occurred, as the Base Hospital is a reference centre for serious cases and also for patients with multiple comorbidities. Here we must point out that depression and anxiety are mood disorders that are very common among patients who have had haemodialysis, and as such they must be adequately diagnosed and treated, so to improve the QoL of these people.

Regarding the presence of alexithymia, 18% of those interviewed in this study showed inconclusive results and 18% tested positive. The mean was 57.6, which means that the sample can be characterised by lack of alexithymia. In Brazil, cut-off values are no longer available, even though some research studies have brought some indications of what they could be^{20,21}. CKD is a disease that has an important effect on the patient's psychological well-being, having a significant effect, not only in terms of anxiety and depression but also with regard to alexithymia²⁰. Thus, we can comprehend a type of difficulty that is found for expression of its effects in cases of psychosomatic diseases. In the study by Pregnoatto²², patients subjected to haemodialysis show high TAS scores regardless of gender, level of schooling, marital status, professional activities, age, and diagnostic hypothesis, therefore disagreeing from the present study. In the appraisal of the QoL related to health, the worst indicators were obtained for labour state and physical function. These results agreed with the findings of the study by Lopes et al.²³, that suggested a reduction in the ability to carry out daily routine activities, or to work. Some studies have already suggested the implementation of a programme based on taking regular physical exercise, for this population^{13,19}. The highest mean scores were obtained in the domains of cognitive function, sexual function, quality of interaction, and social support. Here, it must be pointed out that one should always

perform assessments of the cognitive function of this population at regular intervals, as several are the factors that could bring a risk of cognitive decline²⁴.

In this study, the mean time spent under treatment through haemodialysis was approximately 54.5±8.6 months (equivalent to 4.5 years). Similar results were obtained in the specialised literature, where a variation in the mean haemodialytic treatment time between 40 and 55 months was observed^{10,15}.

On observing the positive correlation between pain and jeopardised dimensions of QoL, it was observed that the greater the intensity of pain among those patients with bone pain, the greater the harm caused to physical function. Santoro et al.²⁵, in their study, mention that pain is an important health problem within CKD, which affects half of all dialysis patients, most of whom experience moderate to intense pain. However, these authors also stress that the impact of chronic pain and its consequences are often underestimated. Sources of pain related to the environment include renal bone uraemic disease (cystic fibrous osteitis, osteomalacia), osteoarthritis, calcified uraemic arteriopathy, and peripheral neuropathy. A study²⁵ shows that potential consequences of persistent pain include disturbances to sleep, weakening of memory and attention, mood swings (anxiety and depressive disorder), impotence, a poorer general physical state, and reduction in social activities, affecting QoL.

CONCLUSION

This study shows that patients with CKD undergoing haemodialysis as treatment and who have bone pain have the poorest indicators of quality of life (QoL), anxiety, depression, and pain, even though the indicators for alexithymia have been similar. It has also become evident that this segment of the population deserves greater studies and psychological support, and also other health professionals, in order to have a healthier lifestyle.

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Temporomandibular dysfunction, myofascial, craniomandibular and cervical pain: effect on masticatory activity during rest and mandibular isometry

Disfunção temporomandibular, dor miofascial crâniomandibular e cervical: efeito na atividade mastigatória durante o repouso e isometria mandibular

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ABSTRACT

BACKGROUND AND OBJECTIVES: Craniomandibular and cervical symptoms interfere with mandibular stability. Determining whether these disorders influence muscle activation when chewing, it is possible to improve interventions for this population. The objective of this study was to verify the effect of the temporomandibular joint dysfunction, craniomandibular and cervical pain on the electromyographic activity of the masticatory muscles during rest and mandibular isometry.

METHODS: Fifty-five women aged between 18 and 30 years were divided into two groups: with temporomandibular dysfunction (n=28) and without temporomandibular dysfunction (n=27). The diagnosis of temporomandibular dysfunction was established using the Research Diagnostic Criteria for Temporomandibular Disorder (RDC/TMD). The RDC was also used to determine the presence of craniomandibular pain. Cervical pain was defined by physical examination. The electromyographic activity of masseter and temporalis muscles was evaluated in the rest position and mandibular isometry. The amplitude of muscle activation was represented by the root mean square values (RMS%) and normalized by maximum voluntary contraction. The Mann-Whitney U test was used to detect differences between the groups with and without temporomandibular dysfunction; with and without myofascial craniomandibular pain; and with and without cervical myofascial pain.

RESULTS: It was observed greater amplitude in the activation of masseter and right temporalis muscles in the rest position in individuals with myofascial craniomandibular pain compared to asymptomatic ($p<0.05$). There was no difference among individuals with and without cervical myofascial pain, and with and without temporomandibular dysfunction.

CONCLUSION: The presence of myofascial craniomandibular pain did not affect the masticatory activity, with greater muscle activation in mandibular rest.

Keywords: Chewing, Electromyography, Myofascial pain, Temporomandibular dysfunction.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Sintomas crâniomandibulares e cervicais interferem na estabilidade mandibular. Ao determinar se essas desordens influenciam na ativação muscular durante a mastigação é possível aprimorar intervenções para essa população. O objetivo deste estudo foi verificar o efeito da disfunção temporomandibular, dores crâniomandibular e cervical na atividade eletromiográfica dos músculos mastigatórios, durante o repouso e a isometria mandibular.

MÉTODOS: Cinquenta e cinco mulheres com idade entre 18 e 30 anos, foram divididas em grupo com disfunção temporomandibular (n=28) e sem disfunção temporomandibular (n=27). O diagnóstico de disfunção temporomandibular foi estabelecido por meio do *Research Diagnostic Criteria for Temporomandibular Disorder* (RDC/TMD). O RDC também foi utilizado para determinar a presença de dor crâniomandibular. A dor cervical foi definida por meio de um exame clínico. A atividade eletromiográfica dos músculos temporal e masseter foi avaliada durante o repouso e a isometria mandibular. A amplitude de ativação muscular foi representada por valores de raiz quadrada da média (RMS%) e normalizada pela contração voluntária máxima. O teste U de Mann-Whitney foi utilizado para detectar diferenças entre os grupos, com e sem disfunção temporomandibular; com e sem dor miofascial crâniomandibular; e com e sem dor miofascial cervical.

RESULTADOS: Observou-se maior amplitude de ativação dos músculos temporais e masseter direito durante o repouso para indivíduos com dor miofascial crâniomandibular em relação a assintomáticos ($p<0,05$). Não houve diferença entre indivíduos com e sem dor miofascial cervical e com e sem disfunção temporomandibular.

CONCLUSÃO: A presença de dor miofascial crâniomandibular exerceu efeito sobre a atividade mastigatória, com uma maior ativação muscular no repouso mandibular.

Descritores: Disfunção temporomandibular, Dor miofascial, Eletromiografia, Mastigação.

INTRODUCTION

Temporomandibular disorder (TMD) is characterized by a group of clinical conditions associated with noises and blockages in the temporomandibular joint (TMJ)¹. The Research

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Diagnostic Criteria (RDC/TMD) is composed of a set of criteria, determining the TMD's diagnosis through a variety of signs and symptoms². This evaluation method can diagnose an individual with TMD through the disc and articular symptoms, or due to muscular pain's presence, and also in a mixed way, including the alteration types³.

Masticatory muscles pain and in the TMJ region is the most prevalent symptom in TMD-individuals⁴. Besides these symptoms, 60% of TMD-individuals have pain in other regions such as head and cervical⁵. The pain presence in this region is due to the connection between the cervical structures and the TMJ, which through muscles and ligaments form the complex called the craniocervical-mandibular system⁶. These structural connections have encouraged studies aiming to understand the relationship between TMD and cervical symptoms.

It is already known that individuals with craniomandibular symptoms have more frequently cervical pain than do the asymptomatics^{1,7}. Another study observed the relationship between cervical postural changes and increased activation of the masseter muscle⁸. In addition, a relationship was observed between the cervical pain presence and the increased muscle sensitivity in the skull-mandibular system⁹.

Factors such as increased sensitivity and pain presence are associated with proprioceptive deficits and interfere with the muscle activation pattern^{10,11}. Thus, mandibular movements' dysfunctions may also be influenced by cervical symptoms in TMD-patients. These symptoms' frequency in this population suggests the presence of compensatory strategies, aiming at promoting stability for mandibular movements and maintaining the musculoskeletal system functional effectiveness¹².

This way, it is important to consider cervical and craniomandibular symptoms during masticatory muscle evaluation. These muscles' electromyographic analysis will enable to determine if these disorders influence the muscular activation pattern of symptomatic subjects, enhancing assessments and therapeutic interventions for this population.

The purpose of this study was to verify the effect of TMD, myofascial, craniomandibular and cervical pain on the electromyographic activity of the masticatory muscles during rest and mandibular isometry.

METHODS

The probabilistic and intentional sample was recruited through the research project's dissemination in universities and health centers in Florianópolis.

Volunteers were clarified about the research's objectives and signed the Free and Informed Consent Form (FICT).

Inclusion criteria were: age between 18 and 30 years old and female. Exclusion criteria were: use of functional orthodontic/orthopedic appliances, use of analgesic and anti-inflammatory drugs, systemic diseases such as arthritis and arthrosis, classified as Angle's¹³ classes II and III, vestibular system's alterations, dental failures, cervical trauma history, shoulder girdle, face, and TMJ.

Sixty women were evaluated. Fifty-five participated in the study, and five were excluded due to data processing problems.

Volunteers evaluated by the present study were classified according to the presence or absence of three conditions: TMD, myofascial pain in the craniomandibular region and cervical pain.

Clinical instruments

All volunteers were assessed by RDC/TMD¹⁴ to determine TMD-presence. Volunteers who had one or more TMD diagnoses were included in the TMD group, based on the history and presence of clinical signs according to the RDC/TMD. In the group without TMD, volunteers who did not present TMD diagnoses according to RDC/TMD were included.

RDC/TMD¹⁴ is an instrument that considers physical (axis I) and psychosocial aspects (axis II) and determines the TMD presence or absence, classifying individuals into three groups: I) Muscular diagnoses (myofascial pain with or without limited opening); II) Disc displacement (with or without reduction and with limited opening or without reduction, and without limited opening); III) Arthralgia, osteoarthritis, osteoarthrosis of TMJ. To be classified as TMD, the individual must present at least one diagnosis and may have a maximum of five diagnoses¹⁴.

The clinical examination by muscle palpation of the RDC/TMD was also used to determine the myofascial pain presence in the craniomandibular region, regardless of the TMD diagnosis. Volunteers were classified as "myofascial craniomandibular pain present" when reporting pain in at least one muscle area during evaluation by palpation.

The cervical pain presence was detected by a clinical examination¹⁵, consisting of the evaluation of active and passive movements, tests (dynamic-static) and cervical muscles palpation. Those volunteers who presented pain during muscle palpation and head movement were classified as "Myofascial craniomandibular pain present", according to this examination.

Based on the anteroposterior relationship's visual inspection between the mandible and the maxillary, Angle's malocclusion classification was used to evaluate the morphological aspects of dental occlusion¹³.

Electromyography

Electromyography (EMG) was used to evaluate the electrical activity of the masseter (MA) and temporal (TA) muscles bilaterally, during isometry and mandibular rest. The Miotool USB (Miotec) electromyography was used with 14-bit resolution analog-to-digital converter board for an acquisition rate of 2000 Hz, minimum Common Mode Rejection Ratio of 110 dB. In order to capture the electromyographic signal, the surface electrodes of Meditrace Kendall-LTP brand, model Chicopee MA 01022 were adopted.

For this evaluation, individuals remained seated on a chair with back support, knees at 90° and head in the Frankfurt position (parallel plane to the ground). The skin was cleaned on the electrode fixing place with 70% alcohol, and trichotomy was done, as necessary.

Electrodes' fixing on the skin surrounding the MA and TA muscles followed the SENIAM recommendations (Surface Electromyography for the Non-Invasive Assessment of Muscles)¹⁶. The best electrodes positioning was determined by an isometric con-

traction reference, through dental tightening. Electrodes were bilaterally fixed on the MA (2 cm above the mandible angle), and TA (vertically, from the muscle's anterior margin)^{17,18}. The reference electrode was fixed on the sternal manubrium.

A pre-protocol evaluation training was done for the participants to understand the activities execution. The electromyographic signal acquisition occurred during the following activities:

Rest: lips touching lightly with teeth out of the occlusion for three 10-second repetitions;

Isometry: with an M Parafilm bar (Neenah, Wisconsin, USA), 15 times-folded (1.5 cm x 3.5 cm), positioned bilaterally between the last dental contacts; was requested a maximum voluntary contraction, maintained for five seconds. Three attempts were made with a one-minute interval between them.

Data analysis

The MATLAB R2009a software was used for data processing. The amplitude analysis was calculated by RMS, root-mean square, in micro volts (µv). Two thousand one-second data (the second most central of each muscle) were selected. To reduce external noise, the 20Hz high-pass filter and 500Hz low-pass filter were used. The amplitude normalization of masticatory muscular activity (RMS%) was made by the RMS value percentage during one second of each muscle by isometry.

This study was approved by the Ethics and Research Committee on Human Beings of Santa Catarina's State University-UDESC, under Report Nr. 149,333.

Statistical analysis

Descriptive statistics were used by average and standard deviation with a 95% interval. The data normality was tested by Kolmogorov-Smirnov test. The Mann-Whitney U test was used to detect differences between the groups' averages: a) with and without TMD; B) with and without myofascial craniomandibular pain; C) with and without cervical myofascial pain.

For this, the *Statistical Package for the Social Science (SPSS)* version 20.0 was used with a significance level of 5% (p<0.05) and two-tailed distribution.

RESULTS

Figure 1 shows the volunteers distribution (number of individuals) regarding the presence or absence of the three conditions: TMD, craniomandibular myofascial pain, and cervical pain. Individuals with craniomandibular myofascial pain exhibited greater activation amplitudes during the rest of the RT, LT and RM muscles than asymptomatic individuals (p<0.05). The craniomandibular pain did not affect isometry (p>0.05). For cervical myofascial pain, the electrical activity of the masticatory muscles during rest and isometry did not present statistical differences between groups (p>0.05) (Table 1).

Comparison of the average of amplitude surface EMG indexes (RMS%) during rest and isometry did not present statistical differences (p>0.05) between subjects with and without TMD (Table 2).

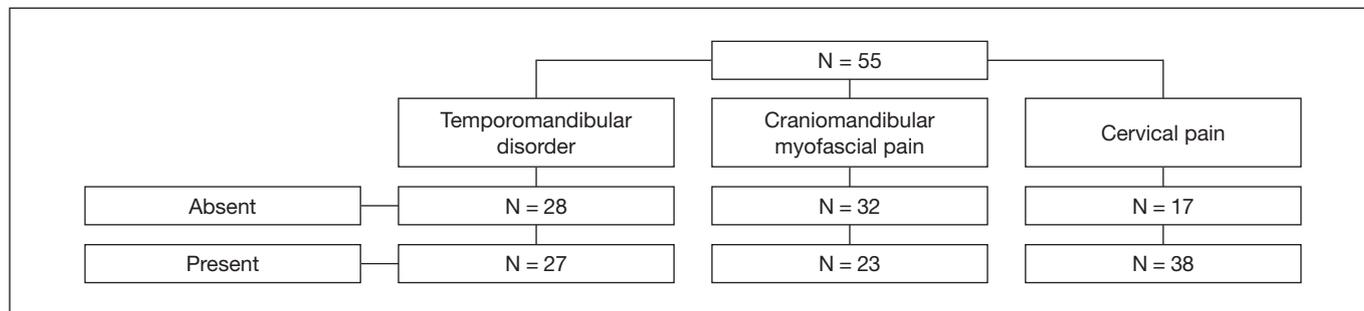


Figure 1. Volunteers' distribution regarding the presence or absence of temporomandibular disorder, craniomandibular myofascial pain and cervical pain

N = number of volunteers.

Table 1. Comparison between the averages of activation amplitude for right and left temporal muscles, right and left masseter muscles, during rest and isometry according to the myofascial pain presence in the craniomandibular region and the cervical region

	AAM%	Average	SD		Average	SD		p value
			Absent (n=23)			Present (n=32)		
Craniomandibular myofascial pain								
Rest	RT	2.39	1.30	1.98 - 2.81	3.20	1.28	2.49 - 3.91	0.02
	LT	2.44	1.19	2.06 - 2.82	3.15	1.29	2.44 - 3.86	0.03
	RM	1.82	0.72	1.59 - 2.05	2.73	1.55	1.87 - 3.59	0.03
	LM	1.52	1.10	1.17 - 1.87	1.50	0.63	1.16 - 1.86	NS
Isometry	RT	88.00	9.71	84.85 - 91.14	85.95	10.12	80.35 - 91.55	NS
	LT	89.73	4.13	88.39 - 91.07	88.76	5.82	85.54 - 91.98	NS
	RM	85.55	9.33	82.52 - 88.57	86.08	6.65	82.39 - 89.77	NS
	LM	85.36	7.79	82.83 - 87.88	84.40	7.95	79.99 - 88.80	NS

Continue...

Table 1. Comparison between the averages of activation amplitude for right and left temporal muscles, right and left masseter muscles, during rest and isometry according to the myofascial pain presence in the craniomandibular region and the cervical region – continuation

	AAM%	Absent (n=23)			Present (n=32)			p value
		Average	SD	CI	Average	SD	CI	
Cervical myofascial pain								
Rest	RT	2.64	1.49	2.15 - 3.13	2.55	0.91	2.08 - 3.02	NS
	LT	2.61	1.27	2.19 - 3.03	2.69	1.21	2.07 - 3.31	NS
	RM	2.05	1.14	1.67 - 2.42	2.12	0.95	1.63 - 2.61	NS
	LM	1.55	1.12	1.18 - 1.92	1.45	0.61	1.14 - 1.76	NS
Isometry	RT	88.08	7.84	85.47 - 90.69	86.01	13.22	79.21 - 92.81	NS
	LT	89.72	4.63	88.17 - 91.26	88.90	4.71	86.48 - 91.32	NS
	RM	85.84	9.34	82.73 - 88.95	85.38	7.02	81.77 - 88.99	NS
	LM	85.30	8.52	82.46 - 88.14	84.64	6.04	81.53 - 87.75	NS

AAM = activation amplitude; RT = right temporal muscle; LT = left temporal; RM = right masseter; LM = left masseter; NS = not significant; SD = standard deviation; CI = confidence interval; Mann-Whitney U test.

Table 2. Comparison between the averages of activation amplitude for right and left temporal muscles, right and left masseter muscles (AAM%), during rest and isometry according to the temporomandibular disorder presence

	AAM%	Without TMD (n=27)			With TMD (n=28)			p value
		Average	SD	CI	Average	SD	CI	
Rest	RT	4.26	1.74	2.03 - 3.14	4.57	1.92	2.14 - 3.14	NS
	LT	2.63	1.35	2.09 - 3.17	2.64	1.16	2.19 - 3.09	NS
	RM	1.82	0.78	1.51 - 2.13	2.31	1.28	1.81 - 2.80	NS
	LM	1.68	1.28	1.17 - 2.19	1.36	0.57	1.14 - 1.58	NS
Isometry	RT	87.12	11.36	82.63 - 91.62	87.73	8.08	84.54 - 90.93	NS
	LT	88.87	3.85	87.34 - 90.39	90.05	5.29	87.96 - 92.15	NS
	RM	83.67	10.17	79.64 - 87.69	87.72	6.26	85.24 - 90.20	NS
	LM	84.62	8.59	81.22 - 88.02	85.56	6.99	82.79 - 88.33	NS

AAM = activation amplitude; RT = right temporal muscle; LT = left temporal; RM = right masseter; LM = left masseter; NS = not significant; SD = standard deviation; CI = confidence interval; Mann-Whitney U test.

DISCUSSION

This study evaluated the electric activity behavior of the masticatory musculature during rest and mandibular isometry in women with and without TMD, seeking to understand the effect of the craniomandibular myofascial pain and mandibular pain on the activity of these individuals' masticatory muscles. The main result showed that the activation of RT, LT and RM muscles at rest is greater in the presence of craniomandibular myofascial pain than in the absence of this symptom, independent of the TMD diagnosis.

As during rest the mandible is in a position of involuntary suspension resulting from the masticatory muscles' relaxation, the electromyographic activity expected is minimal^{19,20}. However, in this study, individuals with craniomandibular myofascial pain presented greater electrical activation amplitude of the masticatory muscles during rest than those asymptomatic ones, a result found by Bodéré et al.²¹. As to the TMD presence, there was no difference between the groups. It was considered that the greater activation amplitude of the masticatory muscles during rest in subjects of the TMD group, compared to the control group found in other studies^{22,23} was due to methodological differences. The severity degree of TMD and the inclusion in the non-TMD group of individuals who presented craniomandibular myofascial pain may have influenced the results. Individuals with moderate to

severe intensity of TMD showed greater activation during rest compared to those with mild pain or from control group²³. The present study included subjects with mild, moderate and severe TMD in the same group. The inclusion of individuals with mild TMD may have reduced the differences between this group and the control.

Despite the presence of TMD, the presence of craniomandibular myofascial pain in the control group may have increased the activation of the masticatory muscles during rest. The exclusion in the control group of any dysfunction sign or symptom was considered in another study²². When some disturbance interferes with the stomatognathic system functioning, the organism uses several adaptive processes to maintain the efficiency of the functions that involve its structures²⁴. It is likely that by means of sensory and motor interactions, the presence of myofascial pain in this region modifies the generation of a resting action potential, changing the activation pattern of the craniomandibular muscles²². In TMD's study, it is necessary that the control group does not present any dysfunction sign and symptom.

The muscle activation amplitude did not differ in the isometry between the groups with and without myofascial pain and with and without TMD. The same result was observed by Rodrigues-Bigaton et al.²² and Lauriti et al.²³, indicating that both the presence and intensity of pain in TMD subjects did not influence the electrical activity of the masticatory muscles.

However, other studies have found less electrical activity during the maximal voluntary contraction of the masticatory muscles in subjects with TMJ disorders²⁵, or with arthrogenetic and psychogenic TMD, but not myogenic TMJ²⁶. In this study, the DTM group consisted of individuals with one or more RDC/TMD diagnosis. Most individuals with TMD presented pain only due to muscle palpation¹⁴. Spontaneous pain (active pain) at rest, which is characteristic in myofascial pain because of muscle tension and contracture²⁷, was not frequent among subjects in the TMD group. And some of the individuals with TMD classified according to RDC/TMD as group II (disc displacement) showed no signs of joint and muscular pain. As pain is an important modifier of muscle function^{26,28,29}, it is probable that the absence of the symptom or its location may also have contributed to the similarity in the amplitude parameters during mandibular isometry between the groups with and without TMD.

Due to the anatomical and neurophysiological connection between the craniomandibular structures and the cervical⁶, the initial hypothesis was that pain in this region could influence the masticatory muscles' activity. However, no significant difference was observed in the isometry or at rest of the masticatory muscles between the groups. Corroborating these results, Svensson et al.³⁰ verified through an experimental study that cervical pain is not associated with changes in the electromyographic activity of the mandibular muscles. Nevertheless, it has been shown that masticatory dysfunction seems to be more associated with chronic cervical pain, lasting at least three months³¹.

As the presence of pain may alter the functional balance and the masticatory action effectiveness³², the results of this study reinforce the importance of considering craniomandibular myofascial pain during the evaluation and treatment of TMD-patients. The information obtained through this research provides subsidies for research protocols that identify more specific aspects of the pain influence on the masticatory muscles' activity, contributing to the clinical intervention of these subjects.

CONCLUSION

Cervical pain and TMD did not affect masticatory electrical activity at rest or in isometry. At rest, there was a greater masticatory muscles activation amplitude in the presence of craniomandibular myofascial pain. Thus, craniomandibular myofascial pain seems to interfere in the physiological behavior of the masticatory muscles when the mandible is at rest and should be investigated in the evaluation and intervention of TMD-individuals. The importance of the symptoms absence in the TMD study control groups is emphasized.

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The use of dry needling in the treatment of cervical and masticatory myofascial pain

O emprego do agulhamento seco no tratamento da dor miofascial mastigatória e cervical

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ABSTRACT

BACKGROUND AND OBJECTIVES: Dry needling is an interventionist, minimally invasive technique, used in the treatment of myofascial pain. The objective of this study was to describe the use of dry needling and to perform a critical literature analysis about the technical aspects of its use by qualified health care professionals.

CONTENTS: A search in the literature was carried out for books in English, review articles, randomized controlled or quasi-randomized clinical trials, blind or double-blind and published case studies series in Portuguese or in English. The following databases were used: Cochrane, LILACS, and Pubmed. Articles published from September 1996 to January 2017 were selected according to the following keywords: dry needling *versus* myofascial pain syndrome *versus* temporomandibular joint dysfunction syndrome) *versus* trigger points *versus* musculoskeletal manipulations *versus* trapezius muscle, superficial back muscles *versus* masseter muscle *versus* secular muscle *versus* pterygoid muscles *versus* digastric muscle, neck muscles. Reports of clinical cases, “open-label” studies, studies with animal models and articles not related to DN were excluded. After the matching descriptors and the implementation of inclusion and exclusion criteria, we selected six articles.

CONCLUSION: The diagnosis of myofascial pain can be a difficult task since it can simulate different masticatory system pain, from a toothache to a trigeminal neuropathic pain. This can be minimized with proper history taking, clinical examination involving muscle palpation, as well as the own experience and professional training. The deactivation of myofascial trigger points should be a priority in myofascial pain therapy since there is a significant improvement of local and referred pain when we use this approach. Despite the favorable results of studies about the use of dry needling in myofascial pain treatment related to

temporomandibular joint dysfunction and the cervical region, the literature still lacks studies with a high level of evidence proving the effectiveness and efficacy of this technique. This is a minimally invasive, low cost, and safe therapy that provides local, segmental, extra segmental and placebo effects. Therefore, its use should be recommended by different health professionals in cases of myofascial pain.

Keywords: Dry needling, Myofascial pain syndrome, Myofascial trigger points, Temporomandibular joint dysfunction.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O agulhamento seco é uma técnica intervencionista, minimamente invasiva, utilizada no tratamento da dor miofascial. O objetivo deste estudo foi descrever o emprego do agulhamento seco e realizar a análise crítica da literatura sobre os aspectos técnicos de sua utilização por profissionais capacitados da área da saúde.

CONTEÚDO: Foi realizada uma busca na literatura por livros em inglês, artigos de revisão, estudos clínicos controlados randomizados ou quase-randomizados, encobertos, ou duplamente encobertos e estudos de séries de casos publicados em português ou inglês. Foram utilizadas as seguintes bases de dados: Cochrane, LILACS e Pubmed. Foram selecionados artigos publicados no período de setembro de 1996 a janeiro de 2017, recrutados após a utilização dos seguintes descritores: agulhamento seco *versus* síndromes da dor miofascial *versus* síndrome da disfunção da articulação temporomandibular *versus* pontos-gatilho *versus* manipulações musculoesqueléticas *versus* músculo trapézio (superficial back muscles) *versus* músculo masseter *versus* músculo temporal *versus* músculo pterigoideo *versus* músculo digástrico. Foram excluídos relatos de casos clínicos, estudos abertos “open-label”, estudos em modelos animais e artigos não relacionados ao agulhamento seco. Após o cruzamento dos descritores e aplicação dos critérios de inclusão e exclusão, foram selecionados seis artigos.

CONCLUSÃO: O diagnóstico da dor miofascial pode se apresentar como uma tarefa difícil, uma vez que ela pode simular diferentes algias do sistema mastigatório, desde uma odontalgia até uma dor neuropática trigeminal. Isso pode ser minimizado com uma adequada anamnese, exame clínico envolvendo palpção muscular, além da própria experiência e treinamento profissional. A desativação dos pontos-gatilho miofasciais deve ser prioridade na abordagem terapêutica da dor miofascial já que é observada melhora significativa da dor local e referida, quando essa é realizada. Apesar de resultados favoráveis em estudos sobre

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o agulhamento seco no tratamento da dor miofascial, relacionada à disfunção temporomandibular e a região cervical, ainda faltam na literatura pesquisas com elevado nível de evidência que comprovem a eficácia e a eficiência dessa técnica. Essa é uma terapia minimamente invasiva, de baixo custo, segura e apresenta efeitos locais, segmentares, extrassegmentares e placebo. Diante do exposto, pode-se recomendar seu emprego por diferentes profissionais da área da saúde nos casos da dor miofascial.

Descritores: Agulhamento seco, Disfunção da articulação temporomandibular, Pontos-gatilho miofasciais, Síndrome de dor miofascial.

INTRODUCTION

Dry needling (DN), used for myofascial pain (MP) treatment, despite being taken for traditional Chinese acupuncture, is a western technique based on distinctive neurophysiologic principles. First described by Travell in the 1960s, DN was largely used after Lewitt's studies were published and widespread in the last decade^{1,2}. DN was originally developed in order to disable myofascial trigger points (MTrPs). A myofascial trigger point is a hyperirritable spot, located within a taut band of muscle, or muscular fascia, associated with local or referred pain. They are also associated with clinical signs of MP and a source of peripheral and central sensitization^{3,4}.

Besides being closely linked to MP physiopathology, the MTrPs are connected to muscle weakness, local irritability, muscle unbalance and lack of motor coordination on the affected muscle or the groups pertaining to its synergy^{5,6}.

Wright e North⁷ have studied 190 patients suffering from temporomandibular pain, in order to demonstrate which masticatory and cervical muscles connected to temporomandibular dysfunction (TMD) are more affected and more capable of generating pain in the craniofacial area. They found the prevalence of the superior trapezius muscle in 60% of the patients, the lateral pterygoid in 50% and the masseter, superficial bundle, in 47%.

Another epidemiological study, conducted by Fernández-de-las-Penas et al.⁸ investigated the number, location and reference area of active MTrPs pain in the superior trapezius, head splenius, sternocleidomastoid, masseter, superior oblique, levator scapulae and suboccipital muscles in 13 women, 30 and 50 years old, with tension type cephalalgia. An average of seven active trigger points (AMTrPs) was found in each patient with the following location prevalence: suboccipital muscles (92%), superior oblique muscle (85%), superior trapezius muscle (85%) and masseter muscle (69%). The largest pain reference area by AMTrPs was the forehead (5.9 cm²), followed by the occipital (4.1 cm²), lateral left (3.3 cm²) and right (2.8 cm²) areas.

The objective of this study was to describe the use of DN and to perform a critical literature analysis about the technical aspects of its use by qualified health care professionals.

THEORETICAL MODELS

In the last 30 years, several methods and conceptual models concerning DN have been developed. The most used MTrPs

model in clinical practice proposed by Simons, Travell and Simons⁹, proposes that needling should be performed directly on the active and latent MTrPs since they are assumed as an MP¹ hegemonic factor. The DN is intended to cause an effect known as "rapid contraction response" (RCR), which features a spinal reflex, resulting from the sudden and involuntary contraction of the muscle fibers present in the stressed muscle band, which contains the MTrPs^{9,10}. This effect is considered necessary in this model so that the technique is effective and when touched, it indicates the needle was inserted correctly^{11,12}.

Gunn¹³, one of the ND use pioneers, from empirical observations, proposed a model called "Radiculopathy." In this model, the needle is inserted in the paraspinal area (mainly in the multifidus muscles) related to the peripheral muscles and in the muscle tendon junction which contains the MTrPs. The same author has based his technique on the principle that considers the MP as a syndrome caused by a neuropathy or peripheral radiculopathy. This syndrome features neurophysiologic changes in the spinal nerve emerging area, associated with disc compressions, narrowing of intervertebral foramen and nerve compression. These changes can be associated with muscular malfunction, with the resulting emergence of MTrPs in muscles innervated by the affected root^{6,11,13}.

The spinal segmental sensitization model was proposed by the physiatrist Fischer¹⁴. In this case, the needling is made in the interspinous and supraspinous ligaments, in the paravertebral muscles and directly in the MTrPs. According to this model, the segmental sensitization results in a hyper activation of the medullary dorsal horn by nociceptive stimulus originating from the wounded tissue. This results in hypersensitivity in the dermatomes and painful activation of the corresponding sclerotomes, besides the generation of MTrPs in the muscles connected to that spinal level^{3,11,12,15}.

MECHANISM OF ACTION AND PHYSIOLOGICAL EFFECT

The effects of reduction of pain and muscle stress, coordination and muscle length improvement, besides recovery of mobility due to DN, are very complex and are associated to MTrPs disinhibition. Therefore, we will begin with describing the physiopathology of the trigger points (TP) build up and later the mechanisms that explain the effects of the DN grouped into local, segmental and extra segmental, according to the most recent literature. These effects differ depending on the location, depth, and movement of the needle, and also whether the RCR is present or not.

MYOFASCIAL TRIGGER POINT

The MTrP can objectively be observed in nuclear magnetic resonance (NMR) exams, ultrasound scan (US)¹ and infrared thermography (IRT)^{16,17}. The first two exams are difficult to use in regular practice due to their high cost, while the IRT equipment is not normally available on specialized services and hospitals. In the face of that, it must be identified by manual touching or

by rolling or pinching techniques to find the muscles, their synergistic and their antagonists^{1,6}. After identification, the MTrPs can be qualified into three subtypes: active, latent and satellite, the two first ones being the most used in the ND therapy. The active MTrP is spontaneously painful, producing a pain pattern from a distance. The latent usually triggers pain only after the stimulus, while the satellite results from primary TrPs (latent or active) present during long periods of time^{9,15,18}.

PHYSIOPATHOLOGY OF THE MYOFASCIAL TRIGGER POINT

According to recent research, there are three essential factors involved in the MTrP generation: excessive release of acetylcholine, shortening of sarcomeres and release of inflammatory and algogenic substances like, for example, substance P. Increase of acetylcholine at the neuromuscular joint causes increase of muscle fiber tension and, consequently, localized ischemia and hypoxia which induce release of algogenic substances (energy crisis). These substances cause higher release of acetylcholine completing a vicious cycle^{2,18,19}. Maintaining harmful stimulus gradually increases sensitization of the medullary dorsal horn and neurons, which were silent, start sending ascending stimulus, activating supraspinal systems which result in central sensitization¹⁸⁻²⁰.

LOCAL EFFECTS

Inserting the needle in the MTrP harms and/or destroys the motor plates with the resulting distal axonal denervation and inducing physiological regeneration after 7 to 10 days. This lesion is focal and does not bring a significant risk of generating scar tissue^{6,11}.

The RCR, when obtained, reduces electric activation of the affected motor plate (by reducing the excessive action of acetylcholine), which is observed by the spontaneous reduction of electrical activity in the tension band zone²¹.

Another probable local effect is the stretching of the cytoskeleton structures, followed by the recovery of the sarcomeres normal length due to the reduction of the overlap of the actin and myosin filaments^{6,20}.

The mechanical pressure induced by the needle associated with its rotation polarizes the conjunctive tissue, which has an inherent piezoelectricity feature. This mechanical stress transformed into electrical activity seems to help tissue remodeling⁶.

When the needle is inserted, an axonal reflex hits the terminal net of A delta and C fibers, which are connected to the release of several vasoactive substances^{6,19,20}. They act generating vasodilatation and increase of local blood flow which results in reducing the concentration of algogenic substances and reducing the activation of nociceptors, reaching the point of resolution of peripheral sensitization¹⁸. Besides local vasodilatation, a study using a thermographic camera has shown distal vasodilatation in the pain reference area^{21,22}.

SEGMENTAL EFFECTS

Inserting the needle awakes A delta and A beta fibers present in muscles and skin, which in turn activate intermediate cells like dorsal in the spinal medulla, by collateral terminals. The intermediate cells release enkephalin which blocks the transmission of pain, effect known as “segmental analgesia,” which requires a few seconds to begin but can last several days²³.

EXTRA-SEGMENTAL EFFECTS

ODN activates the release of opioid neuropeptides such as beta-endorphins, enkephalin and dynorphin. These opioids can work by inhibiting directly the ascendance of the nociceptive transmission which began in the medullary dorsal horn. The beta-endorphin released after needling originates a suppression in the release of substance P, also inhibiting the transmission of pain^{2,4}. These peptides also activate an area in the mesencephalon, the periaqueductal gray substance (PAG), where several fibers descend from each spinal medullary level to the dorsal horn. The PAG is activated by beta-endorphin which is released by the nerve fibers descending from the hypothalamus (more precisely from the arcuate nucleus). The system descending from PAG releases serotonin which makes the intermediate cells to release enkephalin, which, in turn, inhibits the spinal dorsal horn cells, blocking the transmission of pain. Another descending PAG via originates diffuse release of noradrenaline all over the dorsal horn, generating a post-synaptic inhibitory block of the transmission cells (Figure 1)²³.

A delta fiber stimulation seems to activate descending inhibitory systems mediated by a synergistic relationship between serotonin and norepinephrine. Norepinephrine has a direct inhibitory effect on the post-synaptic membrane of the transmission cells².

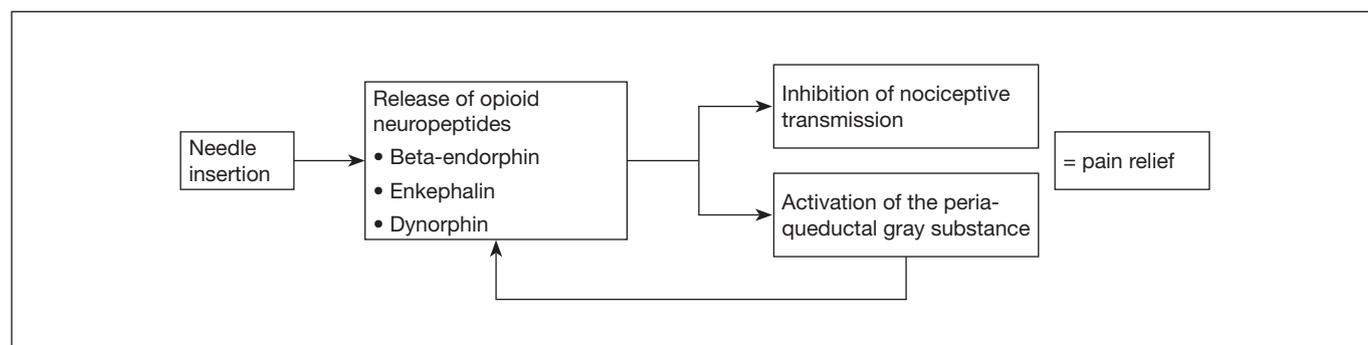


Figure 1. Extra-segmental effects

More recent studies indicate that DN increases the number of opioids via endocannabinoid system². These cannabinoids can inhibit the release of several pro-inflammatory cytokines reducing pain and inflammation.

PLACEBO EFFECT

The expectation generated by therapeutic procedures is capable of modulating the perception of pain, a mechanism known as “placebo analgesia”¹⁶. Neuroimaging showed that brain areas such as the periaqueductal gray substance, amygdala, insula, and thalamus are recruited during the placebo analgesia. Therefore, these effects are enhanced when the ND⁴ technique is used.

APPLICATION TECHNIQUE

DN can be used with deep (DDN) and superficial (SDN) technique. In DDN, the needle is inserted through the skin and goes deep towards the center of the MTrPs. When the RCR signal is provoked, the technique seems to be more effective, probably due to the rapid depolarization of the muscle fibers involved, associated to the reflex contraction¹².

The conclusion of a recent² review study was that the RCR is not a crucial component in the treatment. The DDN reaches the polymodal receptors of the motor units, and studies suggest that these receptors are more effective in inducing analgesia than cutaneous receptors^{12,23}. These receptors respond to chemical, thermal and mechanical stimulation and can generate effective analgesic effects when stimulated by needling. DDN is associated with the reduction in the activation of the terminal motor plates involved in reducing local and referred pain, increasing movement amplitude and reducing the concentration of inflammatory substances present in the location of the MTrPs^{20,24,25}.

It can be performed by using different methods of inserting the needle. In the stationary technique, the needle is inserted in the desired location and kept with no other manipulation. In the piston-like type, the needle is inserted and partially removed several times in the selected spot or around it. Another application method is to perform needle rotations, both clockwise and counter-clockwise, keeping it in the same spot. This rotation seems to activate more precisely the C fibers and the superficial and deep receptors when compared to the piston-like type². Piston-like type is believed to be more effective in inducing local relaxation of the muscle fibers. However, it is associated with a higher number of adverse effects². The stationary type seems to be more effective as analgesia^{12,24,26}. Despite these considerations, the studies are not conclusive as to which is the more effective approach.

In SDN, the needle is inserted in the MTrPs, into the subcutaneous layer, 5 mm to 10 mm deep, at an angle between 20 and 30°. The needle can be kept fixed on the spot or be rotated. Since it isn't inserted into muscle tissue, RCR is not expected. SDN has the benefit of being less painful than DDN, besides being indicated for application in risky areas such as lungs and large blood vessels. Studies have shown that SDN is more effective than the placebo in reducing painful situations¹².

Either DDN or SDN can be used in muscles in a distal position in relation to the active MTrPs on the same dermatome³. The resulting analgesic and sedative effect can be explained by the diffuse nociceptive inhibitory control phenomena. This needling technique can be selected if the main area to be treated is very sensitive (hyperalgesia and/or allodynia).

APPLICATION TIME AND FREQUENCY

Studies are non-conclusive as to how long the needle should be in place with either technique, and there is no consensus as to how many sessions would be necessary. Clinical practice indicates it can last from 5 up to 30 minutes⁴. Some authors indicate 2 to 3 sessions for acute cases and 3 to 5 sessions for chronic cases¹.

CONTRAINDICATIONS

The ND absolute contraindications are needle phobia, areas with lymphedema, medical urgency, history of abnormal reaction to anesthetic procedures and unconsciousness, or mental confusion. The relative contraindications are therapy with anti-coagulant, vascular disorder, epilepsy, allergy to the metal on the needle, pregnancy and in children^{1,11}.

CONTENTS

Search strategies in literature

In order to make a critical review of the scientific evidence on the use of ND to control masticatory and cervical muscle pain, a search in the literature was carried out for books in English, review articles, randomized controlled or quasi-randomized clinical trials, blind or double-blind and published case studies series in Portuguese or in English. The following databases were used: Cochrane, LILACS, and Pubmed. Articles published from September 1996 to January 2017 were selected according to the following keywords: dry needling versus myofascial pain syndrome versus temporomandibular joint dysfunction syndrome) versus trigger points versus musculoskeletal manipulations versus trapezius muscle, superficial back muscles versus masseter muscle versus temporal muscle versus pterygoid muscles versus digastric muscle, neck muscles. Reports of clinical cases, “open-label” studies, studies with animal models and articles not related to DN were excluded.

After the matching descriptors and the implementation of inclusion and exclusion criteria, we selected six articles, with results summarized below:

Dry needling on myofascial trigger point in the cervical area

Ong and Claydon²⁷ in their systematic review study, with meta-analysis, meant to determine ND efficiency, as compared to other techniques (needling with lidocaine and placebo) to treat MTrPs, in the cervical and shoulder areas. The visual analogue scale (VAS) was the rating instrument selected to measure the pain in these patients. It was used at the beginning of the treatment, right after the end and 1 to 6 months later. AMTrPs were found in the superior trapezius muscle in all the studies, but

there was no reference as to which ND technique was used and if it was applied in other AMTrPs in the analyzed areas. The conclusion was that ND is as effective as the use of lidocaine in the active MTrPs and points out that the first is minimally invasive, low cost and has less adverse effects than the local anesthetic. They have also mentioned there is no difference between ND and the placebo.

Ziaifar et al.²⁸ conducted a randomized study with 33 patients which also presented MTrPs in the superior trapezius muscle. The patients were divided into a standard group (n=17) and an experimental group (n=16). The first group received the digit pressure therapy in the MTrPs and the second group, dry needling (DN) using the piston-like type. They were submitted to 3 sessions for a one-week treatment. The VAS and the algometer were used before and after each procedure to measure pain intensity and the pain threshold to pressure. The measurements were taken again, 2 days after the end of the 3rd session. The results of this study suggest that both the digit pressure and the ND were effective to relieve pain and increase the pain threshold to pressure. However, the difference in the VAS measure in the group receiving ND was significantly higher. According to the study, this can be explained by the higher blood flow and local oxygenation promoted by DN.

Pecos-Martín et al.²⁹ observed in a randomized research with 73 patients with unilateral cervical pain, that the patients submitted to DN on the active MTrPs of the inferior trapezius muscle, presented significant pain relief, increase of pain threshold to pressure and reduced incapacity rate when compared to patients submitted to needling in the same muscle, but at a distance 1.5 cm farther from the active MTrPs.

Dry needling on myofascial trigger point in the masticatory muscles

Fernández-Carnero et al.³⁰ researched the effects of DDN, compared to the placebo (false superficial needling) in 12 female patients com TMD, myofascial pain type. The DDN and the placebo were performed in the active MTrPs of the masseter muscle, in 2 sessions 2 days apart. An electronic algometer was used to measure the pain threshold to pressure before the intervention, after 5 minutes and 1 week later. The maximum mouth opening without pain was measured the same way. The technique used in the DDN was piston-like, performed in the active MTrP of the masseter muscle, up to 5 rapid contraction responses (RCR). The conclusion was that the DDN in the masseter was more effective in raising the pain threshold to pressure and gain mouth opening amplitude without pain, although the group receiving placebo also had an improvement in the measurements.

After confirming that masseter and anterior temporal muscles are the most commonly affected with masticatory myofascial pain, other authors³¹ conducted a randomized, double-blind study comparing the DDN technique and the placebo needling (Sham) in the active MTrPs of those muscles. The study included 52 subjects (45 women and 7 men) with ages varying from 18 to 57 years, divided into a study and a control group. The study group was submitted to 3 sessions, one every 7 days, when the active MTrPs received the DDN using the piston-like technique.

The VAS and the pressure algometry were applied immediately after the 1st intervention and again a week after the last intervention. The study results pointed to pain reduction and an increase in pain threshold to pressure in both groups. Other studies already mentioned have also pointed there was no difference between the NND technique and the Sham needling (superficial). Gonzalez-Perez et al.³² conducted a study with 48 patients who had chronic masticatory myofascial pain, with the involvement of the lateral pterygoid muscle. This muscle, selected because it is difficult to reach for the application of other techniques such as stretching and deep massage, received the DN via extraoral in the test group (n=24). There were 3 sessions, once a week, totaling 3 weeks. The control group was submitted to pharmacological therapy with methocarbamol/paracetamol prescribed every 6 hours, for 3 weeks³³. The VAS and the movement amplitude measurements, such as maximum mouth opening, laterality, and protrusion of the mandible were measured at the beginning and the end of the treatment. The authors reached the conclusion that the ND was more efficient for reducing pain and recovering the amplitude of the measured movements than the group pharmacologically treated.

CONCLUSION

The diagnosis of myofascial pain can be a difficult task since it can simulate different masticatory system pain, from a toothache to a trigeminal neuropathic pain. This can be minimized with proper history taking, clinical examination involving muscle palpation, as well as the own experience and professional training. The deactivation of myofascial trigger points should be a priority in myofascial pain therapy since there is a significant improvement of local and referred pain when we use this approach. Despite the favorable results of studies about the use of dry needling in myofascial pain treatment related to temporomandibular joint dysfunction and the cervical region, the literature still lacks studies with a high level of evidence proving the effectiveness and efficacy of this technique. This is a minimally invasive, low cost, and safe therapy that provides local, segmental, extra segmental and placebo effects. Therefore, its use should be recommended by different health professionals in cases of myofascial pain.

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Nurses' role in the non-pharmacological pain treatment in cancer patients

O papel da enfermagem no tratamento não farmacológico da dor de pacientes oncológicos

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ABSTRACT

BACKGROUND AND OBJECTIVES: Non-pharmacological therapy is important and complements the pharmacological treatment to relieve the pain and anxiety in many patients, and it is also classified as complementary and integrative therapy. The objective of this study was to describe the nurses' role in non-pharmacological pain management in cancer patients.

CONTENTS: Integrative literature review. Scientific publications indexed in the Medline, Integrated Building Environmental Communications System, LILACS and Nursing databases, accessed through the Virtual Health Library in October 2016, were evaluated. Following the inclusion criteria, seven studies were selected, published between 2006 and 2016. Data were subjected to content analysis. Based on this analysis, the articles were described in three categories: 1) the perception of nurses; 2) the perception of the patient, and 3) nursing actions.

CONCLUSION: It was evident the fundamental and important role of the nursing staff in the non-pharmacological pain management in cancer patients. Both patients and family members should actively participate in the treatment. It is recommended the development of reliable and effective communication links, in addition to the implementation of educational actions involving the triad patient-family-team.

Keywords: Neoplasia, Nursing care, Pain management, Perception of pain.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A terapia não farmacológica é importante e complementa o tratamento farmacológico no alívio da dor e da ansiedade em muitos pacientes, e também é classificada como terapia complementar e integrativa. O objetivo deste estudo foi descrever o papel da enfermagem no manuseio não farmacológico da dor de pacientes oncológicos.

CONTEÚDO: Revisão integrativa da literatura. Foram avaliadas publicações científicas indexadas nas bases de dados Medline, *Integrated Building Environmental Communications System*, LILACS e Base de Dados em Enfermagem, acessadas por meio da Biblioteca Virtual em Saúde, em outubro de 2016. Seguindo os critérios de inclusão, selecionaram-se sete estudos com publicações entre 2006 e 2016. Os dados foram submetidos à análise de conteúdo temática. Com base nessa análise, os artigos foram descritos em três categorias: 1) a percepção do enfermeiro; 2) a percepção do paciente; e 3) as ações de enfermagem.

CONCLUSÃO: Evidenciou-se o fundamental e importante papel da equipe de enfermagem no manuseio não farmacológico da dor do paciente oncológico. Tanto pacientes quanto familiares devem participar de forma ativa do tratamento. Recomenda-se o desenvolvimento de vínculos de confiança e eficaz comunicação, além da implementação de ações educativas envolvendo a tríade paciente-família-equipe.

Descritores: Cuidados de enfermagem, Manuseio da dor, Neoplasias, Percepção da dor.

INTRODUCTION

Cancer can be defined as the uncontrolled growth of cells that can reach different regions of the body. The disease represents one of the leading causes of death in the world population. About 8.2 million people die every year due to the disease, accounting for 13% of global deaths. In addition, it is estimated a 70% increase in cancer cases over the next two decades¹. There are more than 100 types of cancer that require specific diagnoses and treatments. The areas most commonly affected in men are the lungs, prostate, intestine (colorectal region), stomach and liver; and in women, breast, intestine (colorectal region), lungs, uterus and stomach¹.

In Brazil, the *Instituto Nacional de Câncer José Alencar Gomes da Silva* (INCA) estimated an increase of almost 600,000 new cancer cases in 2016. According to the Institute, this can be attributed partly to an increase in life expectancy, urbanization, and globalization. Regarding the types of cancer in the country, the highest incidences are those of non-melanoma, prostate and breast².

Pain prevalence in cancer patients increases with the progression of the disease. Pain is present in about 30% of cancer cases during treatment; and in cases where the disease has spread, around 60 to 90% of the patients have pain. On the other hand, in about 80 to 90% of the cases, pain can be completely relieved, and an acceptable relief level can be achieved in most other cases³.

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Living with cancer brings with it important daily changes that require personal and family reorganization in the social, organic, emotional and spiritual spheres. In this context, nursing is inserted in these patients care, aiming at visualizing this population needs, as well as rethinking a care program directed to the current problem⁴.

Pain control and relief are a multidisciplinary team attribution. As the nursing team is the professional class who remain most of the time close to the patient, being responsible for their care, it is clear their important role in pain evaluation and management of the cancer patient, especially non-pharmacological management⁵. It was considered as a research question: do nurses have knowledge about pain management with non-pharmacological measures? Thus, it is evident the importance of adequate pain management in this class of patients.

The purpose of this study was to describe the nursing role in the non-pharmacological pain management in cancer patients.

CONTENTS

This is an integrative review of the literature, with a qualitative approach to identify scientific papers on the nursing role in the non-pharmacological pain management in cancer patients. To conduct the study, the six steps for integrative review were followed, namely: selection of the research question; inclusion criteria definition of studies and samples selection; table format representation of selected studies; critical analysis of the results, identification of differences and conflicts; clear interpretation of the results to be reported, the evidence found.

For the selection of the studies, we searched the publications indexed in Medline (Medical Literature and Retrieval System on Line), IBECs (Integrated Building Environmental Communications System), LILACS (Latin American and Caribbean Health Sciences) and the Nursing Databases (BDENF), accessed through the Virtual Health Library (VHL), in October 2016.

To search for the articles in the databases, the following Health Science Descriptors (DeCS) were used: "Nursing Assessment," "Nursing Care," "Pain," "Pain Measurement," "Pain Perception," "Pain Management," "Neoplasms," "Cancerism".

The following inclusion criteria were considered: studies involving cancer patients, including the evaluation of the nursing role in the non-pharmacological management of cancer; including only adult patients, all study designs, such as randomized clinical trials, observational studies, qualitative studies, case-control, cross-sectional studies, case reports, systematic reviews and meta-analyses, and literature reviews, published between 2006 and 2016, in Portuguese. As for the exclusion criteria, books chapters, dissertations, thesis and publications with duplicate data were considered illegible for the study. For the potentially eligible studies, the full texts were searched for a thorough examination. Studies that met the previously established eligibility criteria were included.

For the data extraction of the selected articles, we used an instrument designed for this purpose, with title, authors, journal and year of publication, type of research, place of research, objective, methods, main results and conclusion. The material was grouped and compared by content similarity. Three analysis categories were constructed: the nurse's perception, the patient's perception, and the nursing actions. The searches conducted in the electronic databases resulted in 2034 citations, which included studies related to pain, not only in the nursing field or addressing non-pharmacological treatment. Of the 2034 articles, 61 were published between 2006 and 2016 in the Portuguese language. Of those, 36 were duplicate texts, remaining 25 citations for titles and abstracts analysis. Of the 25 studies, 10 were excluded because they did not meet the eligibility criteria, remaining 15 articles for the full text analysis. Among them, seven met the eligibility criteria previously defined and were included in this study (Figure 1). The seven articles included were published between 2008 and 2015 and used a qualitative methodology, one of which is a literature review⁶. Participants included nurses as well as cancer patients. Such information, as well as each study purpose and location, are shown in table 1.

As previously described, based on the results of these studies, three categories were organized: the nurse's perception, the patient's perception, and the nursing actions. Table 2 sum-

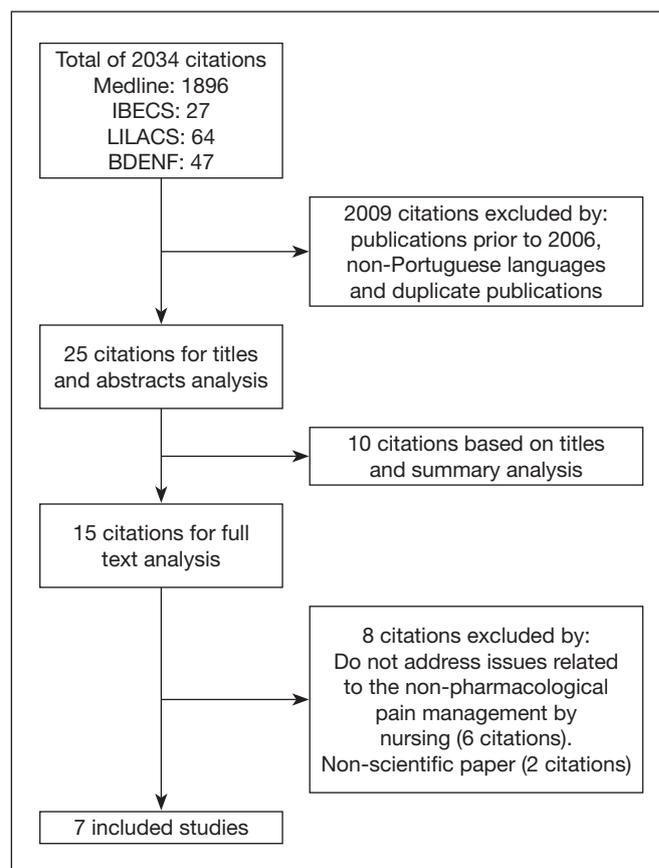


Figure 1. Study selection flowchart

Source: authors.

Table 1. Characteristics of the studies included

Authors	Purposes	Studies design	Locations	Participants
Stübe et al. ⁷	Apprehending the nurses' perception who works in Oncology, referring to the patient's pain and knowing the actions for their handling.	Descriptive, qualitative study.	Oncologic clinic, chemotherapeutic and radiotherapeutic units of a general hospital in Rio Grande do Sul.	7 nurses
Rennó e Campos ⁸	Analyzing the patients' perception of an oncology ambulatory about professional-patient interpersonal communication.	Exploratory qualitative case study.	High complexity Oncology unit from south of Minas Gerais.	13 oncologic patients
Macedo, Romanek e Avelar ⁹	Reflecting on the pain management in the immediate postoperative period of cancer patients by the perioperative nursing team.	Descriptive, qualitative study. Literature review.	NA	NA
Fernandes et al. ¹⁰	Knowing the nurse's perception of the cancer patient under palliative care.	Exploratory qualitative study.	Hospital treating cancer patients under palliative care in the city of João Pessoa, Paraíba.	9 nurses
Waterkemper e Reibnitz ¹¹	Revealing the nurses' conceptions and contributions on the pain evaluation in cancer patients under palliative care, through an education at work proposal based on the problematic education presuppositions of Paulo Freire.	Qualitative research of convergent-assistance type.	Palliative Care Unit of the Oncology Research Center, in Florianópolis, Santa Catarina.	6 nurses
Leal et al. ¹²	Knowing and analyzing the evaluation and register means performed by nurses in the pain context of cancer patients.	Qualitative research.		
Nobre ¹³	Identifying how nurses perceive chronic pain in cancer patients and analyzing nursing care for these patients.	Qualitative, descriptive, exploratory.		

marizes the articles distribution identified in the categories, followed by the description of the findings in each of them.

Table 2. Articles distribution identified in the categories

Category order	Category name	Included articles
Category 1	The nurse's perception	Stübe et al. ⁷ Fernandes et al. ¹⁰ Waterkemper e Reibnitz ¹¹ Nobre ¹³
Category 2	The patient's perception	Rennó e Campos ⁸
Category 3	The nursing actions	Stübe et al. ⁷ Macedo, Romanek e Avelar ⁹ Waterkemper e Reibnitz ¹¹ Leal et al. ¹²

THE NURSE'S PERCEPTION

The pain experienced by the cancer patient goes beyond the physiological scope, extending to the psychological and social dimensions and is perceived by the nurses through verbal reports, facial expression and through the eyes^{7,11}. Emotional pain, also called soul pain, psychological or emotional or spiritual pain, is also often mentioned by nurses. This is an immeasurable aspect, which can be manifested through denial mechanisms regarding diagnosis and treatment. In this context, the perception of the nursing team regarding the cancer patient's attitudes is of great importance, since it can

contribute to the planning of fast and adequate actions, taking into account individuality, uniqueness, lifestyle, beliefs and cultural values⁷.

With regard to terminal cancer patient pain relief, nurses reported pain and suffering relief to improve the patient's quality of life. Palliative care promotes comprehensive, humanized and multidisciplinary care and aims to minimize the patient and family's longings and provide therapeutic support. In this context, communication seems to be a highly relevant tool in palliative care, because it promotes adequate assistance so that the patient reaches his final destination with dignity¹⁰. In addition, it is important to emphasize that pain is understood as a stress agent not only for the patient but also for the team and the family⁷.

THE PATIENT'S PERCEPTION

For the cancer patient, the importance of communication seems to be a consensus in order to promote comfort, calm, alleviate symptoms, diminish distress and provide balance. In this sense, inadequate or noisy communication with the patient can cause distress, fears, anxiety, among other negative feelings, and may cause interference in the assistance⁸.

THE NURSING ACTIONS

In order to minimize the cancer patient pain, the nurse must be able to perform the appropriate patient assessment in order to identify the pain causes and possible nursing behaviors. Stübe et al.⁷ identified as the most common conducts the administra-

tion of analgesics, especially opioids, as well as care regarding dosage, indications, schedules, especially at the patient's home and guidelines to the nursing team. In the same study, other conducts were also mentioned, such as heat application, decubitus changes and walking stimulus; besides care, individualized care, comfort measures and proximity to the patient⁷.

In addition, the importance of the work in a multidisciplinary team is emphasized, favoring patient's integral assistance, as well as educational actions with this team and family integration in the care of cancer patients⁷. A dialogical relationship that aims to listen to the patient and his family is reinforced by the bond and trust between the professional and the patient/family^{9,11}.

Regarding the ways to evaluate pain, one study by Waterkemper and Reibnitz¹¹ did not identify any specific instrument to evaluate pain in cancer patients among the nurses interviewed; in addition, the items identified in the nursing records were considered as low-comprehensive. Therefore, pain evaluation occurs in an individualized and unsystematic way, subjectivity being pointed out as the major obstacle¹¹. Macedo, Romanek and Avelar⁹ identified, through a literature review, the need to use specific instruments for pain evaluation in order to guide the treatment. However, it does not provide descriptions of what instruments should be used. Regarding pain management in the postoperative period in cancer patients, it was found that sensitivity and perception of the nursing team are fundamental⁹.

The pain experienced by the patient with cancer extends beyond the physiological pain to the psychological, social and spiritual spheres. The implementation of appropriate nursing approaches depends on the sensitivity and acumen for the correct pain assessment, which involves pharmacological and non-pharmacological actions.

In the context of pharmacological actions to relieve cancer pain, the nursing team should be able to manipulate drugs, especially opioids. Proper management of drugs and materials is extremely important and can directly influence the patient's clinical outcomes, reduce hospital stay and costs^{9,14}.

However, adequate pain control involves multiple interventions in order to act on the various pain components. Non-pharmacological interventions include a range of educational, physical, emotional, behavioral, and spiritual measures. In general, they are inexpensive and simple to use measures that can be taught to patients and caregivers. However, it is the nursing assignment to choose the interventions for each patient, based on an adequate evaluation¹⁵.

In the context of pain evaluation, the absence of standards by the nursing teams for the adequate assessment of patient pain was evidenced in this study. It is considered that these actions can be improved more specifically with the use of the *Sistematização da Assistência de Enfermagem* (SAE) (Systematization of Nursing Care)⁷. The nursing process is systematic, once it consists of five steps: investigation, diagnosis, planning, implementation, and evaluation¹⁶.

It is known that pain assessment is complex, as it is a subjective symptom, influenced not only by the pathophysiologi-

cal process but also by emotion and culture. In this context, international organizations such as the Joint Commission Accreditation of Healthcare Organizations (JCAHO), the American Pain Society (APS) and the World Health Organization (WHO) propose assessment and treatment policies based on the need of a systematic implementation of pain assessment and recording routines in health institutions. APS suggests the incorporation of pain assessment in the routine of vital signs check, thus creating the expression "Pain: 5th Vital Sign", in an attempt to make health professionals aware of the importance of assessing this parameter¹⁶.

The role of educational actions together with the multidisciplinary team is also highlighted, through the awareness of the importance to identify the causes that generate noise, excessive light, and parallel conversations, which may intensify the patient's discomfort and pain in the hospital environment¹⁷.

The significant role of communication to manage the pain in cancer patients was also evidenced in this study. Communication can be defined as a process of understanding and sharing messages that can interfere with the behavior of the people involved. It is a fundamental interpersonal competence in the context of nursing care, which will allow the adequate attendance of the patient's needs⁸. From the patient's perspective, the balance in the health-disease process and the humanization in interpersonal relationships were achieved when the communication was established⁸. Many times, pain is inadequately managed due to the difficulty of hearing the patient's complaint¹¹.

The patient-family-team triad needs to be built with confidence and bond for the treatment success. In the face of the complexity and variability of the problems arising from cancer treatment, the clinical, social, psychological, spiritual and economic aspects associated with cancer should be considered, as well as family members care⁷. The family integration into the cancer patient's care is of extreme importance in several initiatives aimed at minimizing pain, including educational actions regarding home care. The nursing team should encourage the family to be present and be active in the process of caring and in the confrontation of the disease¹⁸.

CONCLUSION

Nurses recognize the existence of non-pharmacological measures for pain relief. However, the huge workload coming from many fronts end up using too much care time of these professionals, and pharmacological measures are, in many cases, the first choice to treat patients' pain. From the non-pharmacological measures that can be employed and that nurses are aware of for pain treatment, the following stand out: patient orientation with regard to protective postures, emotional support, massage, music therapy, Reiki, relaxing massage, heat or cold application, use of cushions, mechanical immobilization, among other measures that can be implemented by nurses, their teams and family members, contributing decisively to the pain relief of hospitalized patients.

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Experience with women with fibromyalgia who practice zumba. Case reports

Experiência de mulheres com fibromialgia que praticam zumba. Relato de casos

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ABSTRACT

BACKGROUND AND OBJECTIVES: Different types of exercises are being used for the treatment of fibromyalgia, such as aerobic, resistance, flexibility exercises and body awareness therapy, but there is strong evidence that the gold standard for the non-pharmacological treatment of this disease is the aerobic exercise. The objective of this study was to collect reports of patients with fibromyalgia who practiced three months of dance (Zumba) and had to stop dancing for three months due to the recess of the academic activity at the end of 2016 and beginning of 2017.

CASE REPORTS: This is a qualitative study about the experience of 16 women with fibromyalgia, who participated in Zumba class for three months in 2016. The reports were collected when they resumed their dance activities in March 2017. Therefore, the patients remained with no intervention for three months, during the academic recess. The patients wrote their reports on a sheet of paper, answering three questions. According to the reports, we noticed that Zumba brought several benefits for these patients, such as pain relief, improved sleep quality, self-esteem and physical performance.

CONCLUSION: Based on patients' reports we can conclude that Zumba, as a three-month intervention, produced positive effects in improving pain, functional capacity, and quality of life of women with fibromyalgia.

Keywords: Aerobic exercise, Fibromyalgia, Zumba.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Diferentes tipos de exercícios estão sendo usados para o tratamento da fibromialgia, tais como, o exercício aeróbico, treinamento resistido, exercício de flexibilidade e terapia de consciência corporal, mas existe forte evidência que o padrão-ouro para o tratamento não farmacológico

co dessa doença é o exercício aeróbico. O objetivo deste estudo foi coletar relatos de experiência de pacientes com fibromialgia que praticaram três meses de dança (Zumba), e tiveram que suspender a dança por três meses devido ao recesso da atividade acadêmica no final de 2016 e início de 2017.

RELATO DOS CASOS: Este é um estudo de abordagem qualitativa, sobre um relato de experiência de 16 mulheres com fibromialgia, que realizaram três meses de zumba no segundo semestre de 2016. Os relatos foram coletados no retorno das atividades em março de 2017, desse modo, as pacientes ficaram três meses sem a intervenção durante o recesso acadêmico. Os relatos das pacientes foram escritos por elas em uma folha, respondendo três perguntas. De acordo com os relatos foi percebido que a zumba trouxe vários benefícios para essas pacientes, como alívio da dor, melhora na qualidade do sono, autoestima e desempenho físico.

CONCLUSÃO: Baseado nos relatos das pacientes, podemos concluir que a zumba como intervenção realizada por três meses, produziu efeitos positivos na melhora da dor, da capacidade funcional e da qualidade de vida de mulheres com fibromialgia.

Descritores: Exercício aeróbico, Fibromialgia, Zumba.

INTRODUCTION

Fibromyalgia (FM) is a chronic and painful disease of a complex multifactorial etiopathology, as yet not entirely known. The main symptom found in patients with FM is the presence of pain in several tender points scattered around the body, over a period of at least three months. The occurrence of this disease in Brazil stands at 2.5%. The disease affects mainly women aged between 30 and 50 years old¹⁻⁵.

Some research studies of recent decades show that there are several factors within the physiopathology of FM, including changes to the brain and its structure; neural function; muscular physiology; hormonal factors; and genetic influence. There is growing evidence that shows that people with FM experience pain in a different way from the general population, due to the dysfunctional processing of pain in the central nervous system⁶. Its symptoms are many and can be associated with fatigue, sleep disorders, cognitive systems¹, anxiety, and depression. In addition, some cases may show gastrointestinal symptoms (irritable bowel syndrome) and somatosensorial problems such as hyperalgesia, allodynia, and paresthesia. All these symptoms negatively affect the quality of life (QoL) of the individual, affecting the quality of sleep, the ability to carry out activities of daily life, and productivity at work. In addition, it affects the dynamics of the family unit and harms the individual person's independence⁶.

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Women with FM have already shown that they have harmed physical capacities and that physically they are less active when compared with healthy people, having an impact on the QoL of these people⁴. Therefore, for the treatment of FM to be beneficial and to bring more positive results, a multidisciplinary approach is needed. This must involve everything from the education of the patient to illness, pharmacological treatment, taking physical exercise, and behaviour therapy, so that this may cater to all needs felt by these patients⁴. Different types of exercises are being used for the treatment of FM, including aerobic exercises, resisted treatment, flexibility exercises, and body conscience therapy⁴.

Compared with other types of exercise, aerobic exercise has shown a more positive effect on the people's QoL, showing a soothing of pain and depression, lessening of anxiety, and improvement in mental state and physical function. A study has shown that body movement, with low-impact exercise, associated with perception, has brought benefits regarding the perception of the body, improvement of pain, and relaxation, thus being able to reduce the number of painful points and muscular contractions⁷.

According to the European League Against Rheumatism (EULAR), in one of their reviews, aerobic exercise has been associated with general improvement in pain and physical function, among patients with FM. There is strong evidence that aerobic exercise is, indeed, the gold standard for treatment of this disease⁸.

Physical activity can be defined as any body movement carried out by the muscles, generating an increase in energy consumption. Exercise is a physical activity that takes place in a repetitive, programmed and prepared manner; hence, dancing can be considered a type of physical exercise⁷.

Dancing is a captivating and pleasant form of physical activity that gets even more attractive and dynamic when performed as a group activity. This is due to the joint execution of movements, as well as the exchange of ties and experiences. In addition, it brings greater motivation for physical exercise, as well as boosting attention and cognitive abilities, due to an increase in neural connections and blood flow. Last but not least, it has a positive effect on mood⁶.

On top of this, it contributes to the physical training of balance, co-ordination, strength, flexibility, aerobic capacity and proprioception. Dancing also gives stimulation to one's listening, sight, general sensorial capacities, and learning of motor skills, all of this within one learning environment that encourages plasticity. Studies have suggested that dancing can alleviate the symptoms of FM⁶.

One kind of dancing that has been growing and gaining ground these days is Zumba, currently practiced in over 120 countries around the globe. Zumba is a type of dancing inspired by Latin American music and dancing, bringing a few other types of dancing such as *salsa*, *samba*, *merengue*, and *reggeaton*, among others. There is the execution of basic aerobic movements, with sets of steps from belly dancing, *hip-hop*, and others⁹.

People who practice zumba get involved with the rhythms, the movements, and choreographies, all of which are easy to learn. There is no idea of right or wrong; each individual dance at his or her own pace and rhythm, getting carried away by the sound of the music itself. This means there is no need for any specific skills to be able to dance the zumba¹⁰. This rhythm establishes a link between the core principles behind aerobic physical training and general strengthening, thus

bringing an increase in energy consumption and promoting improvements to posture, and to the cardiovascular system, as well as strengthening of bones and muscles and improvement to physical aptitude⁹. The purpose of this study was to present reports on the experience of patients with FM who practised Zumba dancing for three consecutive months in 2016 and had to suspend the dancing activities for three months due to the academic recess between the end of 2016 and the beginning of 2017.

CASE REPORTS

This is a qualitative study on 16 female subjects with FM who participated in zumba dancing for three consecutive months in the second half of 2016. The reports were collected when activities resumed, in March 2017, meaning that the patients went three months without this intervention, during academic recess.

The study was carried out at the Clinic of the School of Physiotherapy at the Health Sciences University of Trairi (FACISA) of the Federal University of Rio Grande do Norte (UFRN), in the city of Santa Cruz, in the interior of the state of Rio Grande do Norte, Brazil.

This study came about as a result of the further activities project "*Zumbafibro: dancing and art in the promotion of health among women with fibromyalgia*", held in 2016 at FACISA/UFRN and renewed for 2017, based on the need to speed up service in the light of the high demand from patients with FM who were on the waiting list at the Clinic of the School of Physiotherapy at this same institution. The patients included in the Project had had a medical referral and a diagnostic hypothesis of FM and were subjected to two sessions of Zumba dancing per week for a period of three months, during the second half of 2016. A student who was duly qualified in this specific area gave these sessions, which took place in a spacious room with air conditioning.

Some groups of patients were excluded from the study. These included patients with uncontrolled hypertension; patients with uncontrolled cardiorespiratory disease; those with a history of syncope or arrhythmia caused by physical exercise; those with uncontrolled diabetes; patients with serious psychiatric problems; those who took regular physical exercise (at least twice a week) over the last 6 months; any other conditions that would make it impossible for the patient to take physical exercise; those with travel planned for the next 12 months.

This study was approved by the Research Ethics Committee of the Health Sciences University of Trairi, by statement No. 1,933,939, as according to the terms of Resolution No. 466/2012 of the National Health Council. All patients have duly read and signed the Free and Informed Consent Form (FICT).

Table 1 shows the social and demographic characteristics of the patients.

Table 1. Characteristics of the patients on initial evaluation

Variables	Mean
Age (years)	51.5
Time diagnosed with the disease (years)	5
Body mass index (kg/m ²)	27.82

When the activities of the Project started again in March 2017, the 16 women with FM answered three questions. The purpose

here was to look into how they felt having been without Zumba dancing for three months. Table 2 presents the results obtained. The first question was asked in order to understand how the patients felt during the long time they spent without zumba. The second question was to understand the real meaning and importance of zumba dancing for the patients (Table 3). The purpose of question 3 was to discover the patients' opinions about what aspects of the disease were improved by zumba dancing (Table 4).

Table 2. How did you feel over the three months of recess, without practicing zumba dancing?

"I felt terrible, with a lot of tension and pain"

"Very tired, with a lot of pain"

"I felt awful"

"I felt awful, with a lot of pain"

"Full of pain, and missing my Zumba dancing"

"I didn't feel at all well; I had fits of intense pain"

"Terrible, a lot of pain"

"I missed my dancing and had a lot of pain. I got worse"

"I felt a bit of pain"

"I felt a lot of pain, and lost motivation"

"I felt really bad"

"I felt a lot of pain without Zumba"

"I felt awful. I am unable to pay for private dance sessions"

"I felt terrible, without doing my exercises"

Patients' answers to question 1.

Table 3. How important is zumba dancing for you?

"Important, as it improves my quality of life"

"I think it is important, it makes me feel good"

"Important, it boosts my self-esteem"

"Very important, it helps me relax"

"Very important. I feel happy"

"Very important for me to socialise and make new friends"

"Very important; I just love zumba"

"I feel better with zumba. I relax"

"It is everything"

"Just great. I love it"

"It soothes my pain. I feel lighter"

"I feel great"

"I feel more courageous and with more self-esteem"

"Very important. I like it, and it makes me feel great"

"It is great, and helps to soothe the pains"

"It is important, as it helps a lot and makes me feel lighter"

Patients' answers to question 2.

Table 4. What do you think improved after zumba?

"The pains improved, and I sleep better"

"The pains improved"

"Reduction in pain, and improvement in self-esteem"

"My sleep improved, I have more energy, and it also helped to reduce my blood pressure"

"Improvement in physical performance, energy, sleep, and pains"

"The pains reduced, and now I have more energy and walk better"

"I sleep well, and pain is alleviated"

"I have more strength and energy to do my daily tasks, and I sleep well."

"I feel more energetic. Pains reduced, and my self-esteem has improved"

"Pain has improved. I feel my joints are less stiff, and I also feel less tired"

"I feel more stimulated"

"Improved self-esteem and reduction of pain"

"I lost weight, and the pain was reduced"

"It relieves pain. I have improved tremendously"

"The pain in my bones was reduced"

"The pain and my sleep improved"

Patients' answers to question 3.

DISCUSSION

As can be seen in the patients' reports, zumba dancing has a positive and direct influence on each patient's life, covering several different aspects of improvements to pain, QoL, and functionalities. Regarding the first question, which addresses how they felt in the three months of recess without practicing zumba, they said they missed the dancing, felt worse without dancing, felt more tired. They also mentioned that pain increased substantially, that they felt tenser, and that self-esteem was also affected.

Specialised literature shows that the aerobic exercises carried out as a group activity not only lead to an improvement in physical function but also favour an emotional improvement among the patients, as there are neuroendocrine changes such as an increase in serotonin, which leads to a better mood¹¹. In addition, group activities boost patient participation, as there is the establishment of ties of affection; in addition, there is sharing of experiences concerning the disease; thus, the activity becomes more dynamic. A study conducted on patients with FM to assess the effects of a programme of supervised physical conditioning, like a gym, showed that there was an increase in general functional capacity, together with an improvement in pain and to the general QoL of the participants¹¹.

In the second question of the study, which addresses the importance of zumba dancing for the patients, the answers reported clearly show that zumba is extremely relevant for the QoL of these people. With zumba dancing, they feel better, more relaxed, with better self-esteem; they also feel more courageous and feel pain relief.

Specialised literature confirms these results, showing that some studies that have carried out aerobic exercise on the ground confirmed that the patients have shown antidepressant effects, as well as greater relaxation and removal of the pain at the painful points¹².

With regard to the third and final question, we can see that zumba has been effective, through the improvements reported, in several different aspects of the patients' lives. The main focus has been pain relief, but there has also been an improvement in areas such as quality of sleep, self-esteem, and physical performance. They also reported that they were much more energetic when practicing zumba dancing. One study shows that exercises, when performed on a regular basis, bring a general feeling of well-being, which results in a reduction in feeling some of the symptoms of FM, also hiking the QoL of these patients¹³.

Lack of physical activity leads patients with FM to a general state of functional decline, with reduction of muscle resistance and cardiorespiratory function. These factors change functional performance, harming the execution of routine daily tasks (RDT)¹¹.

The physical exercise most commonly recommended nowadays, and which has had highly satisfactory results, is aerobics, which produces beneficial effects such as reduction of pain, improvement of sleep, improvement of general mood and cognition, and general improvement to well-being¹¹.

A plan of appropriate physical exercises, performed on a regular basis, improves motor co-ordination and also other physical abilities that are essential for the execution of RDT by people with FM¹⁴. With physical exercise, some substances are released to the brain, including endorphin, which is an important neuro-hormone which has an analgesic effect and acts upon modulation of pain, mood, anxiety, and depression. In addition, it relieves pain and provides a pleasant feeling¹³.

The American College of Sports Medicine (ACSM) stresses that the ideal dose of physical exercise for patients with FM is still unknown; however, in general, the recommendation is that aerobic exercise should be taken three times per week for acquisition of a positive result with the improvement of symptoms¹³.

Apart from these activities, other therapies are also very important. These include stretching exercises and exercises for the muscles. Stretching exercises have a positive effect on FM, generating improvement to sleep and morning stiffness¹⁴. Authors conclude that resistance training improves multidimensional functions, as well as easing pain and boosting muscular strength in women with FM; however, the evidence is still limited due to the small number of studies carried out on the performance of resisted exercise by patients with FM¹⁵.

A study carried out with 80 women with FM who took belly-dancing lessons showed encouraging results, with improvement in pain, sleep, functional capacity, and the patients' self-image. In addition, this being a form of therapy based more on play, there was an improvement in QoL and greater patient participation⁷.

It is believed that physical exercise must be prescribed based on the individuality of each patient and be programmed so that positive results may be obtained. It is important to remember that the best type of exercise is the one in which the patient feels greater pleasure and reduction of symptoms, both during the physical exercise and after it¹⁴.

CONCLUSION

Dancing zumba as a type of intervention, carried out over three months, produced positive effects in improvement of pain, functional capacity and QoL, according to reports by women with FM. The study showed some limitations, such as a small sample size and the absence of a control group, even though the choice made was to produce just one report on the experience by the patients who participated in the further activity project.

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Program of combined physical exercise reduces the perception of pain in a patient with sickle cell anemia. Case report

Programa de exercício físico combinado reduz a percepção da dor em paciente com anemia falciforme. Relato de caso

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ABSTRACT

BACKGROUND AND OBJECTIVES: Sickle cell anemia is one of the most common hereditary hematological disease in the world. Among many clinical manifestations, the main characteristic of this disease is the painful crises. Considering the increasing number of individuals with sickle cell anemia in Brazil, the increase in life expectancy of these individuals, who are advised to restrict physical activity, it is important to investigate this subject since exercises have been listed as relevant in health promotion. The objective of this study was to analyze the perception of pain, some physiological responses and the quality of life of a patient with sickle cell anemia undergoing a program of physical exercises (aerobic and resistance).

CASE REPORT: Female patient, 56 years old, diagnosed with sickle cell anemia as a child, and in the course of this research did not make routine use of drugs in the control of the disease. On physical and ergo-spirometric examination, and during four-month of combined exercise, she did not present critic clinical condition, only some characteristic difficulties such as musculoskeletal pain, low cardiorespiratory resistance, and early fatigue.

CONCLUSION: The results suggested that a program of combined and regular exercises produced important changes in the patient, in several aspects related to her health, including the reduction of musculoskeletal pain and increased general physical fitness, contributing to the improvement of the perception of quality of life.

Keywords: Health promotion, Musculoskeletal pain, Physical exercise, Physiology, Quality of life, Sickle cell disease.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A anemia falciforme é uma das doenças hematológicas hereditárias mais frequentes no mundo. Dentre as diversas manifestações clínicas, a principal característica dessa doença são as crises dolorosas. Considerando o crescente número de indivíduos com anemia falciforme no Brasil, o aumento da expectativa de vida desses indivíduos, e que ainda recebem orientação para restringirem práticas de esforços físicos, investigações sobre o tema se tornam relevantes, uma vez que o exercício físico tem sido elencado como estratégia na promoção da saúde. O objetivo deste estudo foi analisar a percepção da dor, algumas respostas fisiológicas e a qualidade de vida de uma portadora de anemia falciforme submetida a um programa de exercício físico combinado (aeróbio e resistido).

RELATO DO CASO: Paciente do sexo feminino, 56 anos de idade, diagnosticada com anemia falciforme quando criança, e no decorrer desta pesquisa não fez uso rotineiro de fármacos para o controle da doença. No exame físico e ergoespirométrico, e durante o período de intervenção de quatro meses de exercício físico combinado, não apresentou quadro clínico crítico, apenas algumas dificuldades características, como: dores osteomusculares, baixa resistência cardiorrespiratória e fadiga precoce.

CONCLUSÃO: Os resultados sugeriram que um programa de exercício físico combinado e regular produziu alterações importantes para a paciente, em diferentes aspectos relacionados à sua saúde, dentre elas destacam-se a diminuição da dor osteomuscular e aumento da aptidão física geral, contribuindo para a melhora da percepção da qualidade de vida.

Descritores: Anemia falciforme, Dor musculoesquelética, Exercício físico, Fisiologia, Promoção da saúde, Qualidade de vida.

INTRODUCTION

Sickle cell anemia (SCA) is a hemoglobinopathy arising from the replacement of a glutamic acid by a valine at the sixth position of the beta globin, giving rise to hemoglobin S (HbS). The gene responsible for encoding this protein is located on chromosome 11. In the case of absence or decreased oxygen tension, HbS undergoes polymerization, changing the morphology of the red blood cells (sickling), carrying less oxygen and having difficulties to properly circulate through the small blood vessels, resulting in the obstruction of the capillary blood flow and their early destruction¹. Sickle cell anemia is one of the most common hereditary hematological disease in the world. In Brazil, it has a significant

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epidemiological importance due to its prevalence; 2 to 8% of the population and its morbidity and mortality, therefore it has been singled out as a public health issue². However due to the advances in treatment, the infant mortality rate has decreased significantly in recent decades, however, the number of adults with SCA with late complications increased³.

The pathophysiological mechanism of the disease can cause several acute and chronic clinical manifestations, such as acute chest syndrome, pulmonary hypertension, heart failure and stroke⁴. Among the characteristic manifestations of the disease, vaso-occlusive crises are frequent, causing pain in bones, muscles, and joints as a result of the obstruction of the microcirculation of the sickled erythrocytes⁵. The intense physical effort is one of the factors that can contribute to this process⁶ which can worsen the complications and cause sudden death of these patients. However, Harmon et al.⁷ found that the absolute number of deaths in people with SCA due to physical exercise (PE) is small and that mortality occurred with practitioners of intense physical exercise. Thus, there are some recommendations for the practice of physical exercises in order to reduce the risks and injuries of the disease, such as: control the intensity and duration of exercises and hydration during the performance^{8,9}. Following the recommendations, the study of Barbeau et al.¹⁰ showed that regular exercise with moderate intensity (60-75%) can decrease the risk of the inflammatory reaction related to exercise and increase the vasodilator reserve, decreasing the risk of vaso-occlusive crisis.

Systemic deficiencies caused by the disease can lead to a more sedentary lifestyle, which in turn may result in an overall loss of muscle strength and cardiorespiratory capacity. Ivo and de Carvalho¹¹ reported that patients with SCA had dyspnea when walking, climbing stairs or ramps, or performing vigorous physical activities, which indicates a loss of functional capacity in this population. As a result of these alterations, limitations, and pain, it is also common to see a variable impact on the quality of life (QoL) of these patients¹².

As a consequence of the inherent risks in the practice of misguided physical exercises and incipient information in the scientific literature, professionals are still reluctant to recommend physical exercises. Studies on the effects of physical exercises in patients with SCA showed beneficial effects on pain, strength and QoL in children^{13,14}. However, little is known about the possible effects on adults, especially, the combined physical exercise. Considering the increasing number of cases of SCA in Brazil, the increase in life expectancy of these individuals and the progressive reduction in functional capacity due to complications, specifically the painful crises, investigations on the subject become relevant, both for patients who will directly benefit from the effects of physical exercises and for health professionals, who can identify therapeutic strategies for these patients.

The objective of this study was to analyze the perception of pain, some physiological responses and the QoL of an SCA patient undergoing a combined physical exercise program.

CASE REPORT

Female patient, 56 years old, diagnosed with SCA as a child. She underwent a multidisciplinary treatment with the family, to bet-

ter understand the disease, signs of severity, and proper measures to prevent and treat her crises. During this survey, and in the six previous months, she did not take any drugs routinely to control the disease, only when she had the painful crises. Her hemoglobin test showed a moderate anemia (9.7 g/dL), according to the World Health Organization (WHO)¹⁵. In the physical examination and ergospirometry test, she did not present critical clinical conditions (ulcers, bacterial infections or any other renal, ophthalmologic, neurologic, cardiovascular and pulmonary complications)¹⁶, only some difficulties characteristic of the disease as musculoskeletal pain (mainly in the lower limbs and the lumbar region), low cardiorespiratory resistance and early fatigue in the ergospirometry test. Apart from that, she had a physically active life according to the data obtained by the International Physical Activity Questionnaire (IPAQ).

Before the beginning of the activities, it was applied the pain questionnaires (Brief Pain Inventory - BPI)¹⁷ and level of physical activity by IPAQ, brief forms¹⁸. Also, we had anthropometric evaluations (body mass, height, and body mass index - BMI), and physical fitness test (flexibility of upper/lower limbs, motor coordination, agility, upper and lower limbs and abdominal strength, and static balance¹⁹). The ergospirometry test was performed on a treadmill to measure the cardiorespiratory capacity, using the Bruce Protocol adapted, with progressive load until maximum voluntary exhaustion. During the test, the heart rate (HR) was monitored using a frequency counter (POLAR® T31), blood pressure (Premium sphygmomanometer and stethoscope) and the subjective perceived exertion (The Borg Rating of Perceived Exertion scale - RPE)²⁰. During the assessment, the level of hemoglobin was also measured by capillary blood collection and by hemoglobinometer (Agab®).

In addition, for the analysis of the effect of the physical exercise pre-and post-program on the patient's QoL (qualitative character), a semi-structured interview was elaborated aiming at the self-perception of the improvement or worsening in relation to: pain, sleep, mood, self-esteem, health, pleasure, stimulation, posture and exercises.

The physical exercise program adopted lasted for four months (48 sessions). The training was a combined approach (aerobic and resisted in the same session)²¹, and the overload was applied in accordance with the results obtained in the tests and by the RPE during the program. Three weekly sessions of 60 minutes each, consisting of 30 minutes of aerobic training (at HR between the anaerobic threshold 1 and the anaerobic threshold 2 [110-125 bpm]) and 30 minutes of resisted exercise, with three sets of 10 to 12 repetitions, for the large muscle groups, alternating exercises for the lower and upper members. The sequence adopted throughout the experiment was aerobic followed by resisted training, and the subject accomplished the 48 scheduled sessions of physical exercises (100% attendance).

The general characteristics of the patient, the absolute results and the respective classifications of the functional tests (physical fitness), before and after the period of the physical exercises can be observed in table 1. It is worth to highlight the increase in the diastolic blood pressure (DBP) after the training protocol and slight decrease in the hemoglobin value. In addition, the

Table 1. Values of body mass index, heart rate, blood pressure, biochemical tests, and functional fitness before and after the PE program

Variables	Before		After		Δ%
Body mass index (kg/m ²)	21.7		21.4		-1.38
Heart rate at rest (bpm)	70		68		-2.86
Systolic blood pressure (mmHg)	120		120		0.00
Diastolic blood pressure (mmHg)	70		90		28.57
Hemoglobin (g/dL)	9.7		9.4		-3.09
Tests	Before	Classification	After	Classification	Δ%
Flexibility of lower limbs (cm)	61.1	Good	61.3	Good	0.33
Coordination (sec.)	8.26	Very good	7.45	Very good	-9.81
Agility (sec.)	18.8	Very good	16	Very good	-14.89
Strength resistance of upper limbs (rep/t)	20	Poor	22	Regular	10.00
Flexibility of upper limbs (cm)	+ 4.0	Very good	+ 7.50	Very good	87.50
Abdominal resistance (rep/t)	13	Good	15	Good	15.38
Strength resistance of lower limbs (rep/t)	17	Regular	21	Very good	23.53
Static balance (sec.)	30	Very good	30	Very good	0.00

Before = period before physical training; After = period after physical training; Δ% = percentage of change in before and after evaluation; Rep/t: repetitions per time.

results indicated that the patient showed improvement in all the variables after the PE program, except in static balance, which remained the same. The aspects that had higher differences were: flexibility of upper limb, strength resistance of lower limb, abdominal resistance and agility.

The results of the HR, the RPE, maximum consumption of oxygen (VO₂max.), and total time during the ergospirometry test are shown in table 2. We can see a decrease in the VO₂max results e longer permanence in the test after the PE program. Moreover, for the same workload, the subject had a lower HR and RPE in relation to the initial data.

In relation to pain, in the BPI, the patient reported that the main sites of pain in both assessments were concentrated in the lower limbs and the lumbar spine. However, in the assessment after the PE program, she reported a decrease in the pain scale intensity and reduction of pain interference in her daily activities to walk, work, in her social activities, sleep, and mood (Table 3).

Table 3. Pain perception-Brief Pain Inventory before and after the physical exercise program

Pain	Before	After	Δ%
Average intensity	7	5	- 20
At the time of interview	8	4	- 40
Relief with exercise	-	80%	-
Pain interference	Before	After	Δ%
General activity	7	4	- 30
Disposition	6	2	- 40
Ability to walk	3	0	- 30
Work	8	5	- 30
Relationship with other people	0	0	0
Sleep	2	1	- 10
Mood	2	0	- 20

Before = period before physical training; After = period after physical training; Δ% = percentage of change before and after evaluation.

Table 2. Data obtained in the ergospirometry test: heart rate, Borg scale, VO₂ maximum and total time of the test before and after the physical exercise program

Phases	Before	After
Adaptation	HR: 75 bpm	HR: 70 bpm
1 st (3 min)	Easy (9) - 83 bpm	Very easy (7) - 78 bpm
2 nd (3 min)	Relatively easy (11) - 92 bpm	Easy (9) - 89 bpm
3 rd (3 min)	Slightly tiring (13) - 107 bpm	Relatively easy (11) - 100 bpm
4 th (3 min)	Tiring (16) - 118 bpm	Slightly tiring (13) - 112 bpm
5 th (3 min)	Exhaustion - 129 bpm	Exhaustion - 123 bpm
VO ₂ maximum (mL/kg/min)	21.7	20.31
Total time (min)	12.48	14.10

Before = period before physical training; After = period after physical training; HR = heart rate; bpm = beatings per minute; VO₂max = maximum oxygen uptake.

In relation to the qualitative assessment of the QoL, the subject reported pain reduction in the lumbar spine, a significant improvement in her posture, much more disposition in daily activities, and a significant increase in strength or muscle resistance. *"I feel that I am improving, I don't feel so tired during work or even with the activities at home, and I regret when I do not come to the session because I feel my body heavier"*.

DISCUSSION

SCA clinical manifestations vary among patients, while some have severe conditions with several complications, others evolve only with mild symptoms^{22,23}. In relation to the patient in this case, despite living a physically active life as seen in the IPAQ, the early diagnosis and proper professional and family follow-up were very important and probably contributed to a controlled clinical condition, without the need for routine use of drugs, providing a longer life expectancy. In fact, authors state that the early diagnosis, added to the expertise of a multidisciplinary team and the participation of the family has a crucial role in the reduction of complications associated with the disease, as well as prolonging the life of patients^{24,25}.

Pain is a common clinical manifestation of SCA and patients usually seek for medical care²⁶. In fact, Martins, Moraes and Silveira²⁷ in a study conducted in a blood bank in Brazil, showed that the most prevalent care for patients with SCA is due to pain crises, accounting for a total of 64.4% of the cases.

In this study, the main discomfort related to pain reported by the subject was in the lower limbs and in the lumbar region, corroborating with Taylor et al.²⁸ study on the multiple dimensions of chronic pain in adults with sickle cell disease, being the hip region the most affected by chronic pain, followed by the spine. With regard to the hemodynamic variables, the subject had systolic and diastolic blood pressure within the normality limits, however, we noticed an increase in the diastolic blood pressure (DPB) after the PE program. The increase in DPB to 90 mmHg characterizes the cut-off point between normotension and hypertension^{29,30}. In this case, the proposal for a combined exercise intervention may have been responsible for the increase in DPB (however, within the normal range), at the end of the PE period, probably due to a greater total peripheral vascular resistance and the systolic parietal stress caused by resisted exercise³¹.

The results obtained in the ergospirometry confirmed that the cardiorespiratory capacity of the subject, defined by the VO_2 peak, was lower when compared to a person without the disease, as in the study of Liem et al.³². Van Beers et al.³³, also affirmed that the cardiorespiratory responses are below average in 83% of patients with SCA. Moreover, the oxygen uptake efficiency seems to be lesser between adults with SCA submitted to sub-maximum effort tests³⁴.

Some studies analyzed the mechanisms responsible for the intolerance to exercises in patients with SCA and found out that some factors can contribute, such as the reduction of oxygen carrying capacity related with the low hemoglobin level, the functional and structural heart adaptations resulting from the chronic anemia and pulmonary dysfunctions^{9,32,33}.

The patient presented a VO_2 max and HR below the expected for her age and physical condition³⁵, both before and after the combined PE intervention. This condition can be attributed, in part, to the left ventricular systolic dysfunction (due to an HR max lower than expected), and/or the decrease in the hemoglobin level. However, despite the decrease in the relative VO_2 max, the subject had an increase in the total time of the test (13%), on the same protocol (Bruce adapted). So, one can assume that the low hemoglobin level may have led to the decrease of total oxygen content, but, on the other hand, it may have improved blood flow and, consequently, increased the cardiac output after the training period³⁶.

Regarding the cause of SCA, there are no clear indications in the literature that PE have the potential to change hemoglobin S concentration or to revert the sickling process. In the present study, we found a reduction of 0.3 g/dL in plasma hemoglobin concentration after the PE program. However, such difference does not present great biological relevance. Furthermore, it was not measured if this discrete reduction was on sickle hemoglobin (HbS) or normal hemoglobin (HbAA). However, there was no severe symptom of the disease during the experiment, suggesting that a combined, and guided PE program does not bring risks or harm to patients with SCA.

The functional capacity can influence the performance of daily activities. In this context, the subject reported that most of the time her functional capacity was influenced by pain. Lobo, Marra and Silva³⁶ showed that the results of the physical aspects domain that include the impact of physical health in the performance of daily activities and/or professional were also significantly affected by pain.

In this scope, physical fitness parameters were also assessed, and the absolute values demonstrated that after the PE program there was an improvement in all the variables, except for static balance which remained the same. Moreover, in the strength resistance tests of upper and lower limbs, the classification went from poor to good, and from regular to good, respectively. We did not find studies in the literature that used similar tests in SCA patients. However, the responses found become relevant, especially within the context of the patient's QoL since it is influenced by physical aspects, as well as emotional and social³⁷.

Therefore, this case demonstrates that although the cardiorespiratory conditions did not improve by the combined PE protocol, it was observed a trend to the improvement in the aspects of physical fitness, pain and in the perception in the QoL. This is an important point to emphasize since this patient was physically active (according to the IPAQ classification), which can lead to the assumption that better results could have been observed in case of sedentary individuals.

It is important to point out the inherent risks of the practice physical exercises not controlled and supervised by qualified professionals, mainly by people with severe SCA complications. The risks go from worsening of disease complications to sudden death, which raise the fear by doctors to recommend physical exercises for SCA patients⁹. In General, physical exercises induce metabolic changes (production of lactic acid, reactive oxygen species, and other circulating cytokines)^{38,39}, changes in tempera-

ture and dehydration during exercise, which can stimulate the polymerization of HbS⁴⁰ and trigger the vaso-occlusive crisis⁹. However, current results support the safety and potential benefits of the practice of PE by SCA patients, as reported by Tinti et al.¹⁴ and Balayssac-Siransy et al.⁴¹, provided that some specific recommendations are followed^{8,9}. First, before the beginning of PE program, it is recommended to conduct the stress test to identify the intensity of exercise the patient may put up with stand without fatigue, pain or other symptoms. Subsequently, it is recommended to patients to start exercising gradually, avoiding intense efforts and stopping the exercise in the case of fatigue. Also, it is important to pause every 20 minutes for hydration and prevent excessive lactic acid buildup^{8,9}.

CONCLUSION

It is expected that the results of this study will contribute to the planning of preventive interventions and promotion of health in patients with SCA through a multi-professional assistance, including the presence of physical education professionals, aiming at the reduction and improvement of pain, improvement of physiological conditions and resistance to efforts, thus improving the perception of the QoL, providing individuals with SCA better conditions to perform daily activities as a result of the practice of PE.

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Glossopharyngeal neuralgia of tumor origin diagnosed in dental care. Case report

*Neuralgia do glossofaríngeo de origem tumoral diagnosticada em atendimento odontológico.
Relato de caso*

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ABSTRACT

BACKGROUND AND OBJECTIVES: The glossopharyngeal neuralgia is a neuropathy considered rare that manifests itself in the IX cranial nerve distribution characterized by an electric shock-like pain, often associated with hyperalgesia and allodynia. The etiology may be related to vascular changes, brain tumor, or even idiopathic. The aim of this study was to report a case of glossopharyngeal neuralgia secondary to a brain tumor diagnosed in a dental clinic, highlighting its clinical manifestations and discussing its nosological limit with other orofacial pain.

CASE REPORT: Female patient, 63 years old, sought care at a dental outpatient clinic of Orofacial Pain complaining about an intense electric shock and jumping pain of sudden onset on the lower right edge region and right tongue base. She reported that the events were triggered and exacerbated when chewing, opening the mouth, laughing and talking. The diagnostic hypothesis of glossopharyngeal neuralgia was tested by momentary depletion to the application of benzocaine 20% and pain remission with the administration of carbamazepine (400mg/day) for 20 days. The patient was referred to the Neurology service of the hospital, where the magnetic resonance imaging presented an expansive, solid, extra-axial lesion in the right prepontine cistern, suggesting meningioma.

CONCLUSION: The professional should be aware of the differential diagnosis of orofacial pains, especially in episodic neuropathies, to rule out the tumor etiology. In these cases, the quick referral to tertiary centers is fundamental for the good prognosis.

Keywords: Neoplasia, Neuralgia, Orofacial pain.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A neuralgia do glossofaríngeo é uma neuropatia considerada rara que se manifesta na distribuição do IX par craniano com característica de dor em choque elétrico, muitas vezes associada à hiperalgesia e alodínea. A etiologia pode estar relacionada a alterações vasculares, a tumor intracraniano, ou ainda idiopática. O objetivo deste estudo foi relatar um caso de neuralgia do glossofaríngeo secundário a tumor intracraniano, diagnosticada em ambulatório odontológico, destacando suas manifestações clínicas e discutindo seu limite nosológico com outras dores orofaciais.

RELATO DO CASO: Paciente do sexo feminino, 63 anos procurou atendimento em ambulatório odontológico de Dor Orofacial com queixa de dor intensa em choque elétrico e pontadas de início súbito na região de rebordo inferior direito e base de língua direita. Relatou que os eventos eram deflagrados e exacerbados na mastigação, ao abrir a boca, rir e falar. A hipótese diagnóstica de neuralgia do glossofaríngeo foi testada pela depleção momentânea à aplicação de benzocaína a 20% e pela remissão da dor com administração de carbamazepina (400mg/dia) por 20 dias. A paciente foi referida para serviço hospitalar de neurologia, onde após ressonância magnética nuclear foi diagnosticada lesão expansiva sólida extra-axial na cisterna pré-pontina à direita, sugestiva de meningioma.

CONCLUSÃO: O profissional deve estar atento no diagnóstico diferencial das dores orofaciais, especialmente nas neuropatias episódicas, pois a etiologia tumoral deve ser descartada. Nesses casos, a rápida referência a centros terciários é fundamental para o bom prognóstico.

Descritores: Dor orofacial, Neoplasia, Neuralgia.

INTRODUCTION

Orofacial pain is a factor of concern for the patient because many times it affects important physiological functions, such as chewing, swallowing, speak and laugh, also compromising the well-being and the quality of life (QoL) of the individual. The concept of QoL is marked by subjectivity, involving all the essential components of the human condition, whether physical, psychological, social or cultural. Pain, both facial and dental, is the most cited aspect of oral health indicators that impact the QoL, followed by sleep loss and masticatory problems¹. However, in addition to these, a number of painful conditions affect the face, making it essential to establishing differential diagnosis².

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An example of such conditions is neuropathic pain that results in a primary injury or diseases of the somatosensory nervous system. It can be triggered by local trauma or systemic diseases, affecting peripheral or central nerve structures and can be classified into episodic or continuous³.

Neuropathies vary according to with the involved nerve⁴. The glossopharyngeal nerve (IX) provides a general somatic sensation to touch, pain, and temperature of the posterior third of the tongue, pharynx, middle ear and the area near the external acoustic meatus³. The glossopharyngeal neuralgia (GPN) has a paroxysmal character in the innervation area. The prevalence is very low when compared with other neuropathies, estimated between 0.2 and 0.7 cases for every 100,000 people per year⁵. The accepted description for GPN is a painful disorder characterized by unilateral pain usually brief, electric shock type, with abrupt start and end, affecting the ear, the base of the tongue, the tonsillar fossa or beneath the angle of the jaw⁶.

GPN is divided into two clinical types based on pain distribution: eardrum (affecting the ear) and oropharyngeal (affecting the oropharynx area)⁷. It is often difficult for patients with GPN to identify what are the areas of origin of pain since these structures are in deep regions of the mouth, pharynx and the ear⁸.

GPN etiology seems to be related to the demyelination of axons or degeneration of the IX and X cranial nerves, and it can be associated with the compression of IX nerve by vascular structures, intracranial injuries or tumors. The compression causes constant mechanical irritation of the nerve and can significantly decrease the excitability threshold and promote an increase in the action potential⁹.

Thus, the differential diagnosis of orofacial pain is extremely important considering its huge negative impact on QoL of the patient, symptoms and possible tumor causes.

The objective of this study was to discuss the semiological techniques and the approach of GPN with tumor etiology for a patient who came to a dental clinic in search for treatment.

CASE REPORT

Female patient, 63 years old, with a prosthesis (dentures) in the upper and lower dental arches for eight years, sought care at the Orofacial Pain dental outpatient clinic. The major complaint was severe pain which started eight years ago, in the region of the lower edge and the right side of the base of the tongue, referring 10 on the visual analog scale (VAS). She described the pain with characteristics of an electric shock and sudden stinging.

During the history taking, she told that the pain events were triggered and exacerbated when chewing, opening the mouth, laughing, speaking and wearing the total inferior prosthesis. The episodes of pain were described as brief and very frequent and were also associated with vertigo and dizziness. She said she usually took paracetamol and dipyron, but with no significant effect on pain relief. Furthermore, she reported headache events once to twice a week, with no nausea or changes in vision. As for the medical history, the patient reported being on pharmacological control for hypertension and hypothyroidism. The family had a history of stroke, cardiac alterations, and cancer. Regarding the psychosocial situation, she reported having little hope in the

future, irritation, lack of energy, tiredness and social withdrawal since the pain started. She added that the pain interferes with her sleep and disrupts her daily activities.

In the physical examination, the cranial nerves were normal, except for the glossopharyngeal, due to the motor limitation of the posterior region of the tongue, that was attributed to the algescic condition. Even a light touch on the mucosa of the lower-right edge and the base of the tongue generated a painful response. The application of topical benzocaine at 20% in this region led to a momentary pain depletion, confirming the GPN diagnostic hypothesis.

As an initial approach, with the purpose of confirming the diagnostic hypothesis, we prescribed carbamazepine (200mg/day) during the first seven days, and then 400mg/day. It was further requested a panoramic radiograph (Figure 1) and lateral X-Rays of the temporomandibular joint (TMJ) (Figure 2), to rule out somatic causes linked to the masticatory system.

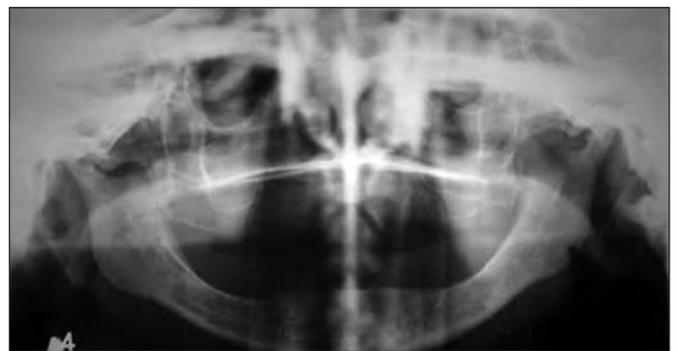


Figure 1. Panoramic radiograph within the normality standards for the age and dental condition of the patient



Figure 2. Lateral radiograph of the temporomandibular joint showing absence of external interference at the site of pain

When the patient returned 20 days later, she reported a significant improvement in pain (VAS=5). Pain remission with the use of carbamazepine strengthened the diagnostic hypothesis of neuropathic pain. The dose was adjusted to 200 mg/day because of complaints of drowsiness with the use of the drug. With the diagnostic hypothesis established, we perceived the need for multidisciplinary care. Therefore, the patient was referred to the neurology service of a local hospital, where the magnetic resonance imaging (MRI) presented an expansive, solid, extra axial lesion in the right prepontine cistern, suggesting meningioma (Figure 3).

In the five-month follow-up, the episodes of pain during the day were described as rare and of less intensity. The inferior prosthe-

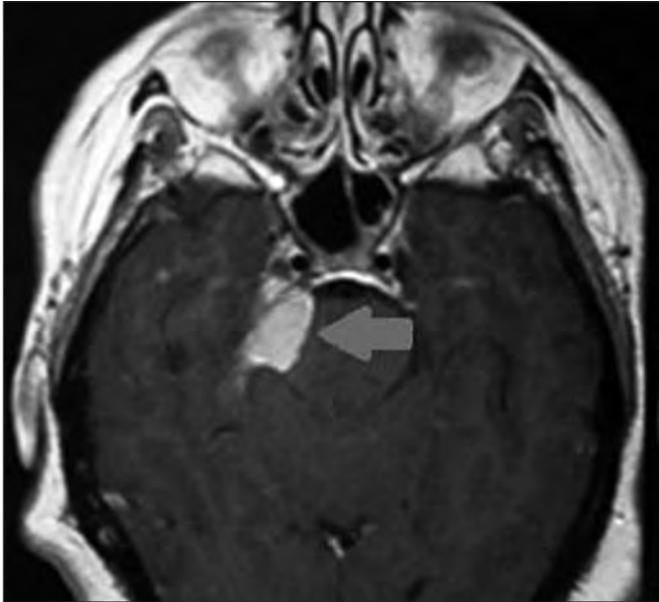


Figure 3. Magnetic resonance imaging axial view showed a lesion suggestive of meningioma indicated by the arrow

sis was adjusted aiming at the elimination of possible compression in the sublingual trigger areas. The dose of carbamazepine was adjusted from 200 to 400mg/day.

She returned six months later reporting the absence of pain events. Currently, the patient has quarterly consultations with a neurologist and is waiting for availability for neurosurgery.

DISCUSSION

The nosological limit of orofacial neuropathic pain can be difficult to measure due to the absence of clinically diagnosable injury, the disproportion between the painful stimulus and the response, and the overlapping of structures with distinct innervation. Although it is not possible yet to define a universal consensus on the diagnostic criteria, several clinical characteristics are suggestive of these diseases, such as paroxysmal pain along the pathway of the affected nerve, allodynia, hyperalgesia and trigger areas able to trigger short-term pain events, with the characteristic of electric shock¹⁰. In this clinical case, the patient sought help at a dental center with the main complaint of intense pain in the lower edge region and on the right side of the base of the tongue, suggesting a possible problem of the prosthesis. However, the observation of the characteristics of the pain and the physical examination conducted led to the hypothesis of GPN, a possibility reinforced by the fact that the patient was over 50 years, the age group where painful facial neuropathies become more common^{9,11}. MRI was performed to rule out secondary neuralgia to intracranial injuries. This procedure is justified by several authors^{11,12}.

We also noticed that the pain reported by the patient was unilateral, a factor supported by the literature, that demonstrates that neuropathic pain is, for the most part, established on only one side, being bilateral in rare cases⁶.

In GPN, painful events can occur spontaneously, but they are generally associated with a specific trigger stimulus. Some stimuli

are chewing, swallowing, coughing, yawning, sneezing, blowing the nose, touching the ear, talking, laughing, ingesting acid, sweet, cold or hot food, or even turning the head to one side^{1,13}. Such stimuli were reported by the patient, reinforcing the diagnosis for GPN.

In these cases, when daily and common activities become pain triggers, the QoL of the patient can be seriously compromised, with a heavy impact on its physical and emotional well-being¹. In this sense, the patient of this case study reported that pain disrupted her sleep and daily activities, causing irritation, lack of energy, tiredness, and social withdrawal.

To relieve pain, the patient took paracetamol and dipyrone, with no satisfactory results. Superficial somatic pain, such as the ulceration of the oral mucosa that often affects patients wearing a prosthesis, usually improves with this kind of drug. However, neuropathic pain such as GPN does not respond to common pain medications¹⁰.

Pain assessment using VAS throughout the reassessment period showed a general reduction in the painful condition. VAS is considered a useful tool with good reproducibility to measure pain¹³ because it turns the subjectivity of a painful experience into objective for clinical evaluation.

During the physical examination, the momentary depletion of pain by the application of benzocaine at 20% in the posterior region of the tongue, region innervated by the glossopharyngeal nerve, confirmed the diagnostic hypothesis of GPN. This response to the topical anesthetic on the trigger area in the mucosa is considered a useful clinical test for differential diagnosis⁶. Studies have shown that pain can be proven by the stimulation of specific points in the area of superficial distribution of the glossopharyngeal nerve¹⁴. Therefore, the adjustments made on the base of the inferior prosthesis aiming at the reduction of the compression in these trigger areas are justified.

Pharmacotherapy is the first line of treatment for GPN. The drugs of choice are carbamazepine, gabapentin, and pregabalin¹⁵. The selection of carbamazepine is based on several studies in which this drug proved effective for the treatment of paroxysmal nerve pain^{16,17}. However, many patients are sensitive to carbamazepine and develop adverse reactions, especially drowsiness, dizziness, vomiting, diarrhea, rashes or even bradycardia¹⁷. Such effects can be minimized when the dose is gradually increased¹⁶. Therefore, it is crucial that the dental surgeon know the clinical characteristics of neuralgias that involve the face and be prepared to perform the differential diagnosis. In the diagnostic hypothesis of paroxysmal neuropathic pain, ruling out secondary neuralgia is a priority, and the referral to a neurological evaluation becomes of key importance.

CONCLUSION

The dental surgeon should be skilled to make the differential diagnosis of orofacial pain, especially of paroxysmal neuralgia. Recognize the clinical characteristics and properly refer the patient to a neurological center is fundamental for a good prognosis, especially in cases of neuralgia of tumor etiology.

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Complex regional pain syndrome type I: impact on work activities of working age individuals. Case reports

Síndrome complexa de dor regional de tipo I: impacto na atividade laboral de sujeitos em idade produtiva. Relato de casos

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ABSTRACT

BACKGROUND AND OBJECTIVES: Complex regional pain syndrome type I causes personal and social losses to the affected subject. The objective of this study was to analyze life, health and working condition of subjects with this syndrome, of working age, in a city in the countryside of Rio Grande do Sul, RS.

CASE REPORTS: Study of seven cases, with the diagnosis of complex regional pain syndrome type I, with a predominance of female, married, relatively low educational level. In assessing physical health condition, the majority of participants considered their physical health moderate, and bad mental/emotional health. Most participants used assistive technology resources.

CONCLUSION: It was observed that the syndrome interfered in the participants' work activities. The data of the International Classification of Functioning, Disability, and Health showed that these subjects face several limitations in their daily activities. Therefore, this disease has negative impacts on life/health condition of these workers, who are temporarily or permanently forced to leave their work activities.

Keywords: Daily activities, International classification of functioning disability and health, Motor skills disorders, Work.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A síndrome complexa de dor regional de tipo I causa prejuízos pessoais e sociais ao sujeito acometido. Este estudo teve como objetivo analisar as condições de vida/saúde e laborais de sujeitos com essa síndrome, em idade produtiva, no município do interior do Rio Grande do Sul, RS.

RELATO DOS CASOS: Estudo de sete casos, diagnóstico de síndrome complexa de dor regional de tipo I, com o predomínio do sexo feminino, casado, com nível escolar relativamente baixo. Na avaliação da condição de saúde física, a maioria dos participantes considerou sua saúde física moderada, e a saúde mental/emocional ruim. A maioria dos participantes utilizavam recursos de tecnologias assistivas.

CONCLUSÃO: Observou-se que a síndrome interferiu nas atividades de trabalho dos participantes. Já os dados da Classificação Internacional de Funcionalidade e Incapacidade e Saúde demonstraram que esses sujeitos enfrentam diversas limitações em suas atividades cotidianas. Portanto esta doença causa impactos negativos na condição de vida/saúde desses trabalhadores, que precisam, na maioria das vezes, serem afastados de suas atividades laborais, temporariamente ou em definitivo.

Descritores: Atividades cotidianas, Classificação internacional de funcionalidade e incapacidade e saúde, Trabalho, Transtornos das habilidades motoras.

INTRODUCTION

In 1994, *The International Association for the Study of Pain* (IASP) created the term complex regional pain (CRPS), subdivided into two categories, according to the CRPS triggering mechanism, types I and II, classifying them as neuropathic pain (NP). This classification prevailed for 17 years, but due to some criticism to this definition, in 2011, IASP gathered the *Neuropathic Special Interest Group* (NEUPSIG), with the objective to redefine the NP concept, creating criteria for the diagnosis and treatment both for the practical clinic and research¹.

From this moment on, NP came to be defined as “that pain resulting from an injury or disease that directly affects the somatosensory system². This new definition excluded CRPS from the NP concept, as well as the essential trigeminal neuralgia and fibromyalgia, among others¹. From this new context, they were named “dysfunctional pain”^{2,3}.

The CRPS I pathophysiology is considered inconclusive³, with characteristics such as local vascular perfusion increase but with

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poor tissue nutrition, accumulation of macromolecules, exacerbated inflammatory process⁴, causing intense pain that persists after the injury^{5,6}.

CRPS is a rare disease, only 1% of the people develop this syndrome as a result of a nerve injury or tissue trauma, being the second most common cause (60%), and the upper limbs are the most frequently affected. But there is no accurate data on the prevalence of CRPS⁷. There are few Brazilian studies on this theme and the ones we have cover specific situations (workers, the elderly, body regions) or outpatient environment⁸.

CRPS I can be subdivided into three stages, being the first also known as acute phase, that occurs soon after the injury until the third month, presenting as signals and symptoms a shining skin, hyperemic, cyanotic, cold, dry or with hyperhidrosis (excess sweating). The second stage, also known as dystrophic phase, starts from the third month and extends up to the sixth month of the injury, where the symptoms and signs of the first stage get worse, with other changes such as, for example, nails with brittle aspect, reduction in polymotor activities, digital pulp atrophy and periarticular space of the affected joints. The third stage or atrophic phase begins after the sixth month and may last for a lifetime. Here, the intensity of the pain decreases, the edema evolves to fibrosis and periarticular thickening, the skin may appear dark or pale, and the affected extremities rigid^{9,10}.

It is known that CRPS I is difficult to treat since besides being different due to the central and peripheral pathophysiology, it also has a prevalence of motor alterations¹¹ that lead the subject to develop functional limitations that end up compromising daily activities (DA), instrumental activities of daily living (IADLs), disability for leisure and work activities, being early retirement one of the main consequences of this disease⁶.

The conditions imposed by the disease compromise the autonomy, causing limitations in the social role that reverberate in the quality of life (QoL) of the subjects⁶, not to mention the psychological manifestations of anxiety and depression¹². It also gives rise to frustration related to therapeutic treatments without great results with regard to pain, a high demand for tests and unsatisfactory information from the health team¹³.

It can be observed that CRPS I compromise the health condition, the functionality and the participation of the patient in activities considered significant. Thus, to understand the health condition of the population, the World Health Organization (WHO) currently adopts two classification systems. They are The International Classification of Diseases (ICD) "an abnormal health condition and its causes, without stating the impact of these conditions on the person's life"¹⁴. This classification presents an etiological model, an anatomic-functional, an anatomic-pathological, clinical and epidemiological. And the International Classification of Functioning, Disability and Health (ICF) that is based on a biopsychosocial model, which encompasses the physical and social environment, the different cultural perceptions and attitudes towards disability, the availability of services and the legislation¹⁵. This classification is based on two concepts: functionality - "a term that covers all the body functions, activity and participation,

and disability is a term that covers deficiencies, limitations of activities or restriction in participation"¹⁶. ICD and ICF are considered complementary classifications, the information obtained provides a wider picture of the patient's life and health conditions¹⁴.

It can be observed that this disease causes limitations and restrictions in the life/health of people. Thus, the model proposed by the ICF will provide a broader view of the functionality and disability, not based only on body structure and function, but considering all health dimensions, including activities and participation.

Given the complexity of this disease, the objective of this study was to analyze the life/health and work conditions of subjects with CRPS I in working age.

CASE REPORTS

This is a descriptive, exploratory study with a cross section approach of a series of cases, with the participation of seven people of both genders, aged 18 years or above. They are workers in leave of absence due to the diagnosis of CRPS I, who were starting the therapeutic follow-up (medical, psychological, physical therapy and occupational therapy) in the Pain Group of the Santa Maria University Hospital (HUSM).

Data collection occurred from February of 2013 to June of 2014, using the ICF summarized Check List¹⁷. The collection was in the HUSM facilities, in a single and individual session, for approximately 1 hour. At this meeting, we collected data on demographic information, body functions and structures, activity and participation, environmental and personal factors and health information summary.

The ICF is organized in two parts: i) functionality and disability (Part 1); and (ii) contextual factors (Part 2). Part 1 is divided into two components: i) body functions (represented by the letter b: *body* and body structures (represented by the letter s: *structure*; and ii) activity and participation (represented by the letter d: *domain*). The contextual factors are divided into two components: i) environmental factors (represented by the letter e: *environment*); and personal factors include characteristics of a subject (gender, age, other health and physical conditions, education, among others), life history and style. These are not classified in the ICF, however, they make up its structure because they can have an impact on the health condition of the subject¹⁶.

In ICF, the letters *b*, *s*, *d*, and *e* are followed by a numerical code and the description of functionality and disability, restriction of the activity and participation, and environmental factors, thus creating an alphanumeric code. Also, a qualifier is assigned by a general numeric scale, that will present the extension of disability or restriction. The component of the body functions has a qualifier related to the extension of the disability: zero - indicates no disability, 1 - mild disability, 2 - moderate disability, 3 - severe disability, 4 - total disability, 8 - not applicable, 9 - not applicable¹⁶.

The component related to body structures account has three qualifiers, two of them are required by the Check List, and the third is optional. The first qualifier refers to the extent of the

disability of this component, following the same scale of body functions (located right after the alphanumeric code, separated by a dot). The second qualifier refers to the nature of the disability (it occupies the second position after the alphanumeric code): zero - no change in structure, 1 - total absence, 2 - partial absence, 3 - additional part, 4 - abnormal/aberrant dimensions, 5 - discontinuity, 6 - position deviation, 7 - qualitative changes in the structure, including accumulation of liquids, 8 - not applicable, 9 - not applicable. The third qualifier indicates the location of the disability (it occupies the third position after the alphanumeric code): zero-more than one region, 1 - right, 2 - left, 3 - both sides, 4 - anterior part, 5 - posterior part, 6 - proximal, 7 - distal, 8 - not specified, 9 not applicable¹⁶.

The component referring to activities and participation is organized with two qualifiers. The first qualifier indicates the performance (occupies the position after the alphanumeric code, separated by a dot). This qualifier describes what the subject does in his usual environment. The second qualifier refers to the ability (occupies the second position after the alphanumeric code), this indicates the ability of the subject to perform a task or action (unassisted). The scale used to qualify these components is the same used for body functions. Environmental factors are indicated as barriers and facilitators: zero-no facilitator/barrier; 1 - light barrier, 2 - moderate barrier, 3 - considerable barrier and 4 - complete barrier; +1 - light facilitator, +2 - moderate facilitator, +3 - considerable facilitator and +4 - complete facilitator¹⁶.

The data of this study was descriptively analyzed. Participants were clarified about the objectives of the study and signed the Free Informed Consent Term (FICT). It should be noted that participants' names will be kept in secrecy, to preserve their identity. Therefore they will be identified as P1, P2, P3, P4, etc.

The participants in this study were of both genders, being two men and five women. The minimum age was 28 years and the maximum 59 years. As for the marital status, five were married. The level of education can be considered relatively low because four had concluded elementary school, two had incomplete elementary school, and one had concluded high school. Concerning the labor activity, three participants were housemaids, two were tobacco growers, one was loading and unloading helper, and one was a nanny, all of them on leave of absence at the time of the evaluation.

Of the seven participants, two had the involvement of the right upper limb (RUL), two of the left upper limb (LUL), one of the right lower limb (RLL) and two of the left lower limb. In the evaluation of current health conditions, four participants considered their health as moderate, two considered it bad, and one considered it very bad. As for the mental/emotional health, three participants considered bad, two considered moderate, one considered very good and one bad.

As for the use of assistive technological resources, four used some device, such as glasses and/or crutches. All participants were using painkillers and antidepressants. It was observed that the CRPS I interfered in the work activities of the participants because six were on leave of absence and one was retired.

As for body functions, the participants with CRPS I presented some impairment of mental functions (b1), and the compo-

nents reported by the participants were sleep (b134), orientation (b114), attention (b140), memory (b144) and emotional functions (b152). In sensory functions and pain (b2), vision (B21 0), hearing (b230), buccal (b235) and pain (b280), were the most important components. On the functions of the cardiovascular, hematological and respiratory systems (b4), the components of heart function (b410), blood pressure (b420) and respiratory system (b440) were commented. On the functions of the digestive, metabolic and endocrine system (b5), the component related to digestive functions (b515) was mentioned. With regard to genitourinary and reproductive functions (b6), the components of urinary functions (b620) and sexual (b640), were reported. In the functions related to neuro musculoskeletal movement (b7), joint mobility (b710), muscle strength (b730), muscle tone (b735) and involuntary movement (b765) were mentioned (Table 1).

In body structures - the structures of the nervous system (s1), brain (s110), spinal and peripheral nerves (s120). Structures related to movement (s7) - region of the shoulder (s720), upper extremity (arm, hand) (s730) and lower extremity (leg, foot) (s750) (Table 1).

With regard to the activity and participation functions, participants had restrictions in the learning and application of the knowledge domains (d1) in the hearing component (d115). In the domain of tasks and general demands (d2), participants had difficulty in performing a single task (d210) and multiple tasks (d220). In communication (d3), we observed restrictions on the speech (d330). In the domain related to mobility (d4), in the components of lifting and carrying objects (d430), in-hand manipulation - grab, hold (d440), walking (d450), use of transportation - cars, bus, train, plane, etc. (d470) and drive - bike, car, etc. (d475). Personal care (d5), wash-bathe, dry, wash hands, etc. (d510), take care of body parts-brushing teeth, etc. (d520), get dressed (d540), eating (d550), drinking (d560) and take care of their own health (d570). With respect to household life (d6), the components are the purchase of goods and services - shopping, etc. (d620), preparation of meals - cooking, etc. (d630), housekeeping - cleaning the house, washing dishes, clothes, etc. (d640). In interpersonal relations and interactions (d7), basic interpersonal interactions (d710) and complex (d720), formal relations (e740), informal social (750) and family (d760) were the components reported by the participants. The main areas of life (d8), paid work (d850) and basic economic transactions (d860) were reported. In community life, social and civic (d9), community life (d910), recreation and leisure (d920) and religion and spirituality (d930), were mentioned by the participants (Table 2).

Regarding products and technology (e1), the products and substances for personal consumption - food, medicine (e110), products and technologies for the personal use in daily life (e115) and products and technology for mobility and personal transportation (e120) were mentioned by the participants. In the domain of natural environment (e2), climate (225) was the only component cited by participants. In support and relationships (e3), the immediate family (e310), friends (e320) and health professionals

Table 1. Function impairment (Part 1a) and body structures (Part 2a)

Parts	Domains	Components	P1	P2	P3	P4	P5	P6	P7
Body functions (Part 1a)	Mental functions (b1)	Sleep (b134)	0	4	0	0	0	0	2
		Orientation - time, place, person (b114)	0	2	0	0	0	0	0
		Attention (b140)	0	3	0	0	1	2	2
		Memory (b144)	0	4	0	0	2	1	2
		Emotional functions (b152)	1	1	0	0	1	0	3
	Sensory functions and pain (b2)	Vision (B21 0)	0	3	0	1	2	2	2
		Hearing (b230)	0	3	0	0	0	0	0
		Buccal (b235)	0	4	0	0	0	0	0
		Pain (b280)	2	4	3	3	4	4	4
	Functions of the cardiovascular, hematological, immune and respiratory systems (b4)	Heart functions (b410)	0	3	0	0	0	0	0
		Blood pressure (b420)	0	0	0	0	0	2	0
		Functions of the respiratory system (b440)	0	3	0	0	0	0	0
	Functions of the digestive, metabolic and endocrine systems (b5)	Digestive functions (b515)	0	0	0	1	0	2	0
	Genitourinary and reproductive functions (b6)	Urinary functions (b620)	0	2	0	0	0	0	0
		Sexual functions (b640)	0	0	0	0	4	0	2
	Neuro musculoskeletal and movement related functions (b7)	Joint mobility (b710)	3	0	3	2	4	4	3
Muscle strength (b730)		3	0	4	3	4	4	3	
Muscle tone (b735)		0	0	3	2	0	4	3	
Involuntary movements (b765)		0	3	0	0	0	0	0	
Body structures (Part 2a)	Structures of the nervous system (s1)	Brain (s110)	0 0 0	3 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
		Spinal and peripheral nerves (s120)	4 5 8	0 0 0	3 8 8	0 0 0	3 8 8	3 8 8	1 8 8
	Structures related to movement (s7)	Shoulder area (s720)	3 8 2	4 8 1	3 8 1	4 8 1	0 0 0	0 0 0	0 0 0
		Upper extremity -arm, hand (s730)	3 8 2	4 8 1	3 8 1	4 8 1	0 0 0	0 0 0	0 0 0
		Lower extremity - leg, foot (s750)	0 0 0	0 0 0	0 0 0	0 0 0	4 8 2	3 8 2	2 8 2

P = participants; Qualifiers of Body Functions (Part 1a) = zero - indicates no impairment; 1 - mild impairment; 2 - moderate impairment; 3 - severe impairment; 4 - total impairment; 8 - not specified; 9 - not applicable. Qualifiers of body structures (Part 2a): Extension of the disability: 0 - indicates no impairment; 1 - mild impairment; 2 - moderate impairment; 3 - severe impairment; 4 - total impairment; 8 - not specified; 9 - not applicable. Nature of the impairment: zero-no change in structure, 1 - total absence, 2 - partial absence, 3 - additional part, 4 - abnormal/ aberrant dimensions, 5 - discontinuity, 6 - position deviation, 7 - qualitative changes in the structure, including accumulation of liquids, 8 - not applicable, 9 - not applicable. Location of the impairment: zero - more than one region; 1 - right; 2 - left; 3 - both sides; 4 - anterior part; 5 - posterior part; 6 - proximal; 7 - distal; 8 - unspecified; 9 - not applicable.

Table 2. Limitation of activity and restriction in participation (Part 2)

Domains	Components	P1	P2	P3	P4	P5	P6	P7
Learning and application of knowledge (d1)	Hearing (d115)	0 0	2 2	0 0	0 0	0 0	0 0	0 0
General tasks and demands (d2)	Perform a single task (d210)	0 0	0 0	0 0	0 0	2 2	0 0	0 0
	Perform multiple tasks (d220)	0 0	0 0	2 2	0 0	2 1	2 2	3 3
Communication (d3)	Speech (D330)	0 0	1 1	0 0	0 0	0 0	0 0	0 0
Mobility (d4)	Lift and carry objects (d430)	4 4	4 4	3 3	3 1	3 3	3 3	3 2
	Fine use of the hands - grab, hold (d440)	4 4	3 3	1 1	3 3	0 0	0 0	0 0
	Walk (d450)	0 0	0 0	1 1	0 0	3 3	0 0	3 3
	Use of transportation - car, bus, train, plane, etc. (d470)	0 0	0 0	2 2	4 4	3 3	3 3	4 4
Personal care (d5)	Drive - bike, motorcycle, car, etc. (d475)	3 3	4 4	0 0	0 0	0 0	3 3	0 0
	Wash, bathe, dry, wash hands etc. (d510)	3 3	4 4	2 2	3 3	0 0	2 2	3 3
	Care of body parts - brushing teeth, etc. (d520)	3 2	2 1	2 1	3 3	0 0	0 0	3 3
	Dress up (d540)	2 2	4 4	3 3	3 3	0 0	2 2	3 3
	Eat (d550)	2 2	3 3	1 1	3 3	0 0	0 0	0 0
	Drink (d560)	0 0	1 1	0 0	1 1	0 0	0 0	0 0
	Take care of own health (d570)	0 0	2 1	0 0	0 0	0 0	2 1	0 0

Continue...

Table 2. Limitation of activity and restriction in participation (Part 2) – continuation

Domains	Components	P1	P2	P3	P4	P5	P6	P7
Domestic life (d6)	Purchase of goods and services – shopping, etc. (d620)	0 0	4 4	2 2	0 0	0 0	0 0	0 0
	Preparation of meals – cooking, etc (d630)	3 3	4 3	2 2	4 4	3 3	0 0	2 2
	Housekeeping – cleaning, washing dishes, clothes, etc. (d640)	3 3	0 0	4 4	3 3	2 2	2 2	3 3
Relationships and interpersonal interactions (d7)	Basic interpersonal interactions (d710)	0 0	0 0	0 0	0 0	0 0	0 0	3 3
	Complex interpersonal interactions (d720)	0 0	0 0	0 0	0 0	0 0	0 0	3 3
	Formal relations (e740)	0 0	0 0	0 0	0 0	0 0	0 0	4 4
	Informal social relations (750)	0 0	0 0	0 0	0 0	0 0	0 0	4 4
	Family relations (d760)	0 0	1 1	0 0	0 0	0 0	0 0	1 1
Main areas of life (d8)	Paid work	3 4	3 3	4 4	4 4	3 3	3 4	3 3
	Basic economic transactions (d860)	0 0	0 0	2 2	0 0	0 0	0 0	0 0
Community, social and civic life (d9)	Community life (d910)	0 0	0 0	0 0	0 0	2 2	3 3	2 2
	Recreation and Leisure	2 1	0 0	4 4	0 0	2 2	3 3	3 3
	Religion and spirituality (d930)	0 0	0 0	0 0	0 0	2 2	0 0	0 0

P = participants; Qualifiers related to the Activity and Participation components = zero - indicates no impairment; 1 - mild impairment; 2 - moderate impairment; 3 - severe impairment; 4 - total impairment; 8 - not specified; 9 - not applicable.

(e355) were reported. In the attitude domain (e4), the individual attitudes of members of the immediate family (e410), caregivers and personal assistants (e440) and health professionals (e450). And in the domain of services, systems and policies (e5), the components services, systems and transportation policies (e540), social security (e570), health (e580) and labor and employment (e590) were mentioned by participants (Table 3).

With regard to the data presented and analyzed by ICF, it was observed that the participants of this study had limitations in the functions and body structures and that these reflect directly on the activities and participation in their daily life. It is worth mentioning that they were still in a productive period of their lives and that after being affected by the syndrome they were on leave of absence or early retired.

DISCUSSION

In studies conducted by Raja and Grabow¹⁸, discussing the mechanisms of the psychopathology of CRPS I, they found that this syndrome is more frequent in women, in a 3:1 ratio, and in another study carried in national level with 301 participants, 288 were female, accounting for 96% of the cases¹⁹. These results can be justified because women tend to have higher rates of musculoskeletal injury compared to men. Such injuries can result in a reduction of the labor capacity of the subject²⁰.

Regarding age, it is clear that participants were of working age, in line with other studies, which claim that people in working age are more affected by CRPS I^{18,19}. The married status was prevalent in this study, but we did not find in the national and interna-

Table 3. Environmental factors

Domains	Components	P1	P2	P3	P4	P5	P6	P7
Products and technology (e1)	Products or substances for personal consumption - food, medicine (e110)	+3	0	+3	+1	+3	+2	0
	Products and technology for personal use in daily life (e115)	0	0	0	0	0	0	+2
	Products and technology for mobility and personal transportation (e120)	0	0	0	+2	0	+3	0
Natural environment (e2)	Climate (225)	0	0	1	1	2	4	0
Support and relationships (e3)	Immediate family (e310)	+2	+2	+3	+4	0	+4	+4
	Friends (e320)	+1	+1	+3	+2	0	0	+2
	Health professionals (e355)	+3	0	+3	0	+3	+3	+2
Attitudes (e4)	Individual attitudes of members of the immediate family (e410)	0	0	+3	0	0	0	+2
	Individual attitudes of caregivers and personal assistants (e440)	+1	0	0	0	0	0	0
	Individual attitudes of healthcare professionals (e450)	0	0	0	+4	0	0	0
Services, systems and policies (e5)	Services, systems and transportation policies (e540)	0	0	+3	0	0	0	0
	Services, systems and social security policies (e570)	3	3	3	3	3	3	2
	Services, systems and health policies (e540)	+3	0	+3	0	0	0	0
	Services, systems and labor and employment policies (e590)	3	3	2	0	3	0	3

P = participant; environmental factors are indicated as barriers and facilitators: 0 - no facilitator/barrier; 1 - light barrier, 2 - moderate barrier, 3 - considerable barrier and 4 - complete barrier; +1 - light facilitator +2 - moderate facilitator, +3 - considerable facilitator and +4 - complete facilitator.

tional literature studies relating the diagnosis of CRPS I with the marital status. But some studies that address the topic of chronic pain (not specifying the type) demonstrated in their results the prevalence of married people diagnosed with this disease^{8,21-23}. The education of the participants can be considered relatively low, as well as in the study conducted by Azambuja, Tschiedel and Kollinger²⁴, in which participants with CRPS showed less than eight years of education.

The subjects affected by CRPS I have limitations on functions and body structures. When it reaches the upper limbs (UL), the syndrome compromises the movements of the shoulder and upper extremity. As for the lower limbs (LL), this syndrome limits the movements of the pelvis and lower extremity, restricting gait movement. It is known that the human body has a complex sensory network that depends on a dynamic integration of the lateral and medial systems and descendant pathways. In this study, five men had CRPS I in the UL, corroborating the data found by Rocha²⁵, which refers a greater impairment of the median nerve, followed by the ulnar, radial and brachial plexus.

Changes in anatomical structures of all participants were observed. They showed joint stiffness, decreased strength and involvement of muscle tone. Due to the constant pain, the subjects who suffer from this syndrome are afraid to perform movements (kinesophobia). Therefore, these subjects tend to reduce and/or avoid involving the affected limb in everyday activities, thus restricting their functionality, causing loss of muscle strength as well as muscle tone²³. "The functional limitation is considered as one of the most striking consequences"²⁶ faced by sick workers and it interferes directly in labor activities²⁶.

In both groups, climate factors interfere directly in the functionality of the affected limb, and it is considered a barrier by four participants of this study. It was not found in the national and international literature, studies relating the diagnosis of CRPS with climate factors. But we did find studies on NP (not specifying the type), and according to these studies, climate change (heat or intense cold) are associated with an increase in pain intensity. These researchers point out that this relationship is not yet well-established^{27,28}.

Of the data collected in this study, it was evident that the subjects affected by CRPS I experience impairment in their daily activities and social participation. These subjects choose not to perform their community, leisure, work and economic, and religious and spiritual activities, which interferes with the basic and complex interpersonal interactions, family, formal and informal social relationships. This situation affects the QoL of these patients considerably.

The effects of CRPS I are not limited to physical health. This syndrome also affects the emotional health of the subject. Since pain is a multidimensional experience and an unpleasant feeling to the subject, it can cause emotional sequela²⁹ with a direct impact on the daily activities, mainly working activities in the case of subjects in working age⁶. Studies that address this theme consider pain "an unpleasant subjective sensory and emotional experience, difficult to quantify and qualify"²⁵.

As for the use of assistive technology (AT) resources, four used some device, such as glasses and/or crutches. Subjects with the

involvement of LL refer to assistive technology for their mobility and personal use in daily life as facilitators in their everyday activities. AT devices (crutches, orthosis, among others) can be used for the treatment of chronic pain³⁰. These resources act as facilitators of the occupational performance of subjects in their daily activities³⁰.

It was observed that CRPS I interfered in the work activities of the participants in the study, corroborating the study by Azambuja, Tschiedel e Kollinger³¹ with formal employees, where 87% of participants were unable to work and/or on leave of absence as a result of this syndrome. Occupational absenteeism due to CRPS I can be characterized as a public health problem, due to the huge burden caused to government budget by subjects away from their work activities or early retired. Subjects with chronic pain who perform strictly manual work are limited in their activities inhibiting their productive capacity and preventing them from performing their work activity.

According to Torres et al.²⁶, the impact of the disease goes beyond its effect on the subject. "The consequences of the disease are the loss of professional identity, the restructure of daily and economic life, the feeling of uselessness and disability, social isolation, insecurity and the fear of losing the job"²⁶.

For some participants of the study, the products and substances, especially the drugs, are considered facilitators by the subjects. Pharmacological resources play an important role in the control of pain. A lot of subjects use drugs for pain relief and sleep disorders, anxiety, and depression simultaneously, causing an impact on the psychological/emotional and social context³².

The attitude of family members, healthcare professionals, colleagues, neighbors, friends, transportation services and healthcare services and policies are considered by these participants as facilitators of their daily life. Contrary to Torres et al.²⁶, in which the individuals studied had psycho-affective alterations that impacted the family relationship. Social security and employment services, systems and policies are pointed out by the subject as barriers. No studies were found in the national and international literature relating CRPS I with social security policies and employment issues.

It was possible to observe in this study that subjects affected by CRPS I suffer a significant disruption in daily life, interfering directly in all areas of occupational performance.

The rehabilitation process of these subjects must be included in multidimensional programs, addressing the biopsychosocial characteristics and a multidisciplinary team. Such programs should include biological, psychological/emotional and social aspects, and also provide guidance on CRPS I and its magnitude²⁹. It is known that these subjects with CRPS I need therapeutic follow-up involving a multidisciplinary team. Physiotherapy and Occupational therapy professionals play a fundamental role in the rehabilitation process and effective reinsertion of subjects with CRPS I in the labor market. However, it is observed that this topic is little discussed in both professions. Therefore, little has been discussed about the rehabilitation process of this syndrome. In this sense, it is necessary to have other studies addressing the importance of physical and occupational therapy in the treatment of CRPS I.

CONCLUSION

This study showed that CPRS I seriously affects the life/health condition and work activity of the subjects. The presence of pain and physical damages resulting from this syndrome affect the functional capacity of workers directly. This disease brings limitations in daily, leisure and work activities, seriously impacting the occupational roles of the subjects affected by this syndrome.

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- 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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Supplement article:

Walker LK. Use of extracorporeal membrane oxygenation for preoperative stabilization of congenital diaphragmatic hernia. *Crit Care Med*. 1993;2(2Suppl1):S379-80.

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