CONTENTS

EDITORIAL
Should we retire statistical significance? ........................................... 211
Luís Claudio Lemos Correia, Gabriela Oliveira Bagano, Milton Henrique Vitória de Melo

ORIGINAL ARTICLES
Vulnerability in the elderly and its relationship with the presence of pain ........ 213
Leticia Masson, Fabiana Meneghetti Dallacosta

Pain and sleeping problems in the elderly ............................................ 217
Élen dos Santos Alves, Nathália Alves de Oliveira, Mariâlí Terassi, Bruna Moretti Luchesi,
Sofia Cristina Iost Pavarini, Keika Inouye

Correlations between masticatory muscle activity, quality of life, and dysfunction severity in women with chronic temporomandibular disorder ............................... 225
Carlos Eduardo Fassicollo, Barbara Camila Flissak Graefling, Lilian Gerdi Kittel Ries

Pain as the fifth vital sign: nurse's practices and challenges in a neonatal intensive unit care ................................................................. 232
Marcela Milrea Araújo Barros, Bruna Viana Scheffer Luiz, Claise Vieira Mathias

The impact of chronic pain on functionality and quality of life of the elderly ........ 237
Bianca de Oliveira Lemos, Ana Marcia Rodrigues da Cunha, Claudia Bernardi Cesarino,
Mariélza Regina Ismael Martins

Prevalence of chronic pain and analysis of handgrip strength in institutionalized elderly ................................................................. 242
Dáfne dos Santos Ribeiro, Karina Garbin, Matheus Santos Gomes Jorge, Marlene Doring,
Marilene Rodrigues Portella, Lia Maria Wibelinger

Relationship between the intensity of chronic low back pain and the generated limitations with depressive symptoms ..................................................... 247
Ariel Donatti, Élen dos Santos Alves, Mariâlí Terassi, Bruna Moretti Luchesi, Sofia Cristina Iost Pavarini, Keika Inouye

Effects of exercises on pain and functional capacity in hospitalized cancer patients .......... 255
Cláudia Ranzi, Bibiana Ferrari Barroso, Douglas Roberto Pegoraro, Amanda Sachetti, Carla
Wouters Franco Rockenbach, Leonardo Calegari

Coping strategies in patients with neuropathic pain .................................... 260
Thainá de Oliveira Laluce, Claudia Maria de Luca Colturato Dalal, Mariélza Regina Ismael Martins,
Rita de Cassia Hela Mendonça Ribeiro, Flavia Cesarino de Almeida, Claudia Bernardi Cesarino

Proposal of the instrument work-related musculoskeletal disorders index ........... 266
Paulo Wenderson Teixeira Moraes, Antonio Virgilio Bittencourt Bastos

SYSTEMIC ALTERATIONS IN PLASMA BIOMARKERS LEVELS IN PATIENTS WITH CHRONIC PAIN ............................................. 274
Leticia Meda Vendrusculo-Fangel, Renan Fangel, Rita de Cássia Marqueti

Pain rehabilitation treatment for women with breast cancer .......................... 279
Tatiana de Bem Fredda, Leonessa Boing, Regina Maldonato Bussmann, Adriana Coutinho de
Azevedo Guimarães
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**Cases Reports**

Temporomandibular joint arthrocentesis: a technique proposal. Case report

Eduardo Grossmann, Rodrigo Lorenzi Polulha, João Paulo Bezerra Leite

Interdisciplinary care in the treatment of orofacial pain. Case report

Lucí Mara França Correia, Juliana Wille Silva, Henrique Lourenço da Costa Lima, Michael Krakauer

Headache after evaluation with transcranial magnetic stimulation in a healthy participant. Case report

Julie Azevedo Araújo Valente, Maria José Pedroire Ramalho, Janine Ribeiro Camatti, Abrahão Fontes Baptista

**Letter to the Editor**

Sleep and pain: a circadian multi-challenge rather than a simple bidirectional pathway

Miguel Meira e Cruz, Izabella Paola Manetta

**Instructions to Authors**


Submitted to articles online:
Should we retire statistical significance?

Devemos aposentar a significância estatística?

Dear Editor,

In the *Nature* journal, echoed the article entitled “Retire Statistical Significance”, which brings a critical reflection on the statistical dogmatism, raising an analysis on both sides of the same coin. On the one hand, the value of the thought brought by the authors. On the other hand, the unintended consequences of the retirement of the concept of statistical significance. The first point of view relates to the bias of value overestimation; the second point relates to the bias of positivism.

The concept of statistical significance is dichotomous; that is, it categorizes the analysis as “positive” or “negative”. Categorizing adds pragmatic utility, but all categorization is arbitrary reductionism. In categorizing for pragmatic reasons, we should understand categories as something of less value than the full view. The categorization paradox occurs when we start to give more value to the information because it is categorical rather than continuous. Continuous information accepts the shades of gray, the intermediate, the doubt, while the categorical gives a definite (pseudo) tone to the statement.

Statistics is the exercise of recognizing uncertainty, doubt, chance. The definition of statistical significance was originally created to hinder claims arising from chance. The confidence interval was created to describe the inaccuracy of our statements. Statistics is the exercise of integrity and humility of the scientist.

However, the categorization paradox fosters a certain dogmatism. First, the authors of the above-cited *Nature* article highlight the overvaluation of negative results. A negative study is not the one that proves the nonexistence, which would be impossible; it is merely a study that has not proven the existence. Therefore, strictly speaking, “absence of evidence is not evidence of absence”, as Carl Sagan stated. That is, “the study proved that there is no difference” is not the best way to describe it, and it is preferable to say, “the study did not prove a difference”.

Such a point should not be mistaken for the idea that a negative study means nothing. It has value and impact. The impact of a negative study (p > 0.05) lies in reducing the likelihood of the phenomenon to exist. As good studies have failed to prove it, the probability of the phenomenon drops progressively to the point where it becomes so low that nullifies the attempt to continue to try, making the hypothesis null the most likely path of thought.

A negative study is not necessarily contradictory in relation to a positive study. Perhaps, the result of the two may be the same when one failed to reject the null hypothesis, and the other was able to reject it. One could not see, and the other could see. In fact, most of the time, only one of the two studies are correct.

Finally, the categorization paradox makes us believe in any statistical significance, although most are false positives (Ioannidis). A p-value < 0.05 is not irrefutable proof. Undersized studies, the multiplicity of secondary analyses, biases can fabricate false statistical significance.

In fact, the predictive value (negative or positive) of studies does not lie solely in statistical significance. It depends on the quality of the study and analysis, the scientific ecosystem, and the pretest probability of the idea.

Therefore, the authors of the *Nature* article are right in criticizing the deterministic view of statistical significance.

**BUT THE QUESTION LOOMS: SHOULD WE REALLY RETIRE STATISTICAL SIGNIFICANCE?**

Such an achievement would mean retiring an advent that has historically been responsible for a major evolution in scientific integrity. However, all that is good tends to be “borrowed”. Artists of false positivization of studies “borrowed” the advent of the p-value (created to make difficult the type I error) to prove false things.

While on the one hand, the retirement of statistical significance would avoid the paradox of categorization, on the other hand, it would make room for the positivity bias, our tropism for creating or absorbing positive information.

The criticism of statistical significance in this and other prominent articles does not provide a better alternative. For example, the author of the *Nature* paper acknowledges that other, more recent statistical approaches (Bayesian, for example) do not abandon the categorization paradigm. Even in certain passages, the authors mention that they do not propose a total abandonment of the notion of statistical significance. Perhaps the title that reflects the real content of the article should be rephrased with a question mark: “Should We Retire Statistical Significance”? 
Currently, much is discussed about scientific integrity than two decades ago. However, in approaching this subject with more emphasis than in the past, it appears that this problem is worse nowadays. That’s not the case. We experience a clear evolution in scientific integrity: concepts of multiplicity are much more discussed today than in the past, clinical trials have their designs published a priori, journals require CONSORT publication standards, much more is said about scientific transparency, open science, slow science. We are evolving. And the first step towards integrity was the creation of the notion of statistical significance in the first half of the last century by Ronald Fisher.

A study published in *PLoS One* (Bob Kaplan) analyzed, over a long period of years, the results of clinical trials funded by the *National Institutes of Health* (NIH). Before the year 2000, when there was no need to previously publish the protocol, the frequency of positive studies was 57%, falling to only 7% of positive studies after the a priori publication rule. Previously, the authors used to positive their studies by multiple a posteriori analyses. Today, this has become less frequent due to the obligation to publish a priori.

The impression is that it has become elegant to criticize the p-value, which seems to be a betrayal of an advent of great historical importance and which, until then, has not found a better substitute. We can’t blame P for being “borrowed” by evil-minded researchers. Researchers are to blame.

Therefore, we propose to maintain the p-value and adopt the following measures:

- Describe the p-value only when the study has a suitable size for the hypothesis test. Otherwise, it would gain a more descriptive character, without using associations for testing of concepts. This would avoid false positives stemming from “small studies”, most published articles. For example, the median statistical power of biomedicine studies is 20%;
- Do not describe the p-value in secondary outcome analyzes;
- In (exploratory) subgroup analyzes, use only the interaction p-value (more conservative and difficult to give meaning), avoiding the p-value obtained by comparing within a subgroup (small studies);
- Include in CONSORT the obligation for the authors to make explicit in the title of sub-studies that it is an exploratory and secondary analysis of a previously published study;
- Abandon the term “statistical significance”, replacing it with “statistical accuracy”. Statistics is used to differentiate true causal associations from chance-mediated pseudo-causalties. Therefore, a p-value of <0.05 connotes veracity. Whether the association is significant (relevant) depends on the description of the numerical difference or the association measures of categorical outcomes. Thus, using “statistical veracity” avoids the confusion between statistical significance and clinical significance.

Finally, we propose the advent of the “researcher integrity index”. This index will be calculated by the ratio between the number of negative studies/numbers of positive studies. An integrity index <1 indicates a researcher of questionable integrity. This index is based on the assumption that the probability of a good hypothesis being true is less than 50%. Therefore, there should be more negative than positive studies. This does not occur due to the “postivitation” techniques of studies (small papers, multiplicties, biases, spin of conclusions) and the publication bias that hides negative studies. A righteous author would be the one who does not use these practices and therefore would have several negative and few positive studies, resulting in an integrity index well above 1.

The *Nature* article is useful for promoting a reflection on the pros and cons of statistical significance. Nevertheless, it does not propose its retirement. Such a thing would be analogous to retiring a still very productive person. Conversely, statistical significance should remain active and progressively evolving in its use. Let us also learn to value a p>0.05. After all, the unpredictability of life is represented by this symbology, much of people’s fate is mediated by chance. Or nothing happens by chance?

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**REFERENCES**

Vulnerability in the elderly and its relationship with the presence of pain

Vulnerabilidade de idosos e relação com a presença de dor

Leticia Masson¹, Fabiana Meneghetti Dallacosta²

ABSTRACT

BACKGROUND AND OBJECTIVES: In Brazil, there is a high prevalence of pain in people above the age of 60, and although pain is not related as a direct factor of dependence and death, it interferes in several aspects of life with functional limitations. This study aimed to evaluate the vulnerability of the elderly and its relation to the presence of pain.

METHODS: A survey with individuals over 60 years using the Vulnerable Elders Survey questionnaire for vulnerability analysis and the Pain-Related Disability Index to analyze the interference of pain in daily activities. The data were analyzed using the Student’s t-test, Chi-square test, and Pearson’s correlation.

RESULTS: The study had 176 participants, mean age 68.3±6.8 years, 111 women (63.1%), and 65.9% rated their health as good. Forty-eight elderly (27.3%) were considered vulnerable, mainly women and patients with hypertension and diabetes. The most limiting daily living activities were bending, kneeling or squatting. The highest scoring domains for limitation due to pain were related to family and household activities, and work-related activities. The domains with lower scores were related to incapacity for sexual life and personal care. The older had lower scores on the pain scale, and the hypertensive had higher scores, as did women. There was an association between pain and vulnerability (p=0.00).

CONCLUSION: Pain impacts the life of the elderly, causing suffering and disability for activities of daily living, besides increasing vulnerability.

Keywords: Elderly, Health vulnerability, Pain.

RESUMO

JUSTIFICATIVA E OBJETIVOS: No Brasil observa-se alta prevalência de dor em indivíduos acima de 60 anos, e embora a dor não apareça como fator direto de dependência e morte, causa interferência em diversos aspectos da vida e relaciona-se com limitações funcionais. O objetivo deste estudo foi avaliar a vulnerabilidade de idosos e relacionar com a presença de dor.

MÉTODOS: Pesquisa com indivíduos acima de 60 anos, utilizando o questionário Vulnerable Elders Survey para a análise da vulnerabilidade e o Índice de Incapacidade relacionado com a dor para a análise da interferência da dor nas atividades de vida. A análise dos dados foi através dos testes t de Student, Qui-quadrado e Correlação de Pearson.

RESULTADOS: Participaram do estudo 176 indivíduos, média de idade 68,3±6,8 anos, 111 mulheres (63,1%), e 65,9% avaliaram sua saúde como boa. Quarenta e oito idosos (27,3%) foram considerados vulneráveis, principalmente mulheres e portadores de hipertensão e diabetes. As atividades de vida diária com maior limitação foram curvar-se, ajoelhar-se ou agachar. Os domínios de maior pontuação para limitação devido à dor foram relacionados à família e atividades domésticas, e atividades relacionadas ao trabalho. Os domínios com menores pontuações foram relacionados à incapacidade para vida sexual e cuidados pessoais. Os mais velhos tiveram menor pontuação na escala de dor e os hipertensos tiveram pontuação maior, assim como as mulheres. Houve associação entre presença de dor e vulnerabilidade (p=0,00).

CONCLUSÃO: A dor impacta a vida dos idosos, causando sofrimento e incapacidade para as atividades da vida diária, além de aumentar a vulnerabilidade.

Descritores: Dor, Idoso, Vulnerabilidade em saúde.

INTRODUCTION

In Brazil, there is a high prevalence of pain in individuals over 60 years old, and although pain does not show up as a direct factor of dependence and death, it interferes in several aspects of life and is related to functional limitations³. Vulnerability increases the susceptibility to illness, impacts on the life of elderly people, and can be defined as a reduction in the capacity for self-determination, with lack of power, intelligence, education, resources, strength or other attributes². This issue has been the object of several studies, but there is little research addressing the influence of pain on the vulnerability of the elderly. It is known that chronic pain affects the elderly’s autonomy, compromising daily life activities (DLA), and impacting the quality of life⁴. In the presence of pain, old adults tend to become more vulnerable because they will have losses in performing DLA, as
well as restricting social interaction, increasing cocooning, and compromising functional status. Pain and chronic health conditions also increase the chance of complications such as anxiety, depression, abuse of substances, and social isolation, which in turn, have an impact on the elderly’s quality of life. Identifying the presence and impact of pain in elderly people has been challenging. Pain is subjective and involves physical, psychic, and cultural mechanisms. The International Association for the Study of Pain (IASP) considers pain as an unpleasant, sensorial and emotional experience, associated or not to actual or potential tissue damage, and may be acute or chronic when it lasts for more than six months or exceeds the expected recovery period.

Thus, this study aimed to analyze the vulnerability of older people and relate it to the presence of pain.

METHODS

A cross-sectional study, conducted with individuals over 60 years of age, living in the city of Ouro, Santa Catarina. The city has 477 hypertensive patients, and 107 people with diabetes enrolled in the Family Health Strategy and the Hiperdia program. Data collection was performed in the first half of 2018, through home visits and at the Health Unit, with questionnaires used by the researchers. The inclusion criteria were aged above 60 years, being registered at the Health Unit and living in Ouro/SC. The exclusion criteria were people who could not communicate to answer the questionnaires or who did not agree to participate in the study.

A total population of 584 individuals (hypertensive and/or diabetic) was considered to calculate the sample. The confidence level adopted was 95%, and a sample error of 5%. The sample size was of 174 individuals, considering the homogeneous population.

Two instruments were used, one for vulnerability analysis, Vulnerable Elders Survey (VES13), and a questionnaire for pain analysis (Pain-Related Disability Index). The VES13 has 13 items that include self-perception of health, presence of physical limitations, and functional decline, classifying the elderly in two groups: vulnerable (VES13≥3) and non-vulnerable (VES13<3). This questionnaire was developed aiming to identify the vulnerable elderly, and it was validated in Brazil by Maia et al., proving to be reliable and easy to apply. The Pain Disability Index (PDI), is an instrument that evaluates and measures the degree of interference of pain in seven DLAs, by a Likert scale from zero to 10, being zero no interference in the activity and 10, total interference. This instrument has been widely used because it is easy to apply and good psychometric properties. It was validated for Portuguese by Azevedo et al.

Those who agreed to participate answered the questionnaires only once, after completing the Free and Informed Consent Term (FICT).

This research was approved by the Ethics Committee of the Universidade do Oeste de Santa Catarina (UNOESC), with opinion no. 2.670.513.

Statistical analysis

The numerical data were analyzed by the Student’s t-test and the categorical data by the Chi-square. Pearson was used for the correlation of the quantitative variables. The SPSS software was used.

RESULTS

A total of 176 individuals participated in the study, with an average age of 68.3±6.8 years, 65 men (36.9%), 111 women (63.1%), 167 white (94.9%), 170 having children (96.6%), 173 (98.3%) with income between one and two minimum wages, 123 (69.9%) married or living with a partner, 162 (98.3%) with low schooling (less than eight years of study).

Table 1 shows the other characteristics of the population surveyed.

Self-perception of health, according to the VES13 questionnaire, showed that 65.9% considered their health “good”, 15.9% “regular”, 6.8% “poor”, 6.3% “very good” and 5.1% “excellent”.

Regarding vulnerability, 48 (27.3%) were considered vulnerable and 128 were non-vulnerable (72.7%) (Table 2).

Table 3 shows the vulnerability analysis according to the VES13 questionnaire. There was no association of vulnerability with marital status (p=0.11), nor with schooling (p=0.25).

Regarding the pain scale, the domains with higher scores were incapacity for activities regarding household chores, work, and family activities. The domains with lower scores were related to the incapacity for sexual life and personal care (bathing, dressing, etc.) (Table 4).

When relating the pain scale with age, it was observed that there was a weak and inverse correlation (r=-0.1; p=0.02) so that the older individuals had a lower score on the pain scale. The hypertensive patients had higher scores on the pain scale (p=0.05), as well as those considered vulnerable (p=0.00). There was no difference in the pain scale for gender (p=0.10). Table 5 shows the analysis of the pain scale score by gender, vulnerability, and the presence of chronic non-communicable diseases.

Table 1. Sociodemographic and clinical characteristics of elderly residents in Ouro, SC (n=176)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic</td>
<td>28 (15.9)</td>
</tr>
<tr>
<td>Take drugs for diabetes</td>
<td>26 (92.8)</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>95 (54)</td>
</tr>
<tr>
<td>Take drugs for hypertension</td>
<td>93 (9.2)</td>
</tr>
<tr>
<td>Participate in the Hiperdia group at FHS</td>
<td>15 (8.5)</td>
</tr>
<tr>
<td>Smokers</td>
<td>12 (6.8)</td>
</tr>
<tr>
<td>Ex-smokers</td>
<td>30 (17)</td>
</tr>
<tr>
<td>Use of alcohol</td>
<td>35 (19.9)</td>
</tr>
<tr>
<td>Sedentary</td>
<td>55 (31.3)</td>
</tr>
<tr>
<td>Do exercises occasionally</td>
<td>107 (60.8)</td>
</tr>
<tr>
<td>Healthy diet</td>
<td>127 (72.2)</td>
</tr>
</tbody>
</table>

FHS = Family Health Strategy.
DISCUSSION

The main outcomes of this study showed a significant association between incapacity due to pain with vulnerability and the presence of hypertension. Studies suggest that pain is mainly associated with the female gender, advanced age, and low socioeconomic status, but in this study, the younger individuals had more complaints of incapacity due to pain.

The activities reported by the elderly as more difficult are bending, kneeling or crouching and raising/extending the arms above the shoulder. Less difficulty was reported for writing or holding small objects. These difficulties do not seem to interfere in the self-perception of health since 65.9% considered their health good. It is known that self-perception of health depends on sociodemographic variables, morbidities and social support, as well as self-rated health or pain intensity.
as the functional capacity is associated with physical activity, nutritional status, and the number of chronic non-communicable diseases. In this way, the perception of health is individual and affected by several factors. Impaired mobility is one of the most disturbing events in the health of the elderly, associated with reduced strength and muscular power, disability, and dependence to perform daily activities. The incapacity to perform daily activities limits the autonomy of the elderly, diminishes the quality of life and increases the risk of dependence, care, and premature death. In the studied population, the highest prevalence was of non-vulnerable individuals, highlighting that the most vulnerable were female. Despite being a universal process, aging has a strong relationship with gender, where women tend to have a longer life expectancy than men, with important characteristics in the old age that make them more vulnerable. Although women have higher life expectancy than men, the proportion of years lived with the disease is also higher.

Regarding chronic non-communicable diseases, it is estimated that 85% of the elderly have at least one, and they constitute an important risk to health. With the increase in the longevity of the population, the aggregation of several risk factors can compromise the quality of life of the elderly, and when comorbidities are present, the possibility of decline is higher, since the ability to compensate a problem is affected by the accumulation of diseases. Concerning the marital status, widowers are more likely to be vulnerable, because the death of a family member may be negative for health, leading to cocooning, but this was not observed in this study.

Although the percentage of elderly people with difficulty to perform DLA was not expressive in this study, it is important to encourage the elderly population to practice physical activities to improve their physical fitness. Regular exercises delay the degeneration of muscles, ligaments, bones, and joints, providing stronger muscles, flexible joints, and maintaining balance and coordination, allowing greater mobility and independence. Also, exercises help the elderly to keep themselves flexible, active, and in good shape.

In this study, it was observed that pain led to incapacity mainly in issues related to family, work, and domestic activities. It is known that pain is one of the main factors that limit the elderly to have a normal life, and causes impairment in the performance of DLA, restricts social interaction, and compromises the functional status.

Some limitations of the study include the cross-section nature, the analysis of a specific period, and the fact that the presence of chronic pain was not investigated, but the incapacity due to pain.

CONCLUSION

This study found a correlation between vulnerability and women, the presence of hypertension and diabetes; while the pain-related incapacity was higher in the younger elderly, the hypertensive and those considered vulnerable.

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Pain and sleeping problems in the elderly

Dor e dificuldade para dormir em idosos

Élen dos Santos Alves1, Nathalia Alves de Oliveira1, Mariélli Terassi1, Bruna Moretti Luchesi2, Sofia Cristina Iost Pavarini1, Keika Inouye3

ABSTRACT

BACKGROUND AND OBJECTIVES: Brazil is going through changes in the sociodemographic profile leading to changes in epidemiological profile and population aging. Considering the increase of the elderly population with chronic noncommunicable disease, and the identification of chronic pain as a public health problem and its persistence associated with the worsening of the quality of sleep, the objective of this study was to identify the association between self-reported sleeping problems and the intensity of chronic pain.

METHODS: A quantitative, descriptive, cross-sectional study conducted with 187 elderly people living in one of the Family Health Unit areas of the municipality and over 60 years old. A sociodemographic characterization instrument was used with one guiding question about sleeping problems (self-reported) and the Multidimensional Pain Evaluation Scale.

RESULTS: Pain was described as moderate and intense, with a higher prevalence in the lumbar, iliac and knee regions, being significantly more intense (p=0.028) in the group of elderly people who have sleeping problems.

CONCLUSION: The analyzes allowed to observe an association between sleeping problems and the intensity of chronic pain.

Keywords: Adaptation disorders, Elderly people, Pain, Sleep.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O Brasil apresenta mudanças no perfil sociodemográfico, acarretando mudanças no perfil epidemiológico e no envelhecimento populacional. Considerando o aumen da população idosa com doença crônica não transmissível, e identificada a dor crônica como um problema de saúde pública e sua persistência associada à piora da qualidade do sono, este estudo teve como objetivo identificar a associação entre dificuldade para dormir autorrelatada e a intensidade da dor crônica.

MÉTODOS: Realizou-se um estudo quantitativo, descritivo de corte transversal, composto por 187 idosos com mais de 60 anos, residentes em uma das áreas de Unidade de Saúde da Família do município. Foi utilizado um instrumento de caracterização sociodemográfica com uma pergunta norteadora sobre dificuldade para dormir (autorrelatada) e a Escala Multidimensional de Avaliação da Dor.

RESULTADOS: A dor foi descrita como moderada e intensa, com maior prevalência nas regiões lombar, ilíaca e joelhos, sendo significativamente mais intensa (p=0.028) no grupo de idosos que tem dificuldade para dormir.

CONCLUSÃO: As análises permitiram observar uma associação entre dificuldade para dormir e a intensidade da dor crônica.

Descritores: Dor, Idoso, Sono, Transtornos de adaptação.

INTRODUCTION

Nowadays, Brazil is changing its sociodemographic profile as a result of declining birth rates and increasing longevity1. This phenomenon that leads to population aging is aligned with the world context. In 2012, there were 810 million people with ages of 60 and over, constituting 11.5% of the global population. It is estimated that by 2050 there will be more seniors than children under the age of 15, and the number of older people is projected to reach 2 billion in the same year, representing 22% of the world’s population2. These demographic changes create important modifications in the epidemiological profile, constituting relevant changes in morbidity, mortality, and health indicators. Population aging is accompanied by increased health problems. In Brazil, the number of older people who have some chronic noncommunicable disease (NCD) increases exponentially, and they are more likely to have autonomy and independence reduction1.

Oldness is often associated with a high incidence of chronic and degenerative diseases that may compromise independence1. Many cases are accompanied by pain, and chronic pain (CP)
is the most frequent type of complaint of the individuals. CP has been associated with pathological processes and is a frequent cause of functional limitations.

According to the Brazilian Society for the Study of Pain (SBED), pain is a warning sign and protection for the body. However, CP loses its alertness and survival function, and gets other aspects of emotional, physical, and social nature, being an abnormal and non-protective response. It can also be defined as a sensory and emotional experience – unpleasant and disproportionate, causing physical and psychic discomfort to the individual. Pain is understood as chronic if it lasts longer than six months and is considered a disease rather than a symptom. Pain, identified as a critical public health problem, is responsible for high health costs, reduced productivity, and quality of life (QoL). The persistence of pain is strongly associated with symptoms exacerbation and worsening sleep quality. Studies show an association between sleep quality and pain.

Sleep is an essential life function. It acts as a repairer of vital and regulatory functions and is core to good mental health. It consists of two phases, called Non-Rapid Eye Movement (NREM) sleep and Rapid Eye Movement (REM) sleep. The NREM sleep is characterized by the absence of rapid eye movements, and is divided into four stages – I, II, III and IV, beginning with superficial sleep, followed by the three stages with increasing depth. Then the superficial phase returns until reach the deepest sleep, called REM. The first phase of sleep, NREM, is characterized by muscle relaxation, but with the maintenance of tone, progressive reduction of body movements and regular breathing. The REM sleep is characterized by the presence of rapid eye movements, we can also say that this phase is also characterized by an active brain in a paralyzed body, and irregular breathing, being in this phase the occurrence of dreams. The phases are distinct and alternate in cycles, ranging from four to six cycles in one night.

The normal aging process leads to changes in sleep structure in more than half of the elderly population, negatively impacting QoL. With advancing age, the elderly tends to sleep less, with a significant reduction in the amount and quality of sleep. According to Kreling, individuals with acute or chronic pain may present changes in sleep pattern, manifestations of irritability, and decreased ability to concentrate.

Sleep disorders occur more frequently in the elderly, affecting the quality of night sleep and the need for rest during the day. Pain, regardless of its nature, when left untreated, can result in impaired sleep patterns. However, its assessment in the elderly can be difficult considering that physiological, psychosocial, and cognitive alterations may be present. Treatment must have as its primary target the causes, prioritizing sleep hygiene in order to improve the QoL of the elderly, with emphasis on functional capacity, sleep pattern, and even the socialization of the individual. However, pharmacological treatment has been a common practice that can have some risks such as falls, daytime sedation, cognitive decline, and alteration of sleep architecture. Thus, there is evidence that the use of sleep hygiene is a good therapeutic option with efficacy documented in the literature.

The presence of pain in the elderly is a relevant problem in the current social and health context, especially when it has influences on the sleep patterns of the elderly. The purpose of this study was to identify the association between self-reported difficulty in sleeping and the intensity of CP.

METHODS

This research is quantitative, descriptive, and cross-sectional. Data were collected from 16 Family Health Units (USF) in the city of São Carlos (SP). The medium-sized city has a total population of 221,950 inhabitants, of these 28,868 are elderly - the equivalent of 13% of the total population. USF coverage is of 39,768 inhabitants in urban and rural areas. The inclusion criteria were being 60 years old or older, being registered and residing in the coverage area of one of the city's USF and presenting self-perceived CP. Data collection was performed by members of the Research Group (RG) of which the authors are part. It was made contact with the USF to identify households with at least two seniors. With a list of all names and addresses (n=594), all the houses were visited by members of the RG. It was collected data from 351 seniors, as some potential subjects refused to participate, were not located, moved, or had died. All participants signed the Free Informed Consent Form (FICT).

Based on the population data, the proportion of older people and the number of individuals served by the USF of the city, it was possible to estimate the number of elderlies assisted at the USFs of São Carlos (5172). It was estimated that 300 elderly would be a sample with a confidence level of 95% and a margin of error of 5.0%. This calculation was made by the Survey Monkey® platform, available at <https://pt.surveymonkey.com/mp/sample-size-calculator/>. Data from 351 elderly were analyzed, of these 187 had CP. The sample size corroborates literature data, as 53% of the elderly had CP.

The elderly were divided into two groups for comparison: Group A - (GA) with sleep difficulty (n=104) and Group B (GB) without sleep difficulty (n=83) - from the guiding question: “Do you have sleeping difficulty?” with the answer options: “Yes” or “No”. Data collection for the dependent variable “pain” was performed using the Multidimensional Pain Evaluation Scale (EMADOR). This instrument was validated for use in Brazil in 2010, and it is used for the evaluation and measurement of the sensitive, affective, and cognitive dimensions of the pain variable. Its objective is to evaluate acute and chronic pain through quantitative and qualitative analysis. The instrument has a question for intensity assessment, with scores ranging from zero to 10 points, where the higher the grade reported, the greater the intensity of pain. For the qualitative analysis, the participant chose, from 10 descriptors, the one that best represented their pain. The scale also includes a body diagram that allows the individual to show the locations affected by pain.

All stages of this work obeyed the ethical guidelines that regulate research with human beings. Data collection started only after the approval of the Research Ethics Committee of the Federal University of São Carlos under opinion number 711,592 of 2014.
Statistical analysis
The data obtained were entered in a database in the software Statistical Package for Social Sciences (SPSS) for Windows to perform: (a) descriptive analyzes to characterize the sociodemographic profile and pain of the elderly; (b) Pearson chi-square and Mann-Whitney tests to compare participants' sociodemographic profile and pain according to difficulty in sleeping. The p-value to consider statistically significant difference was p≤0.05.

RESULTS
The sample consisted of 187 older people with CP registered in the areas covered by the USF. Regarding sociodemographic characteristics, the sample had a mean age of 68.9±7.07 years, predominantly female (n=151; 80.7%) and 88.8% (n=166) lived with a partner. As for the education level, 109 (58.3%) had attended primary school, and 18.7% (n = 35) had never attended school. Regarding religiosity, 114 (61%) said they were Catholic. Regarding ethnicity, most of the elderly declared themselves white (n=131; 70.1%). Regarding income, 58.3% (n=109) said it was not enough.

Tables 1 and 2 show the detailed sociodemographic characteristics of the participants and the comparative analysis between the groups divided according to the sleeping. It is noteworthy that the groups did not differ in relation to demographic variables. This pairing ensures greater control of the comparative analysis of the dependent pain variable, minimizes bias, and increases the reliability of the outcomes regarding the general research objective.

Regarding pain intensity and description, there was significant variability of responses. Moderate and severe intensities were the most reported in both groups, with severe intensity shifting to the group with sleeping difficulty, that is, the proportion of people with moderate pain was higher in the group without sleeping difficulty. On the other hand, the proportion of elderly with severe pain was higher in the group with sleeping difficulty ($\chi^2=6.508, gl=1, p=0.011$) (Table 3).

Regarding pain descriptors, the most reported were persistent (n=138; 73.8%), depressing (n=104; 55.6%) and uncomfortable (n=173; 92.5%). All with significant differences between groups (p=0.036; p=0.003; p=0.034, respectively) (Table 3).

Regarding pain location, regions were common in both groups, with the low back, the iliac and right knee being the most re-

Table 1. Distribution of the elderly according to the characterization variables regarding sleeping difficulty and comparative analysis between groups. São Carlos, 2014

<table>
<thead>
<tr>
<th>Variables</th>
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<th>With sleeping difficulty (GA)</th>
<th>Both groups</th>
<th>Comparative analysis</th>
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Continue...
### Table 1. Distribution of the elderly according to the characterization variables regarding sleeping difficulty and comparative analysis between groups. São Carlos, 2014 – continuation

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<td>n</td>
<td>%</td>
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<td>100</td>
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* Chi-square; ** Significant; ns= Not significant.

### Table 2. Descriptive and comparative analyzes of characterization variables according to sleeping difficulty. São Carlos, 2014

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<th>p-value*</th>
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<td>68.95</td>
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<td>68.00</td>
<td>67.95</td>
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<tr>
<td>Standard deviation</td>
<td>7.04</td>
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<td>Minimum</td>
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<td>60</td>
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<td>Maximum</td>
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<td>95</td>
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* Mann-Whitney; ** Significant; ns= Not significant.
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<td>n %</td>
<td>n %</td>
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* Chi square; *** Linear-by-Linear Association; ** Significant; ns= Not significant.
Table 4. Descriptive and comparative analyzes of pain and sleeping difficulty. São Carlos, 2014

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* Mann-Whitney; ** Significant.

Figure 2. Comparison of pain intensity between groups of elderly with and without sleeping difficulty

Group B = no sleeping difficulty; Group A = with sleeping difficulty.

ferred sites, varying only in the group with sleeping difficulty, where the left knee was also pointed (Figure 1). However, the pain was significantly more intense in the group that has a sleeping problem \( U= 3516.50, p = 0.028 \), a fact that confirms the study hypothesis and the association between the study variables (Table 4 and Figure 2).

**DISCUSSION**

The mean age of the sample was of 68.9 years, mostly women (80.7%) living with partners (88.8%), depicting the typical profile of the literature. According to Augusti, Falsarella, and Coimbra\(^2\), national and international studies have presented a female profile in the population over 60 years old, a fact attributed to the greater acceptance by women concerning health treatments throughout their lives and self-care conditions. There was a predominance of younger elderly in this research, a condition that corroborates other studies\(^3,24\).
As for the education level, only 58.3% of the elderly had completed primary school, and 18.7% of respondents had never attended school. In our country, studies indicate that the low education level of the elderly can be explained by the culture of the time when they grew up. In the past, the level of education was not as relevant as the need to work the land or learn to do chores, as well as the socioeconomic conditions that made it hard to attend school.

The Catholic religion was predominant (61%). This was expected, because according to the Brazilian Institute of Geography and Statistics (IBGE), in the 2010 census, the Brazilian population is made up of 65% of Catholics. Regarding the income in which 58.3% of the elderly said they were not satisfied, studies conducted with Brazilian elderly point in the same direction. In general, income is considered low, indicating it as the primary source of home maintenance.

CP may be associated with a negative image and pathological processes that may or may not accompany the aging process. Its prolongation for months or years can cause dependence. However, location and intensity vary influencing functional capacity. A CP study, conducted in the state of São Paulo with an elderly population, found a prevalence of 30% on low back pain, 54.5% on regional or one body segment pain and 14.1% generalized pain.

Another study, conducted in the state of Bahia, with 68 institutionalized elderly, pointed out the occurrence of pain in 73.3% of the sample, and 54.7% described it as severe pain, indicating lower limbs as the most common places (47.7%), and the spine (25%). A study with 1,271 elderly residents of São Paulo, reported that 58.45% of the elderly referred to the low back region as the most frequent location of pain, data that corroborate those presented in this study. Celich and Galon pointed to the lumbar spine (44.4%), followed by the leg region (40.7%) and knee joint (25.9%) as the regions with the highest prevalence of CP among the elderly. The same study showed a lower incidence of pain in the toes, ankle joint (7.4%), cephalic region, chest and abdomen (3.7%), which are aligned with the data found in this study.

A research conducted in the city of Campinas showed a positive association between back pain and poor sleep. In a small town in the northern region of the state of Paraná, in 2013, a qualitative study conducted with older people with CP observed the presence of hope for the cure of this pain, followed by the feeling of conformity and powerlessness.

CP has been considered an impacting factor in the life of the elderly, with a probable relationship between pain and difficulty in falling asleep. Ferretti et al. in order to evaluate the quality of sleep in 385 elderly, with and without chronic pain, identified that 58.18% of the elderly had CP, and 57.59% scored poor sleep quality, of the elderly with CP, 48.66% reported moderate pain intensity, in contrast to the elderly without CP (56.52%) who had good sleep quality.

A study conducted in São Luís, MA, with 50 elderly, identified the negative influence of CP on QoL of the respondents, noting a strong relationship with fatigue, sleep disorders and dependence on treatments or drugs.

Monteiro and Ceolim described the quality of sleep at home and hospitalization of a sample of 160 elderly residents in a city in the countryside of São Paulo state. During hospitalization, the scores of the visual analog sleep scales (VAS-Sleep), regarding disturbance (less than 300), supplementation (less than 100) and effectiveness (greater than 300), indicate satisfactory sleep quality and moderate sleepiness during daytime. However, the authors warn that hospitalized individuals have an altered routine and take several drugs that may affect the variable. At home, the same sample had poor quality sleep (70%) according to the Pittsburg Sleep Quality Index (PSQI) scores. Waking up at night (80.0%), getting up to urinate (77.5%) and pain (33.1%) were frequently indicated as causes of sleep fragmentation. Although fragmentation is not positive, it was self-perceived as normal among respondents, since 62.5% of the elderly said they sleep “well” at home.

A descriptive study, conducted in João Pessoa, PB, with the objective of evaluating the characteristics of the sleep pattern of the elderly assisted at the geriatric outpatient clinic of a university hospital (n = 100), observed that 46% of the elderly had very altered sleep according to the scores for the Mini-Sleep Questionnaire. Also, the elderly reported “often,” “very often” or “always” waking up at night (71%), having a restless sleep (33%), snoring (33%) and not going back to sleep if they wake up (33%). However, 57% of the sample rated their sleep pattern as good.

Chen et al. evaluated the relationship between pain intensity and distribution and sleeping difficulty in the elderly. Of the 765 participants, with 64 years and over, a prevalence of sleep problems was observed according to the Brief Pain Inventory (BPI), ranging from 17.8% to 37.0% respectively for the lowest to highest quartiles of pain. With the analysis adjusted, the pain was strongly associated with sleep problems, concluding that widespread, moderate to severe pain is strongly associated with sleeping difficulty in the elderly.

Dutch longitudinal data from the Doeti chef Chin Cohort Study, obtained from four self-reported pain measurements taken every five years with a sample of 3485 adults, aged 25-71 to 40-86 years concluded that individuals with shorter sleep period, smoking, obesity, and poor perception of mental health are more prone to pain. Accordingly, the PAINEL Study, derived from the FIBRA Network Study, conducted in the city of Belo Horizonte, with 378 participants over 60 years, among the findings, found that individuals with disabling low back pain were more likely to have shorter sleep time.

In general, the manifestation of response to the pain of individuals may cause changes in sleep pattern and other physio-pathological processes, considering an association between pain and adequate sleep.

Regarding the limitations of the study, since this research was based on self-report, it would be interesting for future studies to use multi-parametric examinations and tests to assess sleep disorders.

The results obtained during the study showed an association between pain and sleeping in the elderly, and corroborates the scientific literature, elucidating practices and interventions for working with the elderly.
CONCLUSION

Comparative analyses of the present study show that there is a significant association between self-reported sleeping difficulty and the intensity of CP.

REFERENCES

35. Monteiro NT, Ceolim MF. Quality of sleep of the aged at home and in hospital. Texto e Contexto Enfermagem, 2014;23(2): 356-64.
Correlations between masticatory muscle activity, quality of life, and dysfunction severity in women with chronic temporomandibular disorder

Relação entre atividade elétrica mastigatória, qualidade de vida e gravidade da disfunção em mulheres com disfunção temporomandibular crônica

Carlos Eduardo Fassicollo¹, Barbara Camila Flissak Graefling², Lilian Gerdi Kittel Ries²

ABSTRACT

BACKGROUND AND OBJECTIVES: Assessing the possible interactions between the activity of masticatory muscles and quality of life and severity of the temporomandibular disorder can help clarify how changes in muscle activity can be associated with a chronic temporomandibular disorder in women. This study aimed to investigate the correlations between masticatory electrical activity during mandibular resting, maximum voluntary contraction, the severity of the temporomandibular disorder, and quality of life in women with chronic temporomandibular disorder and to compare these parameters with healthy asymptomatic controls.

METHODS: Sixty women, 30 with temporomandibular disorder and 30 asymptomatic, participated in this case-control observational study. Diagnostic Criteria for Temporomandibular Disorder was used to identify the presence or absence of temporomandibular disorder. The SF-36 questionnaire was used to assess the quality of life in participants, and ProTMDmulti-part-II was applied to assess the severity of signs and symptoms of temporomandibular disorder.

RESULTS: During jaw clenching, the masticatory activity of the right temporal and left masseter muscles, the symmetry of the masseter muscles, and anteroposterior coefficient were significantly smaller in the temporomandibular disorder group than in the asymptomatic group. Masticatory activity at rest, signs and symptoms of chronic temporomandibular disorder, and impairment of the quality of life were correlated using Spearman coefficient (p<0.05).

CONCLUSION: Our results contribute to findings on the associations between the masticatory activity in chronic signs and symptoms of the temporomandibular disorder, impairment in quality of life, and differences in the masticatory activity during clenching in patients with temporomandibular disorder and controls.

Keywords: Chronic pain, Electromyography, Masticatory muscles, Quality of life, Temporomandibular disorder.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Avaliar a possível interação entre a atividade dos músculos mastigatórios com a qualidade de vida e a gravidade da disfunção temporomandibular pode ajudar a esclarecer como as alterações na atividade muscular podem estar associadas a mulheres com disfunção temporomandibular crônica. O objetivo deste estudo foi avaliar a correlação entre atividade elétrica mastigatória durante o repouso mandibular, contração voluntária máxima, gravidade da disfunção temporomandibular e qualidade de vida em mulheres com disfunção temporomandibular crônica e comparar esses parâmetros com indivíduos assintomáticos (grupo controle).

MÉTODOS: Sessenta mulheres, 30 com disfunção temporomandibular e 30 assintomáticas, participaram deste estudo observacional caso-controle. O instrumento critérios diagnósticos para disfunções temporomandibulares foi usado para detectar a presença ou ausência de disfunção temporomandibular. O questionário SF-36 foi usado para avaliar a qualidade de vida, e o ProDTMmulti parte II foi aplicado para avaliar a gravidade dos sinais e sintomas de disfunção temporomandibular. A atividade mastigatória durante o repouso mandibular e apertamento dentário foram medidos usando eletromiografia de superfície.

RESULTADOS: Durante o apertamento dentário, a atividade do músculo masseter, temporal direito e esquerdo, simetria do masseter e coeficiente anteroposterior foram significativamente menores no grupo disfunção temporomandibular em comparação ao grupo assintomático. A atividade mastigatória em repouso, sinais e sintomas de disfunção temporomandibular crônica e os prejuízos na qualidade de vida foram correlacionados conforme determinado pelo coeficiente de Spearman (p<0,05).

CONCLUSÃO: Os presentes achados contribuem para evidenciar as associações entre atividade mastigatória em sinais e sintomas crônicos de disfunção temporomandibular, comprometimento da qualidade de vida e diferenças na atividade mastigatória durante o apertamento dentário entre disfunção temporomandibular e grupo controle.

Descritores: Dor crônica, Eletromiografia, Músculos da mastigação, Qualidade de vida, Síndrome da disfunção da articulação temporomandibular.
INTRODUCTION

Chronic orofacial pain is one of the most common conditions reported by patients with temporomandibular disorder (TMD)\(^4,13\). TMD is clinically characterized by soreness of the muscles of mastication and the temporomandibular joint (TMJ), restriction of mandibular mobility, and joint sounds occurring during jaw function\(^5\).

These symptoms may be related to alterations in the masticatory motor control\(^6\). Although there is evidence that muscle activation is altered in patients with TMD\(^4,11\), the relation between the duration of TMD and muscle activity remains unclear. An earlier study observed higher masticatory activity at rest in adolescents with TMD\(^7\) and in adults with myofascial pain\(^12\). However, others did not find a significant difference between symptomatic and asymptomatic adults concerning the activity of the masticatory muscles during mandibular resting\(^11\). Lower muscle activity during clenching in patients with TMD has been observed\(^4,5,7\), whereas others found no significant differences\(^5,11,13\). Yet, other studies have observed greater asymmetry of activity during mastication\(^2,8,10\), clenching\(^7\), and an imbalance in contralateral activities during clenching\(^4,13\) and mastication in subjects with TMD compared to asymptomatic subjects\(^10\).

If pain is the main symptom in patients with TMD\(^3,14\), differences in the duration of TMD in previous studies may be the reason for the inconsistent results found in the literature. Thus, we decided to investigate muscle activation in patients with chronic TMD. We expected this group to display the true effects of persistent pain on the masticatory muscles and quality of life.

Chronic pain conditions, which encompass psychological, behavioral\(^9,15\), and social factors, together with physical conditions\(^1\) can influence the functional status of the masticatory muscles and quality of life. Studies have already confirmed that patients with chronic TMD have a low quality of life\(^6,17\). Others have compared the amplitude of muscle activation during mandibular resting\(^5,11,12\) and dental clenching\(^5,7,9,11,13\); however, the correlation between these parameters has not been fully explored. Understanding the potential interaction between masticatory muscle activities and the quality of life can help to elucidate how changes in muscle activity can be related to the pattern of living in patients with chronic TMD.

The first aim of this study was to investigate correlations between the amplitude of masticatory muscle activity during mandibular resting and clenching, the severity of TMD, and the quality of life of women with chronic TMD, and the second one was to compare these parameters between women with chronic TMD and individuals in a control group (CG).

METHODS

Inclusion criteria for the TMD group were as follows: diagnosis of TMD according to the Diagnostic Criteria for Temporomandibular Disorder (DC/TMD)\(^2\) and chronic orofacial pain (>6 months). The exclusion criteria for the TMD and asymptomatic groups were as follows: Angle Class II or III malocclusion, incomplete dentition, periodontal problems, use of occlusal splints within 6 months prior to the study, current orthodontic and psychotherapeutic treatment, current use of analgesics and anti-inflammatory drugs, and refusal to provide a written informed consent. The inclusion of Angle Class I malocclusion was accepted to have a uniform sample.

The sample size was calculated based on the study by Ries et al.\(^14\). Considering \(\alpha=0.05\), \(\beta=0.22\), and a test power of 85%, a minimum of 29 individuals in each group was required. Thirty individuals were enrolled in each group of the study to maintain a margin of safety. Volunteers were recruited at Santa Catarina State University (Florianopolis, Brazil) by verbal and social-media invitation. They were divided into 2 groups: the TMD group (30 females aged between 18 and 44 years; mean ± SD, 27±7.77 years), in which participants had signs and symptoms of TMD, and the asymptomatic CG (30 individuals aged between 18 and 31 years; mean ± SD, 23.2±3.78 years), in which participants had no signs and symptoms of TMD.

Clinical evaluation

One trained examiner performed the clinical examination on all participants. The diagnosis of TMD was based on the DC/TMD questionnaire\(^2\). According to the DC/TMD, patients with TMD in this study were clinically classified as having myalgia and arthralgia. The quality of life was assessed using the Medical Outcomes Study Item Short-Form Health Survey (SF-36) questionnaire that has been translated and adapted for the Brazilian population\(^16\). It is an inventory with 36 questions designed for individuals aged ≥14 years and includes 8 multi-item scales. Intra- and inter-reliability values of the SF-36 were observed to be 0.4426<r<0.8468 and 0.5542<r<0.8101, respectively (\(\alpha=0.90\)). The results of quality of life ranged from 0 to 100, with 0 indicating the worst quality of life and 100 indicating the greatest possible result. The severity of TMD was evaluated using the validated ProTMDmulti-part II (validated by using the Helkimo Clinical Dysfunction Index with \(r=0.65\) according to Spearman Rank correlation)\(^16\).

Severity was indicated on a printed numerical scale of 0 to 10, with 0 indicating the absence of symptoms and 10 indicating the highest possible severity. The ProTMDmulti-part II quantifies the signs and symptoms of TMD according to the perception of the individual. The severity score was the sum of the scores (range, 0–360) attributed to each sign and symptom in e situations (waking up, chewing, talking, and resting). All evaluations were performed by a single trained and able examiner (first author).

Surface electromyography (EMG) assessment

The electrical impedance of the skin was reduced by cleaning the site with hydrophilic cotton soaked in 70% alcohol. The masseter and anterior temporal muscles on both sides were examined. All EMG signals were recorded using an EMG system (Miotool USB, Miotec Company, Porto Alegre, Rio Grande do Sul, Brazil). Measurements were taken with 12 bites of resolution on an analogical/digital converter board at a 2000 Hz sampling frequency and minimum common-mode rejection ratio of 110 dB. Disposable, bipolar surface electrodes (Medi-trace Kendall-LTP, Chicopee, Mansfield, Massachusetts, USA) were positioned on...
the surface of masticatory muscle bellies parallel to the muscle fibers with a between-electrodes center-to-center distance of 20 mm\textsuperscript{20}. A muscle function test was performed before the electrode placement. For the temporalis anterior (vertically along the anterior margin of the muscle) and masseter (2cm above the external angle of the jaw) muscles, the electrodes were placed during dental clenching. The reference electrode was placed on the sternum. Before registering the myoelectric activity of the temporalis and masseter muscles, the examiner ensured the individuals were trained to be familiar with the procedures of acquiring the EMG data. Initially, the EMG signals were recorded during mandibular resting: individuals were asked to relax and maintain the maxillary and mandibular teeth out of contact (teeth out of occlusion) for 10 s\textsuperscript{3}. For maximum voluntary clenching (MVC), individuals were requested to clench as hard as possible with the Parafilm (Neenah, Wisconsin, USA) folded 15 times (1.5 by 3.5cm) placed bilaterally in the molar regions\textsuperscript{27,9}. Subjects were requested to maintain the same level of contraction for 5s, and they were verbally encouraged to perform at their best. For both mandibular resting position and MVC, three measurements were recorded, with a 1-min rest interval between measurements during test performances.

Surface electromyography analysis
The MATLAB software version 5.3 (The Math Works Inc., Los Angeles, California, USA) was used to process data. Bilateral electrical activities of the masseter and temporal muscles were analyzed using the root means square (RMS) of the amplitude (unit: μV). In the mandibular resting position and MVC, the most stable 250ms window of muscle activity was selected. In all analyses, data were filtered through high-pass and low-pass filters from 20 to 500Hz, and standardization was performed to allow comparisons between volunteers. For comparisons of the EMG signal between individuals, RMS values were normalized by calculating a percentage of the maximum RMS value obtained for 1 s in the three measurements of the MVC for each subject and muscle. The amplitude analysis of muscle activity was performed by calculating the RMS% in microvolts. In the normalized curve and rectified EMG signal, the symmetry index (SI%)\textsuperscript{21} and antero-posterior coefficient (APC%) were analyzed\textsuperscript{22}.

The SI% was calculated to identify whether the left and right sides of the masseter and temporal muscles were activated during dental clenching with symmetrical muscular patterns; a symmetrical muscle pattern presented as a ratio close to 100%\textsuperscript{21}. The APC% compared the activity between the masseter and temporal muscles; the index ranged from 0% (no synergy between the masseter and temporalis) to 100% (full synergy between the masseter and temporalis)\textsuperscript{22}.

The Human Research Ethics Committee of Santa Catarina State University approved this project under number 758.038/2014, and all volunteers provided written Free Informed Consent Term (FICT).

Statistical analysis
Data were analyzed using the Statistical Package for the Social Sciences Version 20.0 for Windows. For all procedures, a significance level of 5% (p<0.05) with two-tailed distribution was adopted. The Kolmogorov-Smirnov test was used to verify the normality of the data. Student’s t-test or the Mann-Whitney test was used to compare the parameters of EMG activity, TMD severity, and quality of life among patients with and without TMD. The Spearman correlation coefficient was used to assess the correlation between EMG activity parameters, TMD severity, and quality of life in patients with TMD. Correlation values below 0.20 indicated no association, values between 0.20 and 0.39 indicated a very low association, values between 0.40 and 0.69 indicated a moderate association, values between 0.70 and 0.89 indicated a high association, and values between 0.90 and 1.0 a very high association\textsuperscript{23}. To quantify the magnitude of differences independent of sample size, Cohen’s d was applied. As suggested by Cohen, we considered d=0.2, small; d=0.5, medium; d=0.8, large\textsuperscript{24}.

RESULTS
Groups were not significantly different regarding age (p=0.05), weight (p=0.76), and height (p=0.45). The EMG values of masticatory muscles at rest were not significantly different between groups (Table 1). During clenching, patients with TMD had a significantly lower amplitude on the right temporal and left masseter muscles.

| Table 1. Comparison between the means of the activation amplitude (RMS%) of right temporal (RT%), left temporal (LT%), right masseter (RM%), left masseter (LM%), and symmetry index of temporal (ST%), symmetry index of masseter (SM%), anteroposterior coefficient (APC%) during mandibular rest (resting), and dental clenching (clenching) according to the presence of temporomandibular disorder (TMD) |
|-----------------|-----|-------|-------|-----|-------|-------|-------|
|                 | Mean | SD    | CI95% | Mean | SD    | CI95% | p-value |
| **Control**     |      |       |       |      |       |       |         |
| (n = 30)        |      |       |       |      |       |       |         |
| **TMD**         |      |       |       |      |       |       |         |
| (n = 30)        |      |       |       |      |       |       |         |
| **RT**          | 1.46 | 0.67  | 1.20–1.71 | 2.60 | 5.07  | 0.71–4.50 | NS (0.31) |
| **LT**          | 1.18 | 0.57  | 0.97–1.40 | 2.32 | 5.08  | 0.42–4.22 | NS (0.31) |
| **RM**          | 1.18 | 1.05  | 0.78–1.57 | 2.65 | 4.78  | 0.86–4.43 | 0.082 (0.42) |
| **LM**          | 1.11 | 0.90  | 0.77–1.45 | 2.84 | 5.61  | 0.74–4.94 | NS (0.43) |
| **ST**          | 85.87| 9.68  | 82.25–88.49 | 81.45 | 9.85  | 77.77–85.12 | 0.074 (0.45) |
| **SM**          | 83.38| 9.32  | 79.89–86.86 | 84.18 | 11.46 | 79.90–88.46 | NS (0.07) |
| **APC**         | 75.74| 14.13 | 70.46–81.01 | 75.02 | 16.42 | 68.89–81.15 | NS (0.04) |

Continue...
Table 1. Comparison between the means of the activation amplitude (RMS%) of right temporal (RT%), left temporal (LT%), right masseter (RM%), left masseter (LM%), and symmetry index of temporal (ST%), symmetry index of masseter (SM%), anteroposterior coefficient (APC%) during mandibular rest (resting), and dental clenching (clenching) according to the presence of temporomandibular disorder (TMD) – continuation

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<td>82.32</td>
</tr>
<tr>
<td>L</td>
<td>7.02</td>
<td>81.09</td>
</tr>
<tr>
<td>N</td>
<td>8.27</td>
<td>80.58</td>
</tr>
<tr>
<td>C</td>
<td>7.20</td>
<td>82.99</td>
</tr>
<tr>
<td>L</td>
<td>2.14</td>
<td>94.01</td>
</tr>
<tr>
<td>N</td>
<td>3.14</td>
<td>94.01</td>
</tr>
<tr>
<td>C</td>
<td>2.58</td>
<td>95.19</td>
</tr>
<tr>
<td>L</td>
<td>3.58</td>
<td>90.64</td>
</tr>
<tr>
<td>N</td>
<td>96.16</td>
<td>97.12</td>
</tr>
<tr>
<td></td>
<td>2.21</td>
<td>90.01–91.66</td>
</tr>
</tbody>
</table>

IQR = interquartile range; Mann-Whitney test; *p<0.05; **p<0.01; ***p<0.001; NS = not significant. All values are expressed as medians (IQR).

Table 2. Comparison between the ProTMDmulti-part II according to the presence of temporomandibular disorder

<table>
<thead>
<tr>
<th>Control (n=30)</th>
<th>TMD (n=30)</th>
<th>p-value (effect size)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscular pain</td>
<td>0 (0:0)</td>
<td>7 (1:20)</td>
</tr>
<tr>
<td>TMJ pain</td>
<td>0 (0:0)</td>
<td>5 (2:22)</td>
</tr>
<tr>
<td>Neck pain</td>
<td>0 (0:4)</td>
<td>8 (1:20)</td>
</tr>
<tr>
<td>Otolgia</td>
<td>0 (0:0)</td>
<td>0 (0:11)</td>
</tr>
<tr>
<td>Tinnitus (buzzing)</td>
<td>0 (0:0)</td>
<td>0 (0:12)</td>
</tr>
<tr>
<td>Ear fullness</td>
<td>0 (0:0)</td>
<td>0 (0:10)</td>
</tr>
<tr>
<td>Tooth sensitivity</td>
<td>0 (0:3)</td>
<td>2 (0:12)</td>
</tr>
<tr>
<td>Joint noise</td>
<td>0 (0:0)</td>
<td>1 (0:14)</td>
</tr>
<tr>
<td>Difficulty to swallow</td>
<td>0 (0:0)</td>
<td>0 (0:0)</td>
</tr>
<tr>
<td>Difficulty to talk</td>
<td>0 (0:0)</td>
<td>0 (0:1)</td>
</tr>
<tr>
<td>Total score</td>
<td>3 (0:10)</td>
<td>46 (11:94)</td>
</tr>
</tbody>
</table>

IQR = interquartile range; Mann-Whitney test; *p<0.05; **p<0.01; ***p<0.001; TMD, temporomandibular joint. All values are expressed as medians (IQR).

Table 3. Comparison between the functional data according to the presence of temporomandibular disorder

<table>
<thead>
<tr>
<th>Control (n = 30)</th>
<th>TMD (n = 30)</th>
<th>p-value (effect size)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median, IQR</td>
<td>Mean, SD CI95%</td>
</tr>
<tr>
<td>Physical functioning</td>
<td>95 (80:100)</td>
<td>95 (85:100)</td>
</tr>
<tr>
<td>Role limitation</td>
<td>100 (98:100)</td>
<td>100 (75:100)</td>
</tr>
<tr>
<td>Bodily pain</td>
<td>74 (62:84)</td>
<td>62 (45:74)</td>
</tr>
<tr>
<td>General health</td>
<td>82 (67:91)</td>
<td>69 (72:77)</td>
</tr>
<tr>
<td>Vitality</td>
<td>60 (51:70)</td>
<td>63 (35:71)</td>
</tr>
<tr>
<td>Social functioning</td>
<td>89 (73:100)</td>
<td>88 (61:100)</td>
</tr>
<tr>
<td>Emotional role</td>
<td>100 (75:100)</td>
<td>100 (58:100)</td>
</tr>
<tr>
<td>Mental health</td>
<td>72 (68:84)</td>
<td>72 (52:80)</td>
</tr>
</tbody>
</table>

IQR = interquartile range; Mann-Whitney test; *p<0.05; **p<0.01; ***p<0.001; NS = not significant. All values are expressed as medians (IQR).

than those in the CG (p<0.05), with medium effect size (ES). Patients with TMD also exhibited greater asymmetry of the masseter muscle (p<0.05) and greater asynergy of muscle activity (APC%) between the pairs of muscles (masseter and temporal muscles; p<0.00) than those in the CG, both parameters had a medium ES. Patients with TMD had a greater negative perception of TMD, and the clinical evaluation showed low severity of signs and symptoms. The difference between the total score of the two groups presented a high ES (Table 2).

According to the SF-36 questionnaire for quality of life (Table 3), the domains bodily pain (p<0.00, [high ES]), general health (p<0.00, [medium ES]), social functioning (p<0.05, [medium ES]) and emotional role (p<0.05, [medium ES]) scored significantly lower values in the TMD group than in the CG.

Correlation analyses

The analysis of EMG activity during mandibular resting showed that the amplitude of the right masseter had a negative, low correlation with the role limitation (i.e., physical health interferes with the activities of daily living, making it difficult to perform them) and bodily pain (assessed by the SF-36 questionnaire) (Table 4). The amplitude of the left masseter showed a negative, moderate correlation with role limitation and bodily pain (assessed by the SF-36 questionnaire). Regarding limitation and physical pain, the higher the values of the scores, the lower the EMG activities of the masseter and anterior temporalis at rest. A decrease in temporal symmetry showed a positive, moderate correlation with daily pain (SF-36). The severity of TMD had a positive, moderate correlation with the amplitude of the temporal and masseter muscles (right and left). During clenching, there was a negative, low correlation of the synergistic activity between masseter and temporalis muscles and the severity of TMD. The higher the synergistic activity between the masseter and temporalis muscles, the lower the ProTMDmulti score. A negative, low correlation was also observed between the severity of TMD and social functioning and mental health, and a moderate correlation between the severity and emotional role. The higher the values of the items (social functioning, emotional role, and mental health), the lower the ProTMDmulti score.
Table 4. Correlation among the means of the activation amplitude (RMS%) of right temporal (RT%), left temporal (LT%), right masseter (RM%), left masseter (LM%), and symmetry of temporal (ST%), symmetry of masseter (SM%), and anteroposterior coefficient (APC%) during mandibular rest (Resting) and dental clenching (Clenching) with ProTMD (TMD severity) and functional data for the SF-36 questionnaire (+) in patients with temporomandibular disorder (TMD)

<table>
<thead>
<tr>
<th></th>
<th>FF*</th>
<th>RL*</th>
<th>BP*</th>
<th>GH*</th>
<th>V*</th>
<th>SF*</th>
<th>ER*</th>
<th>MH*</th>
<th>ProTMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>-0.22</td>
<td>-0.22</td>
<td>-0.33</td>
<td>-0.11</td>
<td>-0.15</td>
<td>-0.19</td>
<td>-0.26</td>
<td>-0.22</td>
<td>0.50**</td>
</tr>
<tr>
<td>E</td>
<td>-0.25</td>
<td>-0.16</td>
<td>-0.18</td>
<td>-0.21</td>
<td>-0.12</td>
<td>-0.26</td>
<td>-0.27</td>
<td>-0.28</td>
<td>0.49**</td>
</tr>
<tr>
<td>S</td>
<td>-0.21</td>
<td>-0.37*</td>
<td>-0.40*</td>
<td>-0.20</td>
<td>-0.05</td>
<td>-0.14</td>
<td>-0.23</td>
<td>-0.14</td>
<td>0.54**</td>
</tr>
<tr>
<td>T</td>
<td>-0.08</td>
<td>-0.40*</td>
<td>-0.41*</td>
<td>-0.26</td>
<td>-0.10</td>
<td>-0.19</td>
<td>-0.17</td>
<td>-0.17</td>
<td>0.66**</td>
</tr>
<tr>
<td>I</td>
<td>-0.10</td>
<td>0.29</td>
<td>0.42*</td>
<td>0.05</td>
<td>0.29</td>
<td>0.31</td>
<td>0.15</td>
<td>0.25</td>
<td>-0.17</td>
</tr>
<tr>
<td>N</td>
<td>-0.16</td>
<td>-0.19</td>
<td>0.08</td>
<td>0.10</td>
<td>0.21</td>
<td>0.20</td>
<td>0.31</td>
<td>0.30</td>
<td>-0.16</td>
</tr>
<tr>
<td>G</td>
<td>0.11</td>
<td>-0.16</td>
<td>-0.34</td>
<td>0.00</td>
<td>-0.23</td>
<td>-0.01</td>
<td>0.12</td>
<td>0.13</td>
<td>0.07</td>
</tr>
<tr>
<td>C</td>
<td>0.01</td>
<td>-0.14</td>
<td>0.11</td>
<td>0.27</td>
<td>0.12</td>
<td>0.03</td>
<td>-0.05</td>
<td>0.08</td>
<td>-0.16</td>
</tr>
<tr>
<td>L</td>
<td>0.07</td>
<td>-0.17</td>
<td>-0.03</td>
<td>0.18</td>
<td>0.25</td>
<td>0.04</td>
<td>0.21</td>
<td>0.08</td>
<td>-0.10</td>
</tr>
<tr>
<td>E</td>
<td>-0.03</td>
<td>-0.05</td>
<td>-0.11</td>
<td>0.06</td>
<td>0.11</td>
<td>-0.12</td>
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<td>-0.03</td>
<td>-0.27</td>
</tr>
<tr>
<td>N</td>
<td>-0.12</td>
<td>-0.19</td>
<td>-0.15</td>
<td>0.22</td>
<td>0.30</td>
<td>-0.03</td>
<td>-0.05</td>
<td>0.09</td>
<td>-0.19</td>
</tr>
<tr>
<td>G</td>
<td>0.11</td>
<td>-0.14</td>
<td>-0.15</td>
<td>-0.16</td>
<td>0.16</td>
<td>0.06</td>
<td>0.15</td>
<td>0.15</td>
<td>-0.24</td>
</tr>
<tr>
<td>APC</td>
<td>-0.13</td>
<td>-0.12</td>
<td>0.11</td>
<td>-0.27</td>
<td>0.09</td>
<td>0.08</td>
<td>0.26</td>
<td>0.10</td>
<td>-0.36*</td>
</tr>
</tbody>
</table>

Spearman Correlation coefficient; Statistically significant: *p<0.05; **p<0.01; FF* = Physical functioning; RL* = role limitation; BP* = bodily pain; GH* = general health; V* = vitality; SF* = social functioning; ER* = emotional role; MH* = mental health.

DISCUSSION

All participants with TMD evaluated in this study were looking for a diagnosis due to pain in the facial region and agreed to be volunteers. All of them were referred for specialized care with dentists, physiotherapists, and speech pathologists and were free to adhere to any treatment.

The mean EMG RMS values of resting masticatory muscles were higher in patients with TMD than in those in the CG, but the difference was not significant. During clinical evaluation, reports of tenderness upon palpation in the masticatory muscles were frequent in patients with TMD, but of low intensity. Spontaneous pain at rest was not frequent in the TMD group. Changes in the resting masticatory activity in the TMD group compared to those in the CG have been found in adolescents with moderate-to-severe TMD signs in normalized EMG data and adults with moderate myofascial pain and non-normalized EMG data. Our findings differ from those of two previous studies regarding pain severity, TMD assessment, age, sex, and rest data processing methodology and are, therefore, difficult to compare. The increase in the EMG activity of the masticatory muscles at rest was correlated with a low severity of signs and symptoms of TMD according to the pain perception of individuals.

Although there was no difference between the groups regarding limitation, a higher impairment of this domain was observed in the TMD group which might reflect the correlation between bodily pain, role limitation, and the increase of masticatory muscle activity during mandibular resting.

Chronic pain can contribute to more significant physical limitations, difficulties in performing daily living activities, impairment of oral motor functions, and progression of the disorder. TMD directly affects the performance of daily living activities and interferes with the standard of living of chronic individuals. Similarly, our results show an association between an increase in the masseter muscle activity during mandibular resting with increases in generalized physical pain, as well as signs and symptoms of TMD in the craniofacio cervical system based on clinical examination.

Emotional aspects, such as high levels of stress and psychophysiological arousal, can also cause changes in the EMG activity of the jaw muscles. Psychological stress causes a permanent activation of the descending motor pathways in individuals with pain that generates an involuntary motor response involving the muscles of the face in individuals with somatic complaints but not for asymptomatic individuals. Psychological variables are also related to the onset and chronicity of TMD. The increased impairment of affective aspects can also be related to, or influenced by, the higher masticatory activity at rest in the TMD group than in the CG. The pain-model adaptation explains that these changes in muscle activity are related to biological and psychosocial factors regulated by the central nervous system and are unique to each individual.

With respect to the quality of life (SF-36), there was a significant influence of bodily pain in the TMD group on negative results for general health, social functioning, and emotional role compared to the CG. The impairment of general health indicates that patients with TMD have a negative perception of health and poor expectations. The presence of chronic disorder and constant pain causes reduced physical function leading to the impression of no improvement in health in the TMD group. In addition, correlations of TMD severity with social functioning, mental health (low correlation), and emotional role (moderate correlation) were observed. Social functions are linked to the emotional state, indicating that affective problems interfere with work and activities of daily living.
The TMD group displayed significantly less masticatory activity during mandibular clenching compared to the CG, as observed in other studies. Pain in the masticatory muscles was the main symptom reported in the TMD group. This result can be attributed to the low functional efficiency of the masticatory muscles in the TMD group combined with the decreased activity, causing a decreased ability to perform muscle contraction. This, therefore, acts as a predisposing factor to the disorder when motor pain and maladaptation are present. The TMD group had less precision of activity in recruiting the masticatory muscles during clenching along with reduced symmetry of the masster and less synergy between the masster and temporalis muscle. The APC% was correlated with the severity of TMD. This finding may be an indicator of mandibular positioning by the temporal muscles and load generation effort by the masster activity. Adaptations in muscle activity can be numerous in chronic individuals because what defines the worsening of the disease is ongoing pain. The effect of pain on the motor activity also depends on the interaction of biopsychosocial variables that are involved in the painful experience, along with anatomical characteristics and the sensor-motor system of the individual. Studies have interpreted the adaptations of EMG activity as a compensatory mechanism to prevent further damage to and recovery of the muscle function. However, these masticatory motor control changes have a negative impact on the worsening of the disorder, causing more pain in the orofacial and cervical regions. The TMD group displayed low severity of signs and symptoms, and neck pain was the most severe symptom detected by clinical evaluation. TMJ pain and masticatory muscle pain are symptoms expected in patients with TMD as identified by the DC/DC cohort study. J Pain. 2013;14(12 Suppl):T75-90. Psychological factors associated with development of TMD: the OPPERA prospective cohort study. J Pain. 2013;14(12 Suppl):T33-50.

CONCLUSION

The main results showed that the impairments in quality of life, such as limitations in physical aspects and generalized bodily pain are negatively associated with the increase in masster muscle activity during mandibular resting. Additionally, the severity of signs and symptoms of TMD contribute to changes in the activity of masticatory muscles at rest in TMD patients. Although the domains of quality of life were not associated with masticatory activity during clenching, the TMD group showed decreased contractile activities of masticatory muscles and impairments in the quality of life compared to the CG.

ACKNOWLEDGMENTS

Carlos Eduardo Fassicollo and Barbara Flissak Graefling were responsible for the design of the study, volunteers’ recruitment, collection of the data and writing of the manuscript. Lilian Gerdi Kittel Ries was responsible for the guidance of procedures and manuscript, data analysis, and writing the manuscript.

REFERENCES

Correlations between masticatory muscle activity, quality of life, and dysfunction severity in women with chronic temporomandibular disorder

BrJP. São Paulo, 2019 jul-sep;2(3):225-31


ABSTRACT

BACKGROUND AND OBJECTIVES: The importance of recognizing how the nurse acts in the identification, assessment, treatment, and relief of pain since the newborn is not able to express it orally. The objective of this study was to identify the practices and challenges of the nurse in the assessment and treatment of pain in newborns of a neonatal intensive care unit of a reference hospital in the western region of the Brazilian Amazon.

METHODS: A descriptive, field-based, qualitative approach was chosen. Eleven nurses participated in the study, starting with an interview, following a semi-structured script. The content analysis method was used for data analysis.

RESULTS: The participants do not recognize the term “fifth vital sign” in the evaluation of pain, but they believe in the ability of the newborn to feel pain, identifying it mainly by the cry and facial expression. Among the procedures considered most painful are punctures and aspiration. Nurturing and non-nutritive sucking are among the actions most indicated to prevent and relieve pain.

CONCLUSION: We suggest the implementation of protocols, standards, and routines for the assessment and quantification of pain since when not assessed, it can prolong the hospitalization time. The perception of the nurse in the identification of pain signs in a systematized manner, promotes quality and humanized care, and reduces injuries.

Keywords: Newborn, Nurse, Pain.

INTRODUCTION

Pain is an uncomfortable sensation that can be defined as a sensorial, emotional, and subjective experience associated with actual or potential tissue damage. When pain is not treated, the newborn (NB) may suffer detrimental effects due to persistent catabolism, activation of the sympathetic system, alteration in the cardiovascular system, and may trigger intense anxiety and delirium. NB pain has been object of study for the last four decades, thus proving that as of the 16th week there is the capacity to transmit pain impulses through the cerebral cortex, and after the 26th week its mechanism of transmission is completed, being able to respond to nociceptive stimuli through organic, behavioral and physiological changes.

In Neonatal Intensive Care Units (NICU), the NB are exposed to several painful procedures, including loud noises, ex-
cessive light, frequent manipulation, and repeated necessary procedures, resulting in physiological disorganization where the energy reserves that would be directed to growth are used to stabilize the NB.

Pain is understood as a complex and individual experience, manifested by physiological and body signs. It is considered the fifth vital sign by the American Agency for Research and Quality in Public Health and the American Pain Society, that recommends that it must be recorded like the other vital signs.

The interest in the study is the result of the need to address pain in the NB considering its particularity, the repercussions that can be generated in the short and long term, and the importance of recognizing how the nurse acts in the identification, assessment, treatment and relief of pain since the NB cannot express it orally.

Identifying and assessing pain is both an obstacle and a challenge for nurses. Professionals sensitivity to NB pre-verbal language is essential so that they can provide appropriate and humanized treatment to meet their needs.

Added to the discussions and reflections originated, comes the question that guides this research: does the nurse recognize pain as the fifth vital sign?

The objective of this study was to identify the practices and challenges of nurses to assess and treat pain in NB of a NICU of a reference hospital in the western region of the Brazilian Amazon.

**METHODS**

We opted for a descriptive, field research, with a qualitative approach, using interviews with a semi-structured script, recorded and fully transcribed. The Hospital de Base Dr. Ary Pinheiro is a public hospital, a reference care center in the Northern region, located in the city of Porto Velho - Rondônia, with 26 NICU beds. Data collection was from March to April 2017.

NICU nurses who voluntarily agreed to participate in the study were included. Those who were absent during the data collection period due to vacation or leave of absence were excluded. The final sample consisted of 11 nurses. For the analysis of the results, the content proposed by Minayo was used. The study followed the parameters of Resolution no. 466 of December 12, 2012, of the National Health Council/Department of Health that rules research with humans. The participants received the Free and Informed Consent Term (FICT) when the research objectives were clarified. The board of directors authorized the interviews, and the Human Research Ethics Committee of the Faculdades Integradas Aparício Carvalho (FIMCA) approved, under opinion number 1,782,126, on October 19, 2016.

**RESULTS**

The research sample consisted of 11 professional nurses working in the hospital’s NICU. Using the assumptions of content analysis, it was possible to understand and describe the perception of the nurses regarding the importance to assess, prevent, and relieve the pain of the NB in a NICU. After reading the full transcribed reports, it was noticed that each professional assesses pain in a unique way, without using the protocols or the scales recommended by the Department of Health. From the analysis of the statements, based on similar and convergent reports, four thematic groups were listed: the nurse’s perception of pain as the 5th vital sign in the NICU, the process of pain identification and assessment, the procedures considered most painful, and the care provided by nurses for pain prevention and relief.

**DISCUSSION**

The various painful stimuli in the neonatal period cause changes in several organs and systems, resulting in increased neonatal morbidity and mortality. NB admitted to the NICU receive, on average, 53 painful stimuli, and an average of 65% of the procedures do not have adequate analgesia.

Nurses working in the unit surveyed believe that in the NICU, pain is present in almost all manipulations and procedures. All nurses interviewed recognized that the NB can feel pain:

[…] it is present in everything we do, in the manipulation of these little babies and in most procedures […] they feel pain (Jade).

*Pain is present in 99.9% of the newborn* […] (Crystal).

Pain will always be present in the care of NB, and they can perceive it more intensely than older children and/or adults due to the immaturity of the inhibitory control, reducing the ability to modulate painful experiences. So, it is up to the nurse to evaluate and define the most appropriate treatment method, thereby promoting the well-being of the NB.

Care of NB should include principles to minimize painful interventions, including strategies such as routine pain assessment, reduction of bedside procedures, use of scientifically proven measures to prevent and relieve pain as non-pharmacological and pharmacological measures.

The American Agency for Public Health Research and Quality and the American Pain Society describe it as the fifth vital sign, and it should be assessed and recorded along with the other vital signs: temperature, pulse, respiration, and blood pressure.

In the same vein, the Joint Commission on Accreditation of Healthcare Organizations, a North American entity of hospital evaluation, published in 2000 a standard that includes pain as the fifth vital sign. The standard determines that pain should be measured, as well as the other vital signs, being standardized in all health institutions. Pain measurement must be standardized, and its recording should become a routine to doctors and nurses providing care.

Regarding the nurses’ perception related to the theme, it was noticed that they do not recognize pain as the fifth vital sign, and therefore, they do not evaluate it systematically.
I haven’t heard about this nomenclature […] this is the first time I hear it. I don’t know if it’s new or if I don’t know […] (Pérola). I know nothing about the fifth vital sign in our unit […] look, to tell the truth, I do not remember […] (Esmeralda).

This result contradicts the findings in a study conducted at a university hospital in Paraná regarding pain verification, pointing out that 79.3% of the professionals evaluated it with the other vital signs11. The study shows the fragility and inconsistency of knowledge regarding this subject, and the statements show that participants do not use the nomenclature “pain as the fifth vital sign”.

In a study conducted in the Northwest region of Rio Grande do Sul, the participants, even though they did not perform the appropriate measurement, were aware of the nomenclature and also stated that the fifth vital sign should be evaluated, treated and recorded like the other physiological parameters12. The assessment of pain in NB is a challenge for health professionals because it is a subjective phenomenon, in addition to the inability of NB to report it verbally. Due to this lack of oral communication from patients, it is essential that nurses working in neonatal units be aware of this very different language, expressed through actions, to provide full and safe care to the NB13.

When asked about pain identification and assessment, nurses reported difficulties related to their inability to verbalize according to the following statements:

[…] it is complicated to explain because it is a patient who does not speak […] (Rubi).

[…] it is not very easy, but we try to identify […] (Safira).

The non-verbalization of the pain they experience is still considered a hurdle by the nursing staff. The NB express their pain by their behavior, and the team should be prepared to recognize and interpret the signs after painful and stressful stimuli14.

When asked about the use of scales, frequency, and assessment protocols, it was found that there are no protocols and routines for pain management and no methods for pain measurement. Professionals acknowledge being knowledgeable about the scales, but admit the lack of daily practice:

[…] there is no scale, we know it exists, but no scale is used here in the sector […] (Jade).

[…] there are no protocols here […] (Diamante).

[…] actually, there is a pain scale, but it is not applied. (Agata).

Nurses analyze pain in NB in different ways, based on their values and prior and individual knowledge, which may have repercussions on the patient’s clinical status, allowing the occurrence of iatrogenesis in care, thus violating the principles of patient safety1.

Pain assessment in NB has been performed incipiently, by individual analyzes of each professional, adopting particular criteria and without standardization, hindering a proper treatment15.

Regarding the identification and signs that lead them to perceive pain, it was observed that crying and facial expressions are the most used behavioral manifestations for their perception:

[…] more stable baby, it’s crying […] we know by the face, right? some wrinkle the forehead, makes that face of pain, of suffering (Safira).

Through inborn reflexes such as crying or facial expression (Onix), […] crying is one of the manifestations of pain, sometimes the baby is sedated or is little reactive, we notice some frowning […] (Diamante).

With similar results, a NICU survey in four public hospitals in Fortaleza, in the state of Ceará, showed that most nurses assess pain by observing changes in the baby’s behavior such as crying and changes on the face15. The use of behavioral signs is considered the primary method to assess pain by the nursing staff13,16.

Crying is considered the NB primary communication method since it mobilizes the adult, the mother or the health professional, and it can limit the professional when diagnosing pain since many babies do not cry during painful procedures.

When assessing pain, one should consider that other factors can make the NB cry, such as hunger and discomfort17.

Considering that painful stimuli cause behavioral changes that may or may not be associated with other signs, the professional should be vigilant to these signs. It was noticed in the studied NICU, that the professionals are aware and do pay attention to physiological alterations, as reported:

[…] becomes tachycardic, saturation drops […] (Jade).

 […] tachycardia, is what we notice most in the baby by the monitoring we have, right? (Diamante).

 […] saturation decrease […] increased respiratory rate […] increased heart rate (Turquesa).

In a study with 13 health professionals of a NICU in Mossoró, state of Rio Grande do Norte, the respondents used as parameters to identify pain, the crying, the face, behavioral changes, and changes in vital signs18. Physiological manifestations are important to assess pain in the clinical practice, but they should not be used isolated to determine if the NB has pain but added to the behavioral parameters19.

Among the invasive procedures performed during hospitalization in neonatal units, which is often an arduous, iatrogenic and stressful process for both the NB and the assisting staff, the puncture with a short peripheral vascular catheter stands out, mainly due to the vesicant characteristics of most life support components used.

When asked about the most painful procedures, the nurses cited punctures in general as the most painful stimuli, as follows:

[…] heel-stick when it is for glycemia […] or the Guthrie test and venipuncture, but I think it hurts more on the foot because the pain
continues after the puncture, unlike the venipuncture that only hurts at the moment (Safira).

[...] venipuncture that happens almost routinely [...] (Esmeralda).

Everything related to puncture, sticking, sample collection, blood gas, access puncture are the most painful (Cristal).

In a study conducted with nursing assistants in Ceará about the procedures performed in the NICU, several are considered painful, including venipuncture, 25 (100%), capillary, 10 (40%), arterial 8 (32%), and lumbar puncture, 8 (32%)20.

Heel-stick is recommended for tests that require a small amount of blood, for example, the foot test, hematocrit, total bilirubin, venous blood gas analysis, and glucose. Blood collected in the heel stick can be used for many other therapeutic purposes, thus preventing more painful stimuli to infants. Making better use of this process benefits both the practitioner who can perform other tasks rather than spending time on unnecessary interventions and the patient who will not undergo so many painful stimuli21.

The peripherally inserted central catheter (PICC) is a central venous catheter that is implanted in a peripheral vein for safe drug administration, total parenteral nutrition, and long-term hypertonic solutions in central veins. The introduction of PICC is a painful procedure, and the pain repeated several times may delay the recovery of the NB22.

During the interview, the nurses mentioned the importance of using PICC because it provides a longer period of use and, even with the discomfort to the NB at the time of insertion, it prevents the frequent manipulation in search of peripheral venous access. In the following statements, it can be observed that such a procedure was cited as one of the most painful processes:

[...] venipuncture, whether peripheral or central PICC [...] (Agata).

Some invasive procedures [...] peripheral puncture [...] here, 90% of newborns have a PICC [...] so we end up causing this pain to the baby [...] (Rubi).

Most NB in NICU are premature. As a result, there is inadequate development of the lungs and other injuries. During the field research, it was observed that many NB were on artificial airways. From this perspective, the nurses interviewed cited secretion aspiration as a painful procedure, according to the following reports:

Tube suction (Safira).

Tracheal suction [...] (Pérola).

In practice, I would say that the most painful is tracheal suction in the intubated [...] (Turmalina).

In order to investigate the behavioral manifestations of preterm infants hospitalized in high-risk units, it was observed that at the moment of the tracheal suction, crying and twisting movements were the predominant manifestations of the NB. Tracheal suction is of paramount importance for the pulmonary mechanical ventilation therapy since most of them are dependent and, although it seems simple, it requires rigorous care to avoid undesirable effects, especially due to the organic immaturity of these patients23.

Analgesia should be individualized for all NB with potentially painful diseases or those undergoing invasive surgical procedures or not. Although the world current consensus on the importance of pain control, health professionals are often unable to identify and treat it24.

There are now several alternatives to avoid unnecessary pain and suffering in hospitalized NB because, in addition to pharmacological therapy, the nursing staff can use alternative measures and effective relief and discomfort during hospitalization25.

Non-pharmacological methods are noninvasive techniques to minimize pain and comprise of a set of emotional, physical, educational, and behavioral measures, most of them with minimal risk of complication, low cost, and easy application. In Brazil, the most commonly used methods involve facilitated tuck in, swaddling, music therapy, environment, the kangaroo method and breastfeeding, non-nutritive sucking, positioning, and the use of glucose26.

The theoretical and practical knowledge of nurses related to pain is fundamental because only then the NB can receive the proper prevention and necessary care, bringing comfort and safety to the NB as shown in the following statements:

[...] We nestle the baby [...] (Cristal).

[...] We promote comfort nestling the baby [...] we wrap it in its own sheet [...] (Rubi).

[...] We do it before to prevent the pain, we wrap it like a cigar [...] (Safira).

Nestling is a non-pharmacological method for pain relief and comfort, scientifically effective because it simulates the intrauterine position, creating a sense of safety, comfort, and self-organization while minimizing the loss of body heat to the environment. This care consists of bending the upper and lower limbs, reducing the psychological and behavioral response of stress and pain in NB26.

Swaddling helps the self-regulation of the NB during stressful and painful procedures, with the principle of maintaining the midline. Care that includes changing the baby's position, swaddling, nestling, maintaining a bent position, and providing hand-held postural support help the organization and self-regulation of NB27.

Since pain is harmful, the diagnosis is as important as the treatment. To prevent and relieve pain, nurses use non-nutritive suction.

[...] we give a non-nutritive suction and a little glove [...] (Safira).

[...] we improvise a pacifier with a glove and gauze [...] (Esmeralda).

Non-nutritive sucking is generally used to maintain the well-being of the NB when painful and invasive procedures are required, and it can be used as a therapeutic measure, enabling the psychosomatic and somatic self-regulation of the NB. It is recommended to reduce pain scores in mild to moderately painful procedures and should be routinely used27.
CONCLUSION

With the nurses’ reports, it was possible to understand the relevance of proper pain management since when it is not assessed, it can prolong the hospitalization time. The nurse's perception in identifying pain signs provides humanized care, minimizing injuries.

REFERENCES

The impact of chronic pain on functionality and quality of life of the elderly

O impacto da dor crônica na funcionalidade e qualidade de vida de idosos

Bianca de Oliveira Lemos¹, Ana Marcia Rodrigues da Cunha², Claudia Bernardi Cesarino³, Marielza Regina Ismael Martins⁴

ABSTRACT

BACKGROUND AND OBJECTIVES: Chronic pain is one of the most common conditions found by health professionals in elderly and is associated with substantial impairment of reduced mobility, avoidance of activities, depression, sleep impairment and isolation. The objective of this study was to check the impact of chronic pain on the functionality and the quality of life of the elderly.

METHODS: It is a descriptive, cross-sectional and exploratory study with 20 patients attending the Pain Clinic of Hospital de Base de São José do Rio Preto. Twenty patients under the age of 60 were evaluated by the same instruments for comparative data. The instruments used were a semi-structured interview containing questions about sensory aspects, emotional and functional impact, sleep, attitudes and beliefs, coping style, treatment, expectation and objectives, and resources. The World Health Organization Quality of Life Assessment for Older Adults questionnaire was used to evaluate the quality of life and, to evaluate the functional capacity of daily life, the OARS, multidimensional functional assessment questionnaire. The pain was assessed by the Brief Pain Inventory.

RESULTS: A significant difference was observed between the domains of sensory abilities, autonomy and intimacy (p<0.05) in which the analyzed group presented worse values than the control, while the latter presented worse value in the domain of death and dying. In addition, there was a statistical difference between the groups in the instrumental activity of daily living and between the intensity of pain.

CONCLUSION: The pain had a negative influence on the quality of life and impact on the functionality of the elderly studied in the Pain Clinic

Keywords: Chronic pain, Health of the elderly, Quality of life.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor crônica é uma das condições mais comuns encontradas pelos profissionais de saúde; e nos idosos está associada à substancial mobilidade reduzida, esquiva de atividades, depressão, comprometimento do sono e isolamento. O objetivo deste estudo foi verificar o impacto da dor crônica na funcionalidade e na qualidade de vida de idosos.

MÉTODOS: Trata-se de um estudo descritivo, transversal, exploratório com amostra de 20 pacientes pertencentes à Clínica da Dor do Hospital de Base de São José do Rio Preto. Para os dados comparativos foram avaliados pelos mesmos instrumentos 20 pacientes com idade inferior a 60 anos. Os instrumentos utilizados foram: entrevista semiestruturada contendo questões sobre aspectos sensoriais, impacto emocional, impacto funcional, sono, atitudes e crenças, enfrentamento, tratamento, expectativa e objetivos e recursos. Para avaliar a qualidade de vida foi utilizado o questionário World Health Organization Quality of Life Assessment for Older Adults e, para avaliar a capacidade funcional da vida diária, a escala de atividades física e instrumental da vida diária “OARS”. A dor, por sua vez, foi avaliada pelo Inventário Breve de Dor.

RESULTADOS: Foi observada diferença significativa entre os domínios de habilidades sensoriais, autonomia e intimidade (p<0.05) em que o grupo analisado apresentou piores valores que o controle, enquanto este último grupo apresentou pior valor no domínio de morte e morrer. Além disso, houve diferença estatística entre os grupos na atividade instrumental da vida diária e entre a intensidade da dor.

CONCLUSÃO: A dor acarretou influência negativa na qualidade de vida e afetou a funcionalidade dos idosos pesquisados na clínica da dor.

Descritores: Dor crônica, Qualidade de vida, Saúde do idoso.

INTRODUCTION

The aging of the population is an unquestionable event that grows over the years. According to the World Health Organization (WHO)¹, it is estimated that in 2020 the number of people over the age of 60 will exceed the number of children up to 5 years and, by 2050, the population over 60 years will reach 2 billion individuals, which will account for a fifth of the planet’s population. In this sense, one of the challenges of global public health will be to address the problems related to chronic pain
(CP), considering that it is one of the most common conditions found in patients aged ≥65 years2.

CP is related to a substantial inability of elusive mobility of activity, falls, depression and anxiety, sleep disorders, and coothing2-3. However, these negative effects are not restricted to the patient, but also encompass situations that disrupt family and social relationships, as well as changing the roles these individuals recognize themselves in society4.

Given that, it is observed that CP goes beyond a sensorial event, because it also includes affective elements (emotional responses to pain), cognitive (attitudes and beliefs about pain), behavioral (e.g., patients, family members or caregivers’ behaviors in response to pain), besides sensory components (e.g., quality, location and time pattern)5.

Differences in published researches about population, methods, and definitions, however, make it difficult to compare studies and make it impossible to determine the definitive prevalence of pain in the elderly5. This creates barriers for health professionals to develop skills to plan assessments and programs to manage CP in elderly patients.

Regarding the evaluation of the elderly with CP, the literature provides little information, since it is recommended a comprehensive assessment with multidimensional measures, tools to verify the activities of daily living, collection of data of family/caregivers, verification of attitudes and beliefs about the pain, review of comorbidities and drugs, among others. In this context, there are still important limitations based on evidence5.

The objective of this study was to evaluate the impact of CP on functionality and quality of life (QoL) of the elderly.

METHODS

A descriptive, cross-sectional, exploratory study with a quantitative approach. The sample analyzed had 20 patients (test group - TG), over 60 years. The sample size estimation considered a 95% of confidence level, the desired maximum error of three points and a mean, standard deviation, estimated in a pilot study, equal to 12.5 points, totaling a minimum sample of 20 individuals. For the comparative data, 20 patients (control group - CG) below 60 years were evaluated by the same instruments, who also attended the Pain Clinic. Patients who did not agree to participate in the study by signing Free and Informed Consent Term (FICT) and those with sensory and limiting deficits screened by MiniMental test6 were excluded.

The instruments used were a semi-structured interview containing questions about sensory aspects, emotional and functional impact, sleep, attitudes and beliefs, confrontation, treatment, expectation and objectives, and support resources, besides the collection of some personal data. Also, to assess the QoL, it was used the questionnaire World Health Organization Quality of Life Assessment for Older Adults (WHOQOL-OLD)7, containing 24 questions divided into six domains, including sensory ability, autonomy, past, present and future activities, social participation, death and dying, and intimacy. For the evaluation of the functional capacity of daily living, the Physical and Instrumental Activities of Daily Living Scale (OARS)8 was used, which analyzes the ability to perform activities autonomously, with assistance or totally disabled, with scores from zero to 2, scaling from zero to 14 for each activity, and the lower the score, the greater is the individual’s dependence.

The pain was evaluated by the Brief Pain Inventory9 (BPI). This instrument included 15 items, divided into two parts: the first evaluates the intensity of pain (8 items), and the second evaluates the interference of pain in aspects of life (7 items): walking ability, sleep, work, relationship with other people and enjoying life on a numerical scale from zero (no pain) to 10 (worst possible pain).

The Research Ethics Committee of FAMERP approved the research project (Opinion no. 2,647,844), and it was conducted in the Ambulatory of the Pain Clinic, Hospital de Base (FUNFARME/FAMERP).

Statistical analysis

All the participants (TG and CG) were submitted to a single evaluation, and the data obtained were inserted into Excel spreadsheets. All statistical analyses were performed with a significance level = 0.05. The Mann-Whitney test was used to compare both groups since the data were not parametric, and Pearson’s Linear Correlation was used for the correlations.

RESULTS

Table 1 shows the sociodemographic characteristics of the studied samples.

Concerning the sensorial aspects in TG, 40% (n=8) reported decreased visual acuity and 32% (n=6) hearing loss. All the elderly in this group cited a decline in physical and health skills that impact their lives emotionally.

In relation to sleep, 57.5% (n=11), in the TG reported poor sleep quality, while 33.3% (n=7) of the CG reported the same (p<0.05).

In the TG, 65% (n=13) believed that they will always depend on the drug and the most frequent attitude of 55% (n=10) is that impact their lives emotionally.

Concerning confrontation, in the TG 20% (n=4) mentioned music, 35% (n=7) praying, 15% (n=3) coothing, 10% (n=2) talking, 10% (n=2) stretching and 10% (n=2) entertain himself.

In the studied groups, the diagnoses presented were CP related to osteoarticular diseases (n=8), diabetic neuropathy (n=6), pain syndrome after stroke (n=6), polymyalgia rheumatica (n=6), musculoskeletal disorders (n=8), others (n=6).

Regarding the analysis of variables related to QoL obtained by the WHOQOL-OLD, the means for each domain and the overall mean can be observed in figure 1.

The analysis showed a statistically significant difference (p<0.05) between the domains of sensory abilities (p=0.002), autonomy (p=0.001) and intimacy (p=0.023), showing that TG presented worse values than CG.

The CG had more worries, concerns, and fears about death and dying than the TG, with a significant difference (p=0.038).
The impact of chronic pain on functionality and quality of life of the elderly

The impact of chronic pain on functionality and quality of life of the elderly

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About the functional capacity for basic daily activities, obtained by the “OARS” scale, the mean scores can be observed in table 2. Regarding instrumental activities, 70% (n=14) of the elderly reported being unable to clean and housekeeping, while 15% (n=3) claimed to need some help and 15% (n=3) performed the task without help. When asked about activities such as shopping, 25% (n=5) considered themselves incapable of, 45% (n=9) need some help, and 30% (n=6) do it without help. In the evaluations of the activities of the physical scope, 70% (n=14) of the elderly stated that they need help to lie down and to get off the bed, while 30% (n=6) said they could do it without any help or support.

When asked if they have ever had problems to get to the toilet in time, 70% (n=14) answered yes, and 30% (n=6) no.

In table 3, the mean of the data obtained for the various parameters can be observed in the evaluation of the level of pain between the groups by the Brief Pain Inventory (BPI).

### Table 1. Sociodemographic characteristics of patients from both groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>n</th>
<th>(Mean and SD)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>TG</td>
<td>20</td>
<td>66.35±6.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>20</td>
<td>49.45 ± 7.65</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>TG</td>
<td>20</td>
<td></td>
<td>Female - 30 (n=6)</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>20</td>
<td></td>
<td>Female - 50 (n=10)</td>
</tr>
<tr>
<td>Education level</td>
<td>TG</td>
<td>20</td>
<td>Illiteracy - 5 (n=1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>20</td>
<td>Incomplete primary education - 35 (n=7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Complete primary education - 15 (n=3)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Incomplete high school - 10 (n=2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Incomplete higher education - 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Complete higher education - 20 (n=4)</td>
<td></td>
</tr>
<tr>
<td>Employment situation</td>
<td>TG</td>
<td>20</td>
<td>Inactive - 95 (n=19)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>20</td>
<td>Inactive -100 (n=20)</td>
<td></td>
</tr>
</tbody>
</table>

TG = test group; CG = control group.

### Figure 1. Mean scores of the domains related to the quality of life questionnaire by the WHOQOL-OLD in both groups

TG = test group; CG = control group.
DISCUSSION

The Spearman’s Correlation was used to compare the QoL data with the data of the instrumental activities of the pain scales and the interferences that the pain causes in the activities of the elderly. With a p<0.05 parameter, it can be observed that there were significant differences when the QoL was analyzed with the instrumental activity of daily life (IADL) (R=0.4861) and physical activity of daily life (PADL) (R=0.4946). Regarding the correlation pain versus QoL, the statistical difference was of weak intensity (r=0.5863). When correlated to severe and moderate pain, no significant correlations were observed (r=0.3351 and 0.2143, respectively).

About the interference that pain has on QoL, in some aspects, there was significance in the areas of general activity (R=-0.5955), daily activity (R=-0.6486), and personal relationship (R=-0.6455). Regarding the other aspects, mood, walking ability, sleep, and the ability to enjoy life, no correlations were found. Another correspondence observed, when analyzed, was the QoL with the patient’s pain site (R=-0.4549).

The sample showed a predominance of males (70%). This may be related to a devaluation of self-care and health. As to the education level of the elderly, 20% (n=4) have completed higher education, which allowed to observe that, as in the study of Miranda and Banhato, there was an increase in the elderly population with greater academic knowledge. However, in this study, it can be observed that even with a higher education level, the CP had a great negative influence on the QoL of the studied population.

When analyzing the QoL data of the elderly by the WHO-QOL-OLD questionnaire, it was observed that there were statistical differences in the domains of sensory ability, autonomy, intimacy and death and dying, the latter being more prevalent in the CG.

In the context of autonomy and intimacy, as people get older, they tend to need more help, whether from family members or caregivers. In this sense, imperative forms tend to stand out, leaving no room for negotiation with the desires that the elderly have, that is, the freedom to make decisions about their own life ends up becoming more and more reduced, even causing a loss of self-esteem. The result is that the older social group shows worse results, as observed in the research when compared to a young adult population. Also, the difference between the groups in sensory ability may correspond to the regression of the senses as age passes, with hearing and visual loss being the most mentioned. Cavazzana et al. reported that impaired sensory functioning affects the QoL of the elderly by influencing how they experience the environment and react to stimuli and limit social activities - facts that can lead to isolation and depression.

On the other hand, groups under the age of 60 showed greater concern regarding the death and dying domain. This may be related to the fact that the 35 to the 60-year old group have higher rates of anxiety and depression that harm the QoL. Given this, one can assume that these emotional and emotional health aspects have a great influence on this type of thinking.

A recent study reported that young adult and adult patients with hematologic and CP diseases experienced psychological distress, living with future uncertainty regarding their cure and fear of death, thus negatively affecting the QoL. Therefore, in this study, the authors suggested the need for age-specific psychological interventions designed to address this fear.

In the evaluation of “OARS,” there was a difference between the groups in the IADL. This information corroborates another survey since the assessed activities, such as going to distant places that require the use of public transportation, or shopping, requires great physical and cognitive integrity. It was concluded that the progressive loss of this integrity implies a greater need for help or even lack of interest in performing some tasks.

However, pain also ends up being a parameter for the evaluation of the QoL of the elderly since it often stimulates uncomfortable and limiting situations. Thus, the analysis of the intensity of pain ends up being fundamental to ascertain its influence in the way of life of the patient.
The older population has higher pain intensity\textsuperscript{21,22}, which is observed in the study, since the average pain of the group over 60 years falls within the maximum pain scores, while the CG, below 60 years, falls in the moderate pain, which is weaker compared to the previous one. In addition to this high pain scale, it can be observed that the elderly have a very long average time of pain (8.75±4.59 years), making the index of patients with CP very high, as in other studies\textsuperscript{21,23}. The absence of statistical difference between pain interference for various activities between the groups is because pain tends to be limiting for any person\textsuperscript{24}. That is, regardless of age, the pain has negative interference in the performance of tasks, such as walking, relating, working, among others.

Thus, it is necessary to evaluate the physical and psychological components, the personal history, social aspects, beliefs so that all professionals can understand how individuals perceive their pain and adapt to it.

CONCLUSION

This study shows that CP had a negative influence on the QoL of the elderly population, with an impact on their functionality and autonomy.

REFERENCES

Prevalence of chronic pain and analysis of handgrip strength in institutionalized elderly

Prevalência de dor crônica e análise da força de preensão manual em idosos institucionalizados

Dâline dos Santos Ribeiro1, Karina Garbin1, Matheus Santos Gomes Jorge2, Marlene Doring3, Marilene Rodrigues Portella3, Lia Mara Wibelinger1,3

ABSTRACT

BACKGROUND AND OBJECTIVES: Musculoskeletal disorders are accentuated with aging. Among these, chronic pain can influence several functional aspects such as handgrip strength, especially in institutionalized elderly. The objective of this study was to check the prevalence of chronic pain and to analyze the handgrip strength in institutionalized elderly.

METHODS: A cross-sectional, population-based study was carried out at long-term care facilities in Passo Fundo/RS (2016-2018). The population was composed of 281 residents, evaluated for sociodemographic variables (medical records), handgrip strength (manual dynamometry), and chronic pain (self-report).

The statistical analysis used the descriptive statistics and the Student t-test of independent samples (p≤0.05).

RESULTS: The sample consisted of 173 elderly individuals (80.95±8.94 years). The majority lived in private institutions, with 1 to 8 years of education. The prevalence of chronic pain was 39.3%, and the mean handgrip strength was 7.0±6.42kg (right hand) and 6.24±5.96kg (left hand). The handgrip strength was higher in the groups of elderly men (right and left hands: p=0.000) and non-long-living seniors (right hand: p=0.017; left hand: p=0.002). There was no difference in handgrip strength values between the groups with and without chronic pain (p>0.05).

CONCLUSION: Institutionalized elderly present an expressive prevalence of chronic pain and handgrip strength values much lower than expected, being influenced by gender and age.

Keywords: Gender and health, Hand strength, Health profile, Longevity, Long-term care facilities for the elderly, Pain.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Os distúrbios musculoesqueléticos se acentuam com o avanço da idade. Dentre eles, a dor crônica pode influenciar em diversos aspectos funcionais, como a força de preensão manual, especialmente em idosos institucionalizados. O objetivo deste estudo foi verificar a prevalência de dor crônica e analisar a força de preensão manual em idosos institucionalizados.

MÉTODOS: Estudo transversal de base populacional, realizado em instituições de longa permanência de Passo Fundo/RS (2016-2018). A população foi composta por 281 residentes, avaliados quanto às variáveis sociodemográficas (registros médicos), a força de preensão manual (dinamometria manual) e a dor crônica (auto-relato). A análise estatística utilizou a estatística descritiva e o teste t Student de amostras independentes (p≤0.05).

RESULTADOS: A amostra foi composta por 173 idosos (80.95±8.94 anos). A maioria residia em instituições privadas, eram mulheres, viúvas e com escolaridade de 1 a 8 anos. A prevalência de dor crônica foi de 39,3% e a força de preensão manual média foi de 7,0±6,42kg (mão direita) e 6,24±5,96kg (mão esquerda). A força de preensão manual foi maior nos grupos dos idosos do sexo masculino (mão direita e esquerda: p=0,000) e dos idosos não longevidade (mão direita p=0,017; mão esquerda p=0,002). Não houve diferença nos valores de força de preensão manual entre os grupos com e sem dor crônica (p>0.05).

CONCLUSÃO: Idosos institucionalizados apresentam uma expressiva prevalência de dor crônica e valores de força de preensão manual muito abaixo do esperado, sendo influenciado pelo sexo e pela idade.

Descritores: Dor, Força da mão, Sexo e saúde, Instituição de longa permanência para idosos, Longevidade, Perfil de saúde.

INTRODUCTION

Individuals aged 65 and over in developed countries and over 60 in underdeveloped or developing countries are considered elderly1. In Brazil, estimates indicate that by 2025, the elderly population could reach 32 million people2. With human aging, a
series of physiological insufficiencies and changes in cellular, tissue, and systemic activity occur. Thus, the elderly has changes in the neuromuscular system, reduced muscle mass, and strength, flexibility, resistance, joint mobility, coordination, and balance. The elderly is the group of individuals who suffer major consequences from chronic musculoskeletal pain, a condition that affects 100 million people worldwide. Pain is one of the main factors that impact the quality of life (QoL), productivity and functionality, especially in the elderly.

Such complications resulting from the senescence process are significant and interfere with the functionality and performance of activities of daily living. In this sense, the hands, which are complex structures with particular functions, such as the hand-grip strength (HGS), and fundamental to effectively perform activities of daily living (ADL), physiologically present growth in their values of grip strength until the third decade of life, which after that has declined. In addition, individuals with pathologic conditions that cause pain present even more impaired values. In this sense, it can be assumed that institutionalized elderly, who may have decreased HGS due to pain, are more susceptible to falls, difficulty performing ADL, impact on their functionality and mobility, and even the higher risk of mortality. The literature has already presented the values of the HGS and its relationship with chronic pain in community elderly. However, few studies explore this relationship in institutionalized elderly, which becomes a problem, as this population has worse physical and cognitive conditions than their peers in the community, which may interfere with their health status. Knowing the prevalence of chronic pain and HGS values in residents of long-term care facilities for the elderly (LTCF) is fundamental for understanding the health profile of this population, as well as for outlining health promotion strategies and QoL in this context, and contribute to the implementation of public policies in the care of these elderly. Thus, this study aimed to verify the prevalence of chronic pain and to analyze the HGS in institutionalized elderly.

**METHODS**

A population-based, descriptive and exploratory cross-sectional study that is part of a project entitled “Patterns of Aging and Longevity: Biological, Educational and Psychosocial Aspects of Institutionalized Elderly” (PROCAD) developed by the Graduate Program in Human Aging from the University of Passo Fundo. The study was conducted in Passo Fundo/RS, one of the most populated cities in the state, characterized as an important regional health and education hub. In addition, the municipality has 24 LTCF that house about 450 elderly people. The sample calculation was performed using the formula \( n = Z^2 \cdot p \cdot (1-p) / e^2 \), where the letter “n” corresponds to the desired sample size; the letter “Z” corresponds to the deviation of the acceptable average value to reach the desired confidence level (adopting the most commonly used value for this type of calculation: 1.96), the letter “p” corresponds to the expected proportion (adopted the value of 58.1%, taking into consideration the findings of Barbosa et al. and the letter “e” corresponds to the admitted margin of error (adopting the most commonly used value for this type of calculation: 0.05). Thus, the sample size needed to meet the aim of this study would be approximately 374 individuals.

Inclusion criteria were individuals of both genders, aged 60 years old and over, who lived in LTCF in the city of Passo Fundo/RS full time. Exclusion criteria were individuals unable to walk, verbalize or perform the manual dynamometry test (restricted to bed), who were hospitalized on the day of the meeting with the research team, with upper limb neuromotor sequelae, with amputation of one of the upper limbs, or in acute condition of degenerative diseases. Losses were considered to be eligible individuals who refused to participate or who did not sign the Free and Informed Consent Term (FICT). Study participants signed the FICT.

The data collection period was between December 2016, and July 2018. The data collection procedure and the elaboration of the data collection instrument has already been described. Sociodemographic and health data were included in a questionnaire prepared by the authors themselves, which recorded the type of LTCF, gender, age, marital status, education, and the presence of chronic pain. The MPF was assessed by manual dynamometry using a Kratos® device. This instrument measures the handgrip strength produced through an isometric contraction recorded in kilograms (kg). In this study, the recommendations of the American Society of Hand Therapists were used, where the individual should be seated, with the shoulder adducted, elbow flexed at 90°, neutral forearm and wrist with 30° extension. Three attempts were made, and then the arithmetic mean calculated. This study was approved by the UPF Human Research Ethics Committee under opinion number 2.097.278. The study is in accordance with the guidelines of National Health Council Resolution 466/2012, which deals with regulatory standards and ethical aspects of research involving human beings, and the Declaration of Helsinki.

**Statistical analysis**

Data were coded and stored in a database using statistical software. The descriptive statistics was used to characterize the sample, and to verify the relationship between quantitative and qualitative variables, the analysis was performed by Student’s t-test of independent samples. The significance level adopted was \( p \leq 0.05 \).

**RESULTS**

The study population consisted of 281 elderly residents in LTCF in the city of Passo Fundo/RS. Based on the inclusion and exclusion criteria, the sample involved 173 institutionalized elderly, with a mean age of 80.95±8.94 years old (60-100). 108 institutionalized elderly (16 elderly did not answer about the presence or absence of chronic pain, and 92 elderly could not perform the manual dynamometry test) were excluded, totaling a sample loss of approximately 38%. Table 1 presents the data regarding the characterization of the sample studied. Most of the elderly lived in private LTCF, were long-lived, widows with education from 1 to 8 years of study. The prevalence
of chronic pain was 39.3%, and the mean HGS was 7.0±6.42 (0-30.0) kg in the right hand and 6.24±5.96 (0-27.0) kg in the left hand. Table 2 presents the relationship between the HGS and the dependent variables chronic pain, gender, and age group

There was no relationship between HGS and chronic pain in institutionalized elderly. However, men and non-long-lived elderly had higher HGS values in both hands compared to women and long-lived elderly.

### DISCUSSION

The institutionalized elderly presented very low HGS values compared to the reference values for this age group, which are 30.0kg for men and 20.0kg for women\(^\text{15}\). The prevalence of chronic pain was also low in the study sample compared to other studies conducted in the same context\(^\text{15,16}\). Still, there was no relationship between the HGS and chronic pain, but between the HGS and the factors gender and age.

In this study, it was found that the profile of the institutionalized elderly consisted predominantly of private residents of LTCF, women, long-lived, widows and with education from 1 to 8 years\(^\text{12}\) and that are in agreement with other studies\(^\text{11,17,18}\).

With the considerable increase in the number of elderly people in recent times, musculoskeletal disorders, especially chronic pain, have been one of the main complaints among this population\(^\text{19}\), and in up to 80% of cases, these symptoms persist for at least two years until the search for treatment\(^\text{20}\). Thus, chronic pain can be a compromising factor for dislocation and functional activities of daily living, implying disability and loss of QoL of the elderly\(^\text{21}\).

The prevalence of chronic pain in the elderly is constantly explored, and these values are widely variable, permeating around 50% of the elderly in the community\(^\text{21,22}\). In institutionalized elderly, this number may vary between 40 and 78\%\(^\text{23}\). In this study, a prevalence of chronic pain in institutionalized elderly was found corresponding to what the literature reports.

Decreased HGS in the elderly is related to impairments in performing manual tasks and functional limitations in gait and balance, such as the increased risk of falls and loss of functional independence\(^\text{24}\). Thus, assessing it is essential to determine the risk of accelerated health decline in the elderly\(^\text{25}\). A previous study analyzed the HGS of 112 community elderly in the municipality of Passo Fundo/RS, considering age, disease presence, and gender. The HGS values were 24.4kg (right hand) and 13.8kg (left hand) in the men's group, and 15.0kg (right hand) and 15.6kg (left hand) in the women group. In addition, 40.2% of the elderly had some type of joint disease that causes pain\(^\text{26}\). Although the prevalence of chronic pain is similar to the current study, the values of HGS are much higher than those of institutionalized elderly, demonstrating the need to pay attention to the assess-

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
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<td>LTCF type</td>
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</tr>
<tr>
<td>Philanthropic</td>
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<tr>
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<td></td>
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<td>Long-lived</td>
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<td>61.8</td>
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<td></td>
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<td>1 to 8 years</td>
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</tr>
<tr>
<td>Did not answer</td>
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<td>1.7</td>
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<tr>
<td>Chronic pain</td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td>68</td>
<td>39.3</td>
</tr>
<tr>
<td>No</td>
<td>105</td>
<td>60.7</td>
</tr>
</tbody>
</table>

n = absolute value; % = relative value; LTCF = long-term care facility for the elderly.

### Table 2. Relationship between handgrip strength, chronic pain, gender, and age group in institutionalized elderly. Passo Fundo/RS, 2019

<table>
<thead>
<tr>
<th>HGS</th>
<th>With chronic pain</th>
<th>Without chronic pain</th>
<th>CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right hand</td>
<td>7.04±7.06kg</td>
<td>6.97±6.01kg</td>
<td>-1.91 – 2.04</td>
<td>0.948</td>
</tr>
<tr>
<td>Left hand</td>
<td>6.85±6.95kg</td>
<td>5.85±5.21kg</td>
<td>-0.83 – 2.85</td>
<td>0.283</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>10.99±8.07kg</td>
<td>5.37±4.77kg</td>
<td>3.66 – 7.57</td>
<td>0.000*</td>
</tr>
<tr>
<td>Left hand</td>
<td>10.20±7.29kg</td>
<td>4.63±4.33kg</td>
<td>3.77 – 7.36</td>
<td>0.000*</td>
</tr>
<tr>
<td>Non-long-lived</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>6.09±5.72kg</td>
<td>8.47±7.21kg</td>
<td>-4.33 – 0.42</td>
<td>0.017*</td>
</tr>
<tr>
<td>Left hand</td>
<td>5.16±5.28kg</td>
<td>7.99±6.95kg</td>
<td>-4.61 – 1.02</td>
<td>0.002*</td>
</tr>
</tbody>
</table>

HGS = handgrip strength; CI = confidence interval; * p<0.05.
of chronic pain were factors that could influence the results obtained, but do not prevent data generation, encouraging future research on this subject.

**CONCLUSION**

Institutionalized elderly had a significant prevalence of chronic pain and HGS values much lower than expected. Still, the HGS is influenced by factors such as gender and age but was not related to chronic pain.

**REFERENCES**

Relationship between the intensity of chronic low back pain and the generated limitations with depressive symptoms

Relação entre a intensidade de dor lombar crônica e limitações geradas com os sintomas depressivos

Ariel Donatti¹, Elen dos Santos Alves², Mariéli Terassi², Bruna Moretti Luchesi³, Sofia Cristina Iost Pavarini¹, Keika Inouye¹

ABSTRACT

BACKGROUND AND OBJECTIVES: Aging adds to the prevalence of chronic diseases and functional impairment. Depressive symptoms and chronic low back pain affect an increasing number of elderly people and become important research topics. This study aimed to identify the relationship between chronic low back pain intensity, its generated disability, and the presence of depressive symptoms in independent elderly people for basic daily activities.

METHODS: The study is descriptive, quantitative, and cross-sectional. A sample of independent elderly patients with chronic low back pain (n=46) enrolled in the Family Health Units of the city of São Carlos, SP, Brazil, was analyzed. For collection, we used the Characterization Sheet, Multidimensional Pain Rating Scale, Roland-Morris Disability Questionnaire, and the Geriatric Depression Scale. The data obtained were input in the Statistical Package for Social Sciences software (SPSS) for Windows to perform the descriptive and Spearman correlational analysis. The ethical precepts for research with humans of the National Health Council were respected.

RESULTS: The most frequent pain intensity perceived by the elderly was intense (43.5%, n=20), preceded by moderate pain (41.3%, n=19). Most of the elderly describe low back pain as persistent, painful, and uncomfortable. The mean total depression score was 4.37 points (Md=4.00, SD=2.67, x_min = 0.00, x_max = 11.00).

CONCLUSION: Correlational analyses showed that there is a significant directly proportional relationship between the intensity of low back pain and the number of weak depressive symptoms, and a significant directly proportional relationship between the number of disabilities/limitations caused by low back pain and the number of moderate depressive symptoms.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O envelhecimento agrega em aumento da prevalência de doenças crônicas e prejuízo funcional. Os sintomas depressivos e a dor crônica lombar afetam um número crescente de idosos e se tornam temas importantes de investigação. Este estudo teve como objetivo identificar a relação entre a intensidade de dor lombar crônica, sua incapacidade gerada e a presença de sintomas depressivos em idosos independentes para as atividades básicas de vida diária.

MÉTODOS: O estudo é de caráter descritivo, quantitativo e de corte transversal. Foi analisada uma amostra de idosos independentes com quadro de dor lombar crônica (n=46) cadastrados nas Unidades Saúde da Família do município de São Carlos, SP. Para a coleta foram utilizados: Ficha de Caracterização, Escala Multidimensional de Avaliação da Dor, Questionário de Incapacidade de Roland-Morris e a Escala de Depressão Geriátrica. Os dados obtidos foram digitados no programa Statistical Package for Social Sciences (SPSS) for Windows para realização de análises descritivas e análise correlacional de Spearman. Os preceitos éticos do Conselho Nacional de Saúde sobre pesquisas com seres humanos foram respeitados.

RESULTADOS: A intensidade mais frequente de dor percebida pelos idosos foi a intensa (43,5%, n=20), precedida pela moderada (41,3%, n=19). A maioria dos idosos descreve a dor lombar como dolorosa, persistente e desconfortável. O escore total médio de depressão foi de 4,37 pontos (Md=4,00; DP =2,67, x_min =0,00, x_max =11,00).

CONCLUSÃO: As análises correlacionais evidenciaram que existe relação significativa e diretamente proporcional entre a intensidade da dor lombar e o número de sintomas depressivos de magnitude fraca, e uma relação significativa e diretamente proporcional entre o número de incapacidades/limitações provocadas pela dor lombar e o número de sintomas depressivos de magnitude moderada.

Descritores: Depressão, Dor crônica, Dor lombar, Gerontologia, Incapacidade, Saúde do idoso.
INTRODUCTION

The world population is in the process of demographic transition, leading to an inversion of the age pyramid. Data show that this increase went from 62.57 years in 1980 to 73.17 years in 2009. It is estimated that this expectation can reach 81.29 years in 2050, causing a significant increase in the proportion of elderly in the population.

Although the aging process is not necessarily related to diseases and disabilities, chronic-degenerative diseases are often found among the elderly. Thus, there is a growing number of individuals who, despite living longer, present chronic conditions, leading to a greater need to improve the knowledge about the factors that affect the prevalence of age-related noncommunicable chronic diseases (NCDs).

Depression is a severe health problem in the general population and the elderly, and it is defined and diagnosed by the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) as a mental illness that can lead to the aggravation of chronic degenerative or disabling diseases and compromise the quality of life. Alexopoulos et al. described the loss of interest in usual activities, loss of appetite, difficulty to fall asleep, increased irritability, anxiety, and suicidal ideation as the main depressive symptoms in the elderly. Lawrence et al. pointed out that the concept of depression varies in different ethnic and age groups and can be mistaken in the general population as bad mood, hopelessness, and state of concern. A review study conducted in 2011 found that depression in the elderly is associated with a higher incidence of cognitive impairment, which in turn may be a predictor of dementia. According to Hayde, although the elderly are more likely to develop depression, it is not a normal part of aging.

In addition to depression, pain is a common clinical condition in old age, often underestimated and undertreated. The International Association for the Study of Pain (IASP) defines pain as an unpleasant sensorial and emotional experience, associated with actual or potential tissue injury, and described as continuous or recurrent pain, lasting at least for three months. This symptom is an individual experience that interferes with the well-being and may directly compromise the functional capacity.

Considering the criteria established by the IASP – absence of an apparent biological basis and duration for three months or more, the prevalence of chronic pain in the general population of developed countries indicates an average of 35.5%, varying from 11.5 to 55.5%, being of intense characteristic in 11% of the adults. Low back pain (LBP) is defined as localized pain, tension, or stiffness in the region between the last ribs and the gluteal line. It is classified as specific when the symptoms are caused by defined clinical conditions, or as non-specific, when the pain mechanism is not clearly defined.

The spine is one of the musculoskeletal structures that most undergo morphological changes, causing physical limitations with aging, and the lumbar region is referred to as the most frequent cause of musculoskeletal disorders. In Brazil, it is estimated that around 30 to 40% of the population is affected by chronic pain, and the elderly complain twice as much of pain, making this symptom a challenge for the health professionals, especially because pain is a subjective factor.

In the elderly, it is frequent that depressive and LBP symptoms lead to greater susceptibility to functional impairment, undermining body functions, difficulty in performing daily activities, and restriction of social participation. However, studies have shown that 30 to 60% of individuals with LBP have depressive symptoms that directly influence recovery time.

Given the above, the objective of this study was to investigate whether the relationship between LBP and depressive symptoms remains in older people who do not have any impairment in their basic daily life activities (BDLA). Another interesting aspect would be to evaluate and characterize, using a specific and standardized methodology, the disability that chronic LBP brings to the elderly.

METHODS

A descriptive, quantitative, cross-sectional study conducted in the city of São Carlos, a mid-size municipality located in the interior of the state of São Paulo. According to the 2010 Demographic Census, the total number of inhabitants in this municipality was 221,950 and the total number of people aged 60 or over was 28,868, which was approximately 13% of the total population. The city had 14 Family Health Units (FHU) in the urban area and two units in the rural area, covering 39,768 inhabitants.

The survey of the possible participants was carried out at the FHU, and the members of a “Health and Aging” Research Group collected the data.

The participants in this study were 46 independent old people, according to the Katz Index, who reported chronic low back pain (CLBP) in regions 30 and 31 of the item “Location of pain” of the Multidimensional Pain Evaluation Scale (EMADOR). The inclusion criteria for the elderly were aged 60 or older; be registered in one of the FHU of the city of São Carlos; live with another independent old person in the same house; be independent for the BDLA; have CLBP; be able to understand the interview questions; sign the Free and Informed Consent Term (FICT).

From the approximate total number of older people attended at the FHU of the city of São Carlos - 5130, it was estimated that 351 individuals would constitute a sample with a 95% confidence level and 5.0% margin of error. This calculation was performed by the Survey Monkey platform, available at <https://en.surveymonkey.com/mp/sample-size-calculator/#>. Thus, the data from 351 elderly were analyzed, but only 46 had chronic LBP and met the inclusion criteria (Figure 1). The sample size corroborates the data from the literature since 13.11% of the elderly had CLBP.

Figure 1 shows the composition of the sample from the data collection conducted by the “Health and Aging” Research Group. Each of the FHUs provided a list of the households with two or more older adults registered in the area of coverage with their respective names, age, and address. With this list, we visited the houses, and the residents were informed about the objectives of the study.
All participants were informed about the objectives of the study, consulted about their willingness to participate and assured about the confidentiality of the individual information. The instruments chosen for data collection were validated for the Brazilian culture and are widely used in the academic-scientific environment.

It is important to point out that the individuals were allowed to participate only after signing the FICT. No physical or psychic injury was observed in the procedures described in this study. During data collection, the participant was informed about the right to drop out of the study without the need for justification.

The data was collected during interviews conducted by members of the Research Group at the household of the elderly, or in places previously agreed at the participant’s convenience.

One of the data collection instruments used was the Elderly Characterization form. It is a questionnaire designed for this project to collect the demographic data of the participants. The Multidimensional Pain Evaluation Scale (EMADOR), validated for the Portuguese language in 2010, was also used to legitimize, subjectively, and statistically, the pain evaluation. The instrument has descriptors that make it possible to analyze the sensorial, affective, and cognitive dimensions of pain. It is a fast, practical, reliable, sensitive, and valid instrument. The study by Sousa et al. showed that measurements have the methodological rigor, replicability for scientific research, the possibility of monitoring and analysis of the mechanisms of action of different drugs and other therapeutic approaches. It consists of four parts. The first tracks and characterize the pain (absence or presence of pain, type of pain: chronic or acute). The second is the Numeric Pain Rating Scale in which the participant indicates the intensity of his/her pain on a scale from zero to 10, zero indicating “no pain,” 10 “maximum pain.” There is a classification of pain derived from these scores: none (zero points), light (1 to 3 points), moderate (4 to 6 points), severe (7 to 9 points) and unbearable (10 points).

The third part classifies pain according to pre-established descriptors. In this study, only chronic pain descriptors were used: depressing, persistent, distressing, disastrous, harmful, painful, unbearable, frightening, cruel, and uncomfortable. The last part of the instrument refers to the site of the pain, used as inclusion criteria for sample selection. Only subjects with pain in the regions 30 and 31 participated in this study.

The Roland Morris Disability Questionnaire (RMDQ), was developed by Roland and Morris in 1983 to assess pain-related functional impairment in individuals with low back pain. The global interest in the instrument has been increasing, being validated in 17 countries.

The questionnaire consists of 24 dichotomous questions (yes or no), and the result corresponds to the sum of yes answers. This result can range from zero to 24, with zero indicating a person with “no limitations,” and 24 with “severe limitations.” The Geriatric Depression Scale (GDS) is one of the most frequently used instruments for the detection of depressive symptoms in the elderly. Several studies have demonstrated that the GDS offers valid and reliable measures for the evaluation of depressive disorders. In addition, the use of the GDS short versions with 1, 4, 10, 15, and 20 questions (instead of the 30 questions of the original version) is increasing. The use of these short versions in clinical practice is even more attractive since the time spent with their application can be substantially reduced.

This study used the 15-question scale. Score variations are considered: normal (from zero to 5), mild depression (6 to 10), and severe depression (11 to 15 points). All the ethical precepts of Resolution No. 466/12 of the National Health Council on research with humans were respected.
The Research Ethics Committee approved the project with opinion number 711.592, and it is part of the activities of a Research Group in which the student and the advisor participate.

**Statistical analysis**

The data were input in a database in the Statistical Package for Social Sciences (SPSS) software for Windows for the descriptive analyses to characterize the profile of the elderly, the pain, the disabilities caused by the pain and their depressive symptoms. The Spearman’s correlation analysis was conducted to identify the relationship between pain intensity, disability generated by chronic LBP, and the number of depressive symptoms of the elderly.

**RESULTS**

The 46 senior citizens interviewed had family social support, another older adult living in the same house. This cutout was considered due to the importance of this type of support when studying variables with an affective component such as depression and pain perception. No senior person in this study lived alone, and all had an independent senior person to keep him company. The sample was predominantly female (89.1%, n=41), white (78.3%, n=36), married (95.7%, n=44), retired (52.2%, n=24), catholic (63.0%, n=29), with low schooling (80.4% had the fourth grade of primary school, n=37, or a mean of 3.59 years of schooling - Md=4.00; SD=2.90, x_min = 0, x_max =12) and with no health insurance (84.8%, n=39).

The mean age was 67.02 years (Md=65.00; SD=5.54, x_min =60, x_max =81). The elderly had 4.56 children (Md=4.00; SD=2.62, x_min =0, x_max =4) and monthly income of R$577,24 (Md=558.50; SD=841.67, x_min =0, x_max =4500.00). Value of the minimum wage in 2014: R$724,00.

Table 1 shows the proportions of the categorical variables of the participants.

Table 2 shows the distribution of the elderly according to the intensity of the perceived pain. The most frequent pain intensity perceived by the elderly was intense (43.5%, n=20), preceded by moderate pain (41.3%, n=19). Table 2 shows the distribution of the elderly according to the characterization of pain.

Regarding the characterization of pain, the most frequent descriptors were: uncomfortable (93.5%, n=43), painful (91.3%, n=42) and persistent (76.1%, n=35). Table 3 shows the distribution of the elderly according to the characterization of pain. Of the 46 seniors interviewed, only 2.2% (n=1) had signs of severe depression, 28.3% (n=13) had mild depression, and 69.5% (n=32) obtained a score considered normal. The mean total score obtained by the GDS was 4.37 (Md=4.00; SD=2.67, x_min =0, x_max =11.00). It is worthy to note that the three most frequently items presented were: 11 (Do you feel good to be alive?), 7 (Do you feel happy most of the time?) and 1 (Are you satisfied with your life?), related to happiness and satisfaction with life.

Table 4 shows the distribution of the elderly according to the perception of depression. The mean score of disability (limitations) related to LBP in regions 30 and 31, obtained by means of the RMDQ, was 11.391 points (Md=10.500; SD=7.188, x_min =0.00, x_max =24.00). It is

---

**Table 1. Distribution of the elderly according to the characterization variables. São Carlos, 2014**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (n)</th>
<th>Proportion (%)</th>
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<td>89.1</td>
</tr>
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<tr>
<td>Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catholic</td>
<td>29</td>
<td>63.0</td>
</tr>
<tr>
<td>Others</td>
<td>16</td>
<td>36.6%</td>
</tr>
<tr>
<td>No religion</td>
<td>1</td>
<td>2.2</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>100.00</td>
</tr>
<tr>
<td>Ethnic group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>36</td>
<td>78.3</td>
</tr>
<tr>
<td>Black</td>
<td>5</td>
<td>10.9</td>
</tr>
<tr>
<td>Brown</td>
<td>5</td>
<td>10.9</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>100.00</td>
</tr>
<tr>
<td>Sufficient income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>29</td>
<td>63.0</td>
</tr>
<tr>
<td>Yes</td>
<td>17</td>
<td>37.0</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>100.00</td>
</tr>
<tr>
<td>Health insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>39</td>
<td>84.8</td>
</tr>
<tr>
<td>Yes</td>
<td>7</td>
<td>15.2</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>100.00</td>
</tr>
</tbody>
</table>

**Table 2. Distribution of the elderly according to the intensity of the perceived pain. São Carlos, 2014**

<table>
<thead>
<tr>
<th>Intensity of perceived pain</th>
<th>Absolute frequency (n)</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (0)</td>
<td>1</td>
<td>2.2</td>
</tr>
<tr>
<td>Mild (1 to 3)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Moderate (4 to 6)</td>
<td>19</td>
<td>41.3</td>
</tr>
<tr>
<td>Intense (7 to 9)</td>
<td>20</td>
<td>43.5</td>
</tr>
<tr>
<td>Unbeatable (10)</td>
<td>6</td>
<td>13</td>
</tr>
</tbody>
</table>
worth to note that the three most frequent items related to the interruption of basic tasks due to pain were: 15 - my appetite is not very good because of my pain (82.6%, n=38); 19 - because of pain I need the help of other people to get dressed (80.4%, n=37), and 20 - I stay seated most of the day because of my pain (76.1%, n=35) (Table 5).

Correlational analyses showed that there is a significant and directly proportional relationship between the intensity of LBP and the number of depressive symptoms of weak magnitude (rho=0.302, p=0.041) (Figure 2).

Correlational analyses showed that there is a significant and directly proportional relationship between the number of disabilities/limitations caused by LBP and the number of depressive symptoms of weak magnitude (rho=0.403, p=0.005) (Figure 3).

Table 3. Distribution of the elderly according to the characterization of pain. São Carlos, 2014

<table>
<thead>
<tr>
<th>Pain descriptors</th>
<th>Frequency</th>
<th>Yes (n and %)</th>
<th>No (n and %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressing</td>
<td>28</td>
<td>60.9</td>
<td>18 39.1</td>
</tr>
<tr>
<td>Persistent</td>
<td>35</td>
<td>76.1</td>
<td>11 23.9</td>
</tr>
<tr>
<td>Distressing</td>
<td>30</td>
<td>65.2</td>
<td>16 34.8</td>
</tr>
<tr>
<td>Disastrous</td>
<td>21</td>
<td>45.7</td>
<td>25 54.3</td>
</tr>
<tr>
<td>Harmful</td>
<td>32</td>
<td>69.6</td>
<td>14 30.4</td>
</tr>
<tr>
<td>Painful</td>
<td>42</td>
<td>91.3</td>
<td>4 8.7</td>
</tr>
<tr>
<td>Unbearable</td>
<td>28</td>
<td>60.9</td>
<td>18 39.1</td>
</tr>
<tr>
<td>Frightening</td>
<td>20</td>
<td>43.5</td>
<td>26 56.5</td>
</tr>
<tr>
<td>Cruel</td>
<td>23</td>
<td>50</td>
<td>23 50</td>
</tr>
<tr>
<td>Uncomfortable</td>
<td>43</td>
<td>93.5</td>
<td>3 6.5</td>
</tr>
</tbody>
</table>

Table 4. Descriptive data on depression in the elderly. São Carlos, 2014

<table>
<thead>
<tr>
<th>Items of the Geriatric Depression Scale</th>
<th>AF (n)</th>
<th>RF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are you satisfied with your life?</td>
<td>Yes 39</td>
<td>No 7</td>
</tr>
<tr>
<td>2. Have you given up many of your interests and activities?</td>
<td>Yes 25</td>
<td>No 21</td>
</tr>
<tr>
<td>3. Do you feel that your life is empty?</td>
<td>Yes 15</td>
<td>No 31</td>
</tr>
<tr>
<td>4. Do you get bored frequently?</td>
<td>Yes 17</td>
<td>No 29</td>
</tr>
<tr>
<td>5. Do you feel in a good mood most of the time?</td>
<td>Yes 39</td>
<td>No 7</td>
</tr>
<tr>
<td>6. Are you afraid that something bad will happen to you?</td>
<td>Yes 26</td>
<td>No 20</td>
</tr>
<tr>
<td>7. Are you happy most of the time?</td>
<td>Yes 40</td>
<td>No 6</td>
</tr>
<tr>
<td>8. Do you feel that your situation has no way out?</td>
<td>Yes 8</td>
<td>No 38</td>
</tr>
<tr>
<td>9. Would you rather stay at home instead of going out and doing new things?</td>
<td>Yes 24</td>
<td>No 22</td>
</tr>
<tr>
<td>10. Do you think you have more memory problems than most of the people?</td>
<td>Yes 17</td>
<td>No 29</td>
</tr>
<tr>
<td>11. Do you think it's wonderful to be alive?</td>
<td>Yes 44</td>
<td>No 2</td>
</tr>
<tr>
<td>12. Do you feel useless in the present circumstances?</td>
<td>Yes 9</td>
<td>No 37</td>
</tr>
<tr>
<td>13. Do you feel full of energy?</td>
<td>Yes 30</td>
<td>No 16</td>
</tr>
<tr>
<td>14. Do you think your situation is hopeless?</td>
<td>Yes 7</td>
<td>No 39</td>
</tr>
<tr>
<td>15. Do you think that most people are better than you?</td>
<td>Yes 15</td>
<td>No 31</td>
</tr>
</tbody>
</table>

AF = absolute frequency; RF = relative frequency.

Table 5. Descriptive data of disability/limitation related to lower back pain in the elderly. São Carlos, 2014

<table>
<thead>
<tr>
<th>Items of the Roland Morris Disability Questionnaire</th>
<th>AF (n)</th>
<th>RF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I stay at home most of the time because of my pain</td>
<td>Yes 29</td>
<td>No 17</td>
</tr>
<tr>
<td>2. I change position frequently trying to be more comfortable with my pain</td>
<td>Yes 13</td>
<td>No 33</td>
</tr>
<tr>
<td>3. I walk slower than usual because of the pain</td>
<td>Yes 17</td>
<td>No 29</td>
</tr>
<tr>
<td>4. Because of the pain, I’m not doing some of the tasks I usually do at home</td>
<td>Yes 21</td>
<td>No 25</td>
</tr>
<tr>
<td>5. Because of the pain, I use the handrail to climb stairs</td>
<td>Yes 19</td>
<td>No 27</td>
</tr>
<tr>
<td>6. Because of the pain, I frequently have to lie down to rest.</td>
<td>Yes 24</td>
<td>No 22</td>
</tr>
<tr>
<td>7. Because of the pain, I have to lean on things to get up from an armchair</td>
<td>Yes 21</td>
<td>No 25</td>
</tr>
<tr>
<td>8. Because of the pain, I let other people do things for me.</td>
<td>Yes 32</td>
<td>No 14</td>
</tr>
<tr>
<td>9. I dress more slowly than usual because of my pain</td>
<td>Yes 19</td>
<td>No 27</td>
</tr>
<tr>
<td>10. I can only be standing for a short time because of the pain</td>
<td>Yes 23</td>
<td>No 23</td>
</tr>
<tr>
<td>11. Because of the pain, I try not to bend down or kneel</td>
<td>Yes 14</td>
<td>No 32</td>
</tr>
<tr>
<td>12. It is difficult to get up from a chair because of the pain</td>
<td>Yes 26</td>
<td>No 20</td>
</tr>
<tr>
<td>13. I feel pain almost all the time</td>
<td>Yes 23</td>
<td>No 23</td>
</tr>
<tr>
<td>14. It is difficult to turn in bed because of the pain</td>
<td>Yes 21</td>
<td>No 25</td>
</tr>
<tr>
<td>15. My appetite is not very good because of my pain.</td>
<td>Yes 38</td>
<td>No 8</td>
</tr>
</tbody>
</table>
DISCUSSION

The female predominance in the sample was expected since the literature indicates that women tend to have a higher prevalence of pain when compared to men. Some authors assume that women have a higher predisposition to low back pain due to anatomic-functional particularities, such as shorter stature, low muscle mass; low bone density, joint fragility, and less adaptation to physical effort. The meaning of pain can be influenced by cultural and social issues that eventually allow women to express or accept pain more openly while men are encouraged to underestimate it.

Since the sample consisted of elderly with family social support in the figure of another elderly living in the same house, it was expected that the majority would be married. One can say that the profile of the elderly in the sample was typical of the literature: women under 75 years, married, with low income and little education. Recent studies on elderly assisted at FHU report this same profile.

The marked predominance of females is a consequence of male mortality, characterizing the feminization of aging. Low education, especially among women, is a reality since, in the past, female education focused on care and household chores.

The predominant white ethnicity, retirement, and the Catholic religion are in line with the demographic data of the Brazilian elderly and literature characterization. According to data from the Brazilian Institute of Geography and Statistics (IBGE) and the National Household Sample Survey (PNAD), in 2015, most Brazilians (45.22%) self-reported as white and among the elderly, 75.6% were retirees and/or pensioners.

Since the Catholic religion is prevalent in Brazil, the sample was aligned with this data, and 97.80% of the elderly claimed to have a religion, a fact pointed out as positive in the literature. According to Nunes et al., there is a relationship between religiosity, well-being, and quality of life. A systematic review conducted by Amorim et al. shows that religiosity is significantly and positively associated with the functional capacity of the elderly.

The fact of not having health insurance, added to the income considered insufficient, reaffirm the importance of the Unified Health System, especially the primary care for the elderly with LBP complaints that need continuous monitoring.

Most of the elderly perceived their pain as intense or moderate. Data from the Health, Well-being and Aging study (SABE), which aimed to identify the living and health conditions of older adults living in Latin America and the Caribbean, showed similar results for elderly with chronic pain, 45.8% reported moderate pain and 27.55% severe pain.

It is well known that chronic LBP can lead to deficiencies in both functional performance and physical capacity, mainly restricting occupational and leisure activities, and undermining the independence of the elderly to perform their daily activities. As the
sample consisted entirely of older adults with LBP, a high prevalence of unbearable and severe pain was expected. However, the results showed that severe pain preceded by moderate pain was the most prevalent.

Few studies using EMADOR descriptors were found, which made it difficult to compare the data. In this study, the elderly classified the pain mainly as uncomfortable (93.5%), painful (91.3%) and persistent (76.1%)\(^\text{34}\), and 46 elderly residents in long-term care institutions were evaluated and classified the pain was severe (30.43%) with the most cited descriptor being "painful".

Of the 46 seniors interviewed, only 2.2% had signs of severe depression, 28.3% had mild depression, and 69.5% had a score considered normal. The literature highlights the association of depressive symptoms with sociodemographic variables, indicating that social inequalities influence the living and health conditions and can contribute to the onset of these symptoms. Low education, age, and economic loss were the sociodemographic variables associated with depressive symptoms\(^\text{35}\). Individuals with little education have a higher risk for depressive symptoms, indicating that high educational level is a protective factor. The educational level enables the individual to expand coping resources to stressful situations in life\(^\text{35}\).

In older individuals, there is a decrease in physical conditions, especially in those with spinal problems. Also, studies show that individuals over 60 years complain twice as much than individuals under 60\(^\text{24}\).

LBP is a very common problem. A study conducted in the Netherlands reported for sciatica an incidence of 11.6 per 1,000 people per year, and its occurrence is associated with age, physical fitness, smoking, overweight and back and abdominal muscle strength, psychological factors such as depression, occupational and psychosocial factors\(^\text{36}\). Another study with the purpose of analyzing the relationship between the presence and severity of depression and low back pain in the general population in Korea found that the prevalence of depression is significantly higher in Koreans with low back pain compared to individuals with no low back pain (20.3 and 4.5%, respectively) and that this type of pain can be considered a risk factor for depression\(^\text{37}\).

Regarding disabilities/limitations related to LBP, 82.6% of the elderly reported loss of appetite due to pain; 80.4% said that due to the pain they need the help of others to get dressed, and finally; 76.1% remain seated most of the time because of the pain. However, it was concluded that pain directly affects the life of the individual, and its intensity can make it difficult to perform daily activities and may lead to functional disability and depression\(^\text{13}\). Another study conducted with a heterogeneous sample with a mean age of 59.1 years showed that individuals with non-specific LBP have a higher risk for disability with aging\(^\text{38}\).

A meta-analysis carried out in 2004 aimed to identify the epidemiology of pain in depression. About 75% of the depressed individuals who constituted the samples complained of painful physical symptoms such as headache, epigastric, neck and back pain, and reported the presence of non-specific generalized pain. However, the presence of pain symptoms was more severe for depression outcomes\(^\text{39}\).

Studies that evaluated LBP-related disability through the RMDQ were not specific for the evaluation of the elderly population and showed lower disability scores. Nogueira and Navega\(^\text{40}\) evaluated 31 administrative workers with a mean age of 31.81±8.33 years and found that the disability scores were 1.06±1.65 points. Other authors, when studying individuals with nonspecific chronic LBP, aged between 18 and 75 years, showed disability indices of 7.77±5.5 points\(^\text{41}\). One study analyzed medical records of 244 patients with chronic low back pain with a mean age of 46.8±11.90 years, ranging from 18 to 73 years of age, and disability rates were 6.9±3.9\(^\text{25}\). Since the disability scores of this research were significantly higher (M=11.39 points; SD=7.19), one can infer the burden of LBP on the elderly\(^\text{43}\).

The significant and directly proportional relationship between LBP, the number of disabilities/limitations caused, and the number of depressive symptoms corroborates the existence of a depression model in the elderly related to pain. Senior people who were not depressed before the condition started to present depressive symptoms due to chronic pain. In some cases, a bad/very bad report about one's own health can be understood as a depressive symptom. Depression is an important marker of disability in the elderly since it affects the overall health and, consequently, the functional capacity\(^\text{45}\).

In turn, emotional components involved in the chronic pain process can, sometimes, be more significantly expressed than the sensory components. Emotions and symbolic values influence the perception of pain, nulling the proportionality between painful stimulus and pain perceived by the individual. Depression, anxiety, and stress, associated with changes in muscle tone and hormonal factors, lead to fatigue and, consequently, increased pain. This justifies the importance of investigating, beyond the merely physical and objective issues, the individual's emotional aspects, and personality characteristics\(^\text{24}\).

According to Trivedi\(^\text{42}\), depression and pain share the same neurochemical pathway mediated by the serotonin and norepinephrine neurotransmitters, indicating that depression and painful physical symptoms should be treated together. The author, however, does not recommend a single approach that may result in incomplete remission and poor prognosis. It is necessary to choose effective interventions to promote the elimination of painful physical symptoms associated with depression to ensure the remission and return to full functioning.

Therefore, the family attention, the source of the main support network, and of qualified professionals in the process of monitoring chronic pain is extremely important, since the study shows a relationship between this variable and depression. Factors that, when not given proper attention, can affect the quality of life and even trigger other factors in a downward spiral.

In-depth studies on the subject would allow better rationalization of the therapeutic measures and the elaboration of strategies to prevent and control pain. Life extension maintaining functional capacity reduces healthcare costs and decreases the use of hospital and home care services\(^\text{43}\).

This research did not allow generalizations and general extrapolations due to some methodological limitations. This is an ad hoc experience, with the participation of senior people of a single city...
in the interior of the state of São Paulo, specifically treated at the FHUs. The relatively small number of participants was due to the strictness of the inclusion and exclusion criteria that ensure bias minimization but reduce the sample size. It would be interesting to contemplate the senior citizens of the general community in sound samples and comparative analyses, in addition to the correlational ones presented. Moreover, the nonspecificity of the LBP needs to be considered, and future studies could address low back pain with specific pathological origins.

CONCLUSION

There was a significant and directly proportional relationship between the intensity of chronic low back pain and the number of depressive symptoms. Accordingly, there is also a significant relationship between the number of disabilities/limitations caused by pain and depressive symptoms. Most of the elderly describe LBP as persistent, uncomfortable, and painful. The results indicate that higher pain intensities negatively affect the appetite, interpersonal relationships, and mobility.

REFERENCES

Effects of exercises on pain and functional capacity in hospitalized cancer patients

Efeitos dos exercícios sobre a dor e a capacidade funcional em pacientes oncológicos hospitalizados

Cláudia Ranzi, Bibiana Ferrari Barroso, Douglas Roberto Pegoraro, Amanda Sachetti, Carla Wouters Franco Rockenbach, Leonardo Calegari

ABSTRACT

BACKGROUND AND OBJECTIVES: There are few studies evaluating the effects of physiotherapy with multidimensional instruments on cancer pain. The objective of this study was to evaluate the effects of physiotherapy on pain and functional capacity in hospitalized cancer patients.

METHODS: This is a quasi-experimental study including 40 participants with a mean age of 51±18 years assessed before and after physiotherapy interventions, using the verbal numerical rating scale, the McGill Pain Questionnaire - Short Form, the International Physical Activity Questionnaire, the Sit-to-Stand test, and the Eastern Cooperative Oncology Group questionnaire for functional capacity evaluation. The participants were classified according to the number of performed sessions: group 1≤ 5 sessions (n=25) and group 2 ≥ 6 sessions (n=15).

RESULTS: There was a reduction in cancer pain measured by sensory (p=0.02) and mixed descriptors (p=0.05) of the McGill questionnaire as well as by the numerical visual scale (p=0.03) in patients who performed at least six physiotherapy sessions. There was a significant correlation (r=0.81; p<0.001) between the reduction in pain measured by the numerical visual scale and the reduction in pain measured by the Total McGill questionnaire.

CONCLUSION: At least six sessions of physiotherapy with emphasis on kinesiotherapy were needed to promote a reduction of cancer pain in hospitalized patients. We recommend the use of multidimensional instruments in the evaluation of cancer pain in hospitalized patients submitted to physiotherapy.

Keywords: Cancer pain, Neoplasm, Pain measurement, Physiotherapy.

RESUMO

JUSTIFICATIVA E OBJETIVOS: São escassos os estudos que avaliaram os efeitos da fisioterapia sobre a dor oncológica com instrumentos multidimensionais. O objetivo deste estudo foi avaliar os efeitos da fisioterapia sobre a dor e a capacidade funcional em pacientes oncológicos hospitalizados.

MÉTODOS: Estudo quase-experimental, composto por 40 participantes com idade média de 51±18 anos, avaliados pré e pós intervenção fisioterapêutica pela escala verbal numérica, Questionário de Dor de McGill, Questionário Internacional de Atividade Física, teste de sentar e levantar da cadeira e capacidade funcional pelo questionário Eastern Cooperative Oncology Group. Os participantes foram estratificados de acordo com o número de sessões realizadas em grupo 1≤ 5 atendimentos (n=25) e grupo 2 ≥ 6 atendimentos (n=15).

RESULTADOS: Houve redução da dor oncológica mensurada pelos descritores sensitivo (p=0,02) e misto (p=0,05) do questionário de McGill e na escala visual numérica (p=0,03) nos pacientes que realizaram no mínimo seis sessões de fisioterapia. Houve correlação significativa (r=0,81; p<0,001) entre a redução da dor mensurada pela escala visual numérica e a redução da dor mensurada pelo questionário McGill Total. Não houve diferenças significativas no teste de sentar e levantar e no questionário de capacidade funcional pelo Eastern Cooperative Oncology Group.

CONCLUSÃO: Foram necessárias no mínimo seis sessões de fisioterapia com ênfase na cinesioterapia para promover redução da dor oncológica em pacientes hospitalizados. Recomenda-se o uso do instrumento multidimensional na avaliação da dor oncológica em pacientes hospitalizados submetidos à fisioterapia.

Descritores: Dor do câncer, Fisioterapia, Mensuração da dor, Neoplasia.
INTRODUCTION

According to the World Health Organization (WHO), cancer is a public health problem in developing countries, where it is estimated that in the coming decades it will affect 80% of individuals with more than 20 million new cases by 2025. In oncology, physiotherapy appears as a way to preserve, maintain and restore the functional kinetic integrity of the cancer patient's organs and systems, as well as to prevent disorders caused by the treatment of the disease. In oncology, physiotherapy acts in an integral and interdisciplinary way in health promotion at all levels of care, rescuing the individual's functionality.

Most cancer patients complain of pain, and its control/attenuation is among the priorities of the multiprofessional team. Cancer pain can be located in several anatomical sites and with different causes, being considered a mixed pain. In addition to pain, patients may have a range of motion restriction, sensitivity alteration, muscle weakness, axillary web syndrome, lymphedema, and scarring changes. Physiotherapy can contribute with specific techniques, allowing pain relief and improvement in the quality of life. A retrospective study reported that the physiotherapy intervention promoted functionality improvements in palliative care patients. Prospective studies are needed to better understand this area of professional practice on cancer pain in a hospital environment. Regular physical exercise can also attenuate pain by reducing endogenous system receptor phosphorylation, increased serotonin levels, and opioid activation in the central nervous system (CNS) inhibitory pathways. However, few studies have assessed the effects of kinesiotherapy on cancer pain in a hospital environment.

Within this context, this study aimed to assess the effects of therapeutic exercises on cancer pain and functional capacity in hospitalized patients.

METHODS

A quasi-experimental research was performed, with pre and post-intervention assessment, in hospitalized cancer patients. Inclusion criteria were age over 18 years old, diagnosis of cancer by anatomical pathology examination, in-hospital physiotherapy care from March to July 2018. Patients with neurological diseases, use of drugs during hospitalization, regular physical activity, and smoking. The nutritional classification was determined by body mass index (BMI), verified by weight and height according to age group, and pre-established cutoff points. In the elderly population, BMI reference values were classified as low weight ≤22kg/m², eutrophic >22kg/m² and <27kg/m² and overweight BMI ≥27kg/m². In the adult population, the reference values were classified as low weight <18,5kg/m²; eutrophic ≥18,5 and <25,0kg/m²; overweight: ≥25 and <30,0kg/m²; and obesity: ≥30kg/m².

For pain assessment, each individual received a verbal numeric scale (VNS) sheet to rate their pain in scores ranging from zero to 10, according to the intensity of the sensation, being zero when there was no pain and 10 the highest imaginable intensity. The McGill Pain Questionnaire is a multidimensional instrument to measure pain by location, intensity, and its behavior considering the sensitive, affective, evaluative, and mixed dimensions. It has reliability and good validity in cancer patients.

The International Physical Activity Questionnaire (IPAQ) considers walking activities, moderate and vigorous physical activity, and has been used in cancer patients. The interpretation of IPAQ was in accordance with the recommendations suggested by the group of scientific reviewers. The sit-to-stand test (STS) from a chair assessed lower limb strength and endurance. At the signal, the participant had to stand up, stand fully, and then return to a sitting position. The participant was encouraged to complete as many repetitions as possible within 30 seconds. Functional capacity was assessed using the Eastern Cooperative Oncology Group (ECOG) scale, a method of global measurement of functional performance that has been used in cancer patients.

In all visits, the physiotherapist performed a detailed anamnesis with functional tests and physical examination; from this, the therapeutic plans were elaborated. The patients performed strength training with halter and elastic band, active and passive muscle stretching, and aerobic exercise through aisle walk or low to moderate intensity cycle ergometer. In cases of thrombocytopenia, the exercises were assisted active or passive mobilization. Respiratory management consisted of ventilatory patterns, pulmonary re-expansion, and bronchial hygiene techniques. On average, the physiotherapy sessions lasted from 20 to 30 minutes and were performed once a day. Patients were stratified according to the number of sessions performed. Group 1 included those who performed ≤5 sessions and group 2 those who performed ≥6 sessions.

This study was approved by the Research Ethics Committee of the University of Passo Fundo (UPF) under number 2.572.490, respecting the Resolution 466/2012 of the National Health Council. All participants signed the Free and Informed Consent Term (FICT).

Statistical analysis

Descriptive statistics were performed with mean and standard deviation for quantitative variables and absolute and relative frequencies for categorical variables. The Kolmogorov-Smirnov test was used to analyze the distribution of data. Comparisons
Effects of exercises on pain and functional capacity in hospitalized cancer patients


between pre- and post-intervention values were analyzed by the Wilcoxon test. Categorical variables were analyzed by the Chi-square test. The correlation between the VNS and the McGill questionnaire was performed by the Spearman test after the calculation of the deltas of variation (post-intervention – pre-intervention). Values of p≤0.05 were considered significant.

RESULTS

Forty patients were assessed, most of them male 25 (62.5%) and with a mean age of 51.93±18.35 years old. Solid tumors prevailed in 21 (52.5%) patients, as described in table 1.

Table 2 shows the assessments of VNS, McGill, ECOG, and the sit-to-stand test pre and post-intervention physiotherapy. In the group with ≥ 6 physiotherapy sessions, the instruments that assessed pain, VNS and Total McGill, showed a significant decrease in scores (p=0.04 and p=0.03) in the post-intervention period, respectively. The Sensitive and Mixed sub-items of the McGill questionnaire showed a significant decrease in scores (p=0.02; p=0.05) in the post-intervention period, respectively. No significant differences were found in the sit-up test and the ECOG functional capacity scale.

Table 3 shows the use of pain-reducing drugs during hospitalization, classified as non-opioids, opioids, and absence of pain drugs. There were no significant differences between groups stratified by the number of physiotherapy sessions. This result suggests that the reduction in pain scores is related to physiotherapy intervention when ≥ 6 sessions.

There was a significant correlation (r=0.81; p<0.001) between pain reduction measured by VNS and pain reduction measured by the McGill Total questionnaire. Both instruments were able to measure the reduction of cancer pain in patients undergoing physiotherapy.

Table 1. Sample characteristic (n=40)

<table>
<thead>
<tr>
<th>Variables</th>
<th>n (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years old) (mean ± SD)</td>
<td>51.9±18.3</td>
<td></td>
</tr>
<tr>
<td>Length of stay (days) (mean ± SD)</td>
<td>10.3±7.6</td>
<td></td>
</tr>
<tr>
<td>Nutritional classification (BMI kg/m²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low weight</td>
<td>22 (55)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Eutrophic</td>
<td>15 (37.5)</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>2 (5)</td>
<td></td>
</tr>
<tr>
<td>Obesity</td>
<td>1 (2.5)</td>
<td></td>
</tr>
<tr>
<td>Cancer types</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid tumors</td>
<td>21 (52.5)</td>
<td></td>
</tr>
<tr>
<td>Hematologic tumors</td>
<td>19 (47.5)</td>
<td>0.75</td>
</tr>
<tr>
<td>Radiotherapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palliative</td>
<td>6 (15)</td>
<td></td>
</tr>
<tr>
<td>Healing</td>
<td>4 (10)</td>
<td></td>
</tr>
<tr>
<td>Adjuvant</td>
<td>2 (5)</td>
<td></td>
</tr>
<tr>
<td>Did not perform</td>
<td>28 (70)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palliative</td>
<td>28 (70)</td>
<td></td>
</tr>
<tr>
<td>Adjuvant</td>
<td>5 (12.5)</td>
<td></td>
</tr>
<tr>
<td>Healing</td>
<td>5 (12.5)</td>
<td></td>
</tr>
<tr>
<td>Did not perform</td>
<td>2 (5)</td>
<td>0.001*</td>
</tr>
<tr>
<td>IPAQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary</td>
<td>26 (65)</td>
<td></td>
</tr>
<tr>
<td>Irregularly active</td>
<td>5 (12.5)</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>9 (22.5)</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

IPAQ = International Physical Activity Questionnaire; SD = standard deviation; BMI = body mass index; variables expressed as absolute and relative frequency.
*Chi-square test p<0.05.

Table 2. Pain assessments, Eastern Cooperative Oncology Group, and sit-to-stand test pre and post-intervention physiotherapy

<table>
<thead>
<tr>
<th>Group 1 (n=25) ≤5 physiotherapy sessions</th>
<th>Group 2 (n=15) ≥6 physiotherapy sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>VNS</td>
<td>1.52±2.8</td>
</tr>
<tr>
<td>McGill total</td>
<td>7.5±12.6</td>
</tr>
<tr>
<td>Affective</td>
<td>1.2±2.9</td>
</tr>
<tr>
<td>Evaluative</td>
<td>0.68±1.3</td>
</tr>
<tr>
<td>Sensitive</td>
<td>4.76±7.9</td>
</tr>
<tr>
<td>Mixed</td>
<td>1.2±2.4</td>
</tr>
<tr>
<td>ECOG</td>
<td>1.3±0.9</td>
</tr>
<tr>
<td>STS</td>
<td>11.6±4.5</td>
</tr>
</tbody>
</table>

VNS = verbal numeric scale; STS = 30-second sit-to-stand test; ECOG = Eastern Cooperative Oncology Group. Variables expressed as mean and standard deviation.
* p≤0.05, Wilcoxon test.

Table 3. Pain control drugs prescribed during hospitalization, stratified by the number of physiotherapy sessions

<table>
<thead>
<tr>
<th>Group 1 (n=25) ≤5 physiotherapy sessions</th>
<th>Group 2 (n=15) ≥6 physiotherapy sessions</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non opioids</td>
<td>18 (72%)</td>
<td>13 (86.7%)</td>
</tr>
<tr>
<td>Opioids</td>
<td>6 (24%)</td>
<td>1 (6.7%)</td>
</tr>
<tr>
<td>Absence of pain drugs</td>
<td>1 (4%)</td>
<td>1 (6.7%)</td>
</tr>
</tbody>
</table>

*Chi-square test.
DISCUSSION

The results showed that physiotherapy with an emphasis on kinesiotherapy reduced cancer pain in hospitalized patients. The VNS and McGill questionnaire showed decreased pain in patients who had at least six physiotherapy sessions. In addition, a strong association was found between the two pain assessment instruments post-intervention physiotherapy. Corroborating this study, Rett et al.17 reported that kinesiotherapy effectively contributed to the reduction of upper limb pain in a breast cancer patient. These authors showed that pain reduction occurred after the 10th session of physiotherapy27. Physiotherapy in palliative care patients can be performed using manual distraction techniques, massage, and relaxation techniques18. A study by Reis et al.19, consisting of aerobic, resistance, and flexibility exercises, was able to reduce pain intensity in patients undergoing cancer treatment. Studies suggest that physical exercises may modulate the endogenous pain inhibition system6. In patients with advanced cancer, analgesia produced by six physiotherapy sessions including massage, mobilization, and kinesiotherapy techniques was reported by López-Sendin et al.20, corroborating these results.

Although pain is a subjective and particular sensation of each patient, appropriate methods should be adopted for pain assessment in cancer patients. The McGill’s questionnaire assesses pain in the multidimensional form with a general score or in sensitive, affective, evaluative, and mixed dimensions21. The McGill provides comprehensive data that can identify the physical, psychological, or behavioral aspects of pain6. On the other hand, the VNS is a unidimensional scale that measures pain intensity, widely used due to its rapid comprehension22.

In this study, there was a prevalence of physical inactivity, corroborating the results found by Rogers et al.23, who assessed the level of physical activity in 483 patients with breast cancer. The present sample presented suboptimal body weight in 55% of patients, BMI ≤22kg/m² in the elderly or <18.5kg/m² in adults under 60 years old. According to a study that assessed the nutritional status of 96 cancer patients, there was a predominance of malnutrition in this population24, corroborating these results.

Low weight is usually associated with progressive loss of body mass, functional impairment, and chemotherapy treatment24. Two studies25,26 characterized the clinical profiles of cancer patients, demonstrating male prevalence, diagnosis of solid tumors, undergoing treatment with palliative chemotherapy, presenting pain as the most common sign and symptoms, results that corroborate this study.

A randomized clinical trial assessed the effects of aerobic training associated with muscle strengthening in patients with lung cancer undergoing chemotherapy27. The authors reported reduced cancer-related fatigue and improved functional independence of activities of daily living, as measured by the Barthel Index, after the supervised exercise program27. The studies by Pereira, Santos and Sarges15 and Mangia et al.10 reported that the functional capacity assessed by the ECOG questionnaire and the STS can contribute to the elaboration of care plans for the oncologic patient care, being that by identifying the functionality, measures are taken to prevent or reduce functional impairment and the risk of complications. However, in this study, no significant changes in functional capacity were observed after the physiotherapy intervention.

CONCLUSION

The physiotherapy program with a minimum of six sessions and an emphasis on kinesiotherapy promoted the reduction of cancer pain in hospitalized patients. In the McGill questionnaire, the frequency of sensitive and mixed descriptors decreased after the physiotherapy intervention.

REFERENCES


Coping strategies in patients with neuropathic pain

Estratégias de enfrentamento em pacientes com dor neuropática

Thainá de Oliveira Laluce1, Claudia Maria de Luca Colturato Dalul2, Marielza Regina Ismael Martins3, Rita de Cassia Helu Mendonça Ribeiro4, Flavia Cesarino de Almeida5, Claudia Bernardi Cesarino4

ABSTRACT

BACKGROUND AND OBJECTIVES: Chronic neuropathic pain has a multifactorial origin and several coping strategies. The objective of this study was to identify, analyze the different coping strategies for chronic neuropathic pain, relate them with sociodemographic characteristics, pain intensity, and alexithymia.

METHODS: A descriptive and cross-sectional study involving 61 patients with neuropathic pain who attended the Pain Clinic from August to December 2017. The instruments used to collect the data of patients with neuropathic pain were a semi-structured interview, the Douleur Neuropathique 4 Questions questionnaire, the Alexithymia Scale, and the Problems Coping Mode Scale.

RESULTS: Of the 61 patients with neuropathic pain, the majority were female, with a mean age of 50.67±13.12 years, low schooling, with a spouse, with diseases as the leading cause of pain, positive attitudes to cope with neuropathic pain despite the physical problems such as major changes after pain.

CONCLUSION: The results of the present study allowed us to conclude that the coping strategies of patients with neuropathic pain, according to the application of the Alexithymia Scale and the Problems Coping Mode Scale, that the highest scores were in religious practices, social support and focus on the problem. The alexithymia of this group was higher, especially in the subgroup of men with chronic neuropathic pain.

Keywords: Chronic pain, Coping, Coping strategies, Pain.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor crônica neuropática tem origem multifatorial e apresenta diversas estratégias de enfrentamento. O objetivo deste estudo foi identificar, analisar as diversas estratégias de enfrentamento de dor crônica neuropática, relacioná-las com as características sociodemográficas, a intensidade de dor e a alexitimia.

MÉTODOS: Estudo descritivo e transversal em que participaram 61 pacientes com dor neuropática que foram atendidos na Clínica da Dor no período de agosto a dezembro de 2017. Para a coleta de dados dos pacientes com dor neuropática foram utilizados os instrumentos: entrevista semiestruturada, o questionário sobre dor neuropática Douleur Neuropathique 4 Questions, a Escala de Alexitimia e a Escala Modos de Enfrentamento de Problemas.

RESULTADOS: Dos 61 pacientes com dor neuropática, a maioria era mulher, com idade média de 50,67±13,12 anos, baixa escolaridade, com companheiro, doenças como a causa principal da dor, atitudes positivas no enfrentamento da dor neuropática apesar dos problemas físicos como as principais mudanças após a dor.

CONCLUSÃO: Os resultados do presente estudo permitiram concluir que as estratégias de enfrentamento dos pacientes com dor neuropática, de acordo com a aplicação da Escala de Alexitimia e a Escala Modos de Enfrentamento de Problemas, que os maiores escores foram nas práticas religiosas, suporte social e focalização no problema. A alexitimia deste grupo foi maior, especialmente no subgrupo dos homens com dor neuropática crônica.

Descritores: Dor, Dor crônica, Enfrentamento, Estratégias de enfrentamento.

INTRODUCTION

Pain causes negative impacts on an individual’s life, making it one of the biggest challenges for healthcare professionals. According to the International Association for the Study of Pain (IASP), pain is defined as an unpleasant sensory or emotional experience associated with actual or potential tissue injury1. Pain is classified into two types: acute, which arises from an injury or threat to non-neural tissue. It is usually caused by inflammation, infection, injury, among others; and chronic pain (CP) lasting more than three months or persisting after the usual healing time and not responding to common treatments2. CP can be subdivided into nociceptive, chronic neuropathic pain (CNP), and mixed chronic pain. Nociceptive pain occurs through physiological activation of pain receptors and is related to injury to bone, muscle, or ligament tissues. It commonly responds well to symptomatic treatment with analgesics or non-
steroidal anti-inflammatory drugs (NSAIDs). CNP is caused by an injury or disease of the somatosensory system and affects 7 to 10% of the population. In the treatment of CNP, the challenge happens when the therapies do not have the expected effect, and there is psychological distress caused by the dissatisfaction of the therapeutic plan, leading the individual to look for pharmacological strategies that generate greater financial expense, which may lead to future hospitalization.

In this context, when it comes to pain, there are many variables to consider. However, it is noted in the national and international literature difficulties in the use of the instruments for the assessment of CNP, as well as the comparison of which treatment method is the most appropriate.

Pain is a problem that permeates health services and is an important factor that can impact the patient’s ability to go to a health referral center. According to the World Health Organization (WHO), Noncommunicable diseases (NCDs) are the leading causes of mortality and disability in Brazil, impacting the patient, family, health services and the economy due to absence and early retirement.

One of the major agents of NCDs is CP, which is present in patients with type 2 diabetes mellitus, cancer, traumatic injuries, and previous strokes. Failure to treat CNP with conventional drugs has a longer duration, and often this pain becomes a disease of its own. These individuals, together with professionals, seek various ways to reduce pain.

Given this situation, this study aimed to identify and analyze the various forms of coping strategies for CNP, relating them to sociodemographic characteristics, pain intensity, and alexithymia.

METHODS

A descriptive, cross-sectional study with a quantitative approach, conducted at the Pain Outpatient Clinic of the Regional Medical School Foundation of São José do Rio Preto. Sixty-one patients with a medical diagnosis of CNP who attended the Pain Clinic from August to December 2017 participated in this study. When assessing the frequency list of patients with NCD at the Pain Clinic of the last four months, a monthly average of 26 people was obtained. For the sample calculation, the parameters used were 95% confidence level, 8% error, and 10% expected prevalence. Participants were selected by simple random sampling, resulting in 61 patients.

Four data collection instruments were used: the semi-structured interview (sociodemographic and clinical data); the Douleur Neuropathique 4 Questions (DN4) questionnaire (DN screening); the Alexithymia Scale (TAS) (measures difficulties to identify and describe feelings); and the Modes of Coping with Problems Scale (EMEP) (analyzes coping strategies).

The DN4 pain questionnaire, originally in French, was duly translated and validated into Portuguese and used to identify patients with non-neuropathic and neuropathic pain. The questionnaire consists of 10 items subdivided into two parts: sensory descriptors (seven items) and signs related to the sensory examination (three items). The presence of DN was considered the dependent and necessary variable to reach a score of at least 4 out of 10, while non-neuropathic pain had scores lower than 4 out of 10.

The TAS is a 26-item self-report instrument designed to measure the degree of alexithymia. The items are answered on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Total scores range from 26 to 130, and in international research, for scores above 74 (inclusive) the subject is considered alexithymic, and under 62 (inclusive) is considered non-alexithymic. For intermediate values, (between 63 and 73) nothing can be said.

The coping strategies used in the face of a general stressor event or a health-related stressor event can be measured using the EMEP, adapted to the Brazilian population by Seidl, Tróccoli and Zannon. It consists of 45 objective questions, 18 problem-focused, 15 emotion-focused, seven seeking religious practice/unrealistic thinking, and five seeking social support. At the end of the scale, there was also a subjective question, aimed at identifying some other coping strategy that was not included in the previous questions. Answers were rated according to the five-point Likert scale: 1- I never do it; 2- I rarely do it; 3- I do it sometimes; 4- I often do it, and 5- I always do it, higher scores indicated greater use of coping strategy. The items are divided into four factors: factor 1: problem-focused coping; factor 2: emotion-focused coping; factor 3: coping centered on the pursuit of religious practices and unrealistic thinking; factor 4: coping based on the search for social support.

The Research Ethics Committee of the Medicine School of São José do Rio Preto (FAMERP) approved this study under CAAE: 62298816.0.0000.5415. All participants signed the Free and Informed Consent Term (FICT).

Statistical analysis

Data were transferred to a spreadsheet using the Microsoft Excel program, and statistical analysis was performed using analysis of variance (ANOVA) and Tukey multiple comparison tests. The significance level of p<0.05 was adopted for the obtained results.

RESULTS

Table 1 shows the percentage of the sociodemographic and clinical characterization variables of the 61 patients with CNP assessed in the study, in which most of the patients were female (35; 57.38%), with elementary school (36; 59.02 %), with a partner (37; 61.67%), had the disease as the cause of pain (24; 39.34%), reporting physical problems as the main changes after pain (35; 57.38%) and positive attitude towards neuropathic pain (42; 68.85%).

The mean age of the patients assessed was 50.67±13.12 years old, and a median of 51.00 years old. The coefficient of variation (CV) of this distribution was 25.9%. The minimum age observed was 21.0 years old, and the maximum was 74.0 years old. All patients had DN confirmed by the DN4 when considering the aspects involved in this questionnaire. Pain intensity was 5.1±1.2, and the most prevalent sensory descriptors were tin-
gling (52%) and burning (28%). Regarding the physical signs related to sensitivity, hypoesthesia to the touch was the predominant one (62%).

Regarding the age group (p=0.049) and the way patients deal with pain (p=0.007), there were significant differences in DN scores. Regarding the age group, patients aged up to 59 years old had significantly higher DN scores compared to patients aged 60 years old or older, that is, the DN score was higher for adults when compared to the elderly. Regarding patients’ attitude towards pain, patients with negative attitudes had a significantly higher DN score than patients with positive attitudes toward pain.

According to the TAS, on average, patients were alexithymic, because the average score was over 74 points, showing that patients with CNP have significant difficulties in expressing their emotions, feelings, and body sensations. There were significant differences regarding gender (p=0.034) and changes after pain (p=0.040). The men’s average alexithymia score was significantly higher than the women’s score, and physical problems were responsible for determining higher alexithymia in patients with CNP (Table 2).

The results of the application of EMEP for CNP patients had factor 2 (focusing on emotion) as the lowest score when compared to the other factors, assuming that CNP patients do not focus so much on emotion to overcome the pain problem (Table 3).

### Table 1. Percentage of sociodemographic and clinical characterization variables of patients with neuropathic pain in the Clinic of Pain. São José do Rio Preto/SP, 2017

<table>
<thead>
<tr>
<th>Variables</th>
<th>Patients with neuropathic pain (n=61)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>35</td>
<td>57.38</td>
</tr>
<tr>
<td>Male</td>
<td>26</td>
<td>42.62</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary school</td>
<td>36</td>
<td>59.02</td>
</tr>
<tr>
<td>High school</td>
<td>15</td>
<td>24.59</td>
</tr>
<tr>
<td>Higher education</td>
<td>10</td>
<td>16.39</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With partner</td>
<td>37</td>
<td>61.67</td>
</tr>
<tr>
<td>Without partner</td>
<td>23</td>
<td>38.33</td>
</tr>
<tr>
<td>Cause of pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accident</td>
<td>16</td>
<td>26.23</td>
</tr>
<tr>
<td>Diseases</td>
<td>24</td>
<td>39.34</td>
</tr>
<tr>
<td>Others</td>
<td>16</td>
<td>26.23</td>
</tr>
<tr>
<td>Do not know</td>
<td>5</td>
<td>8.20</td>
</tr>
<tr>
<td>Changes after pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional problems</td>
<td>26</td>
<td>42.62</td>
</tr>
<tr>
<td>Physical problems</td>
<td>35</td>
<td>57.38</td>
</tr>
<tr>
<td>How do you deal with the pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative attitude</td>
<td>19</td>
<td>31.15</td>
</tr>
<tr>
<td>Positive attitude</td>
<td>42</td>
<td>68.85</td>
</tr>
</tbody>
</table>

### Table 2. Descriptive statistics of alexithymia scores for patients with neuropathic pain

<table>
<thead>
<tr>
<th>Descriptive statistics</th>
<th>n</th>
<th>Mean±SD</th>
<th>Median</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexithymia (general)</td>
<td>61</td>
<td>77.89±9.41</td>
<td>80.00</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>35</td>
<td>75.86±11.05</td>
<td>79.00</td>
<td>0.034¹</td>
</tr>
<tr>
<td>Male</td>
<td>26</td>
<td>80.62±5.73</td>
<td>82.50</td>
<td></td>
</tr>
<tr>
<td>Age group (years old)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 59</td>
<td>44</td>
<td>78.50±9.02</td>
<td>81.50</td>
<td>0.451¹</td>
</tr>
<tr>
<td>60 or more</td>
<td>17</td>
<td>76.29±10.49</td>
<td>79.00</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With partner</td>
<td>38</td>
<td>79.00±8.65</td>
<td>81.00</td>
<td>0.262¹</td>
</tr>
<tr>
<td>Without partner</td>
<td>23</td>
<td>76.04±10.49</td>
<td>78.00</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary school</td>
<td>36</td>
<td>79.25±7.13</td>
<td>80.00</td>
<td>0.061²</td>
</tr>
<tr>
<td>High school</td>
<td>15</td>
<td>78.87±10.59</td>
<td>82.00</td>
<td></td>
</tr>
<tr>
<td>Higher education</td>
<td>10</td>
<td>71.50±12.81</td>
<td>73.00</td>
<td></td>
</tr>
<tr>
<td>Cause of pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accident</td>
<td>16</td>
<td>79.75±10.91</td>
<td>82.50</td>
<td>0.511²</td>
</tr>
<tr>
<td>Disease</td>
<td>24</td>
<td>77.88±7.58</td>
<td>77.50</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>16</td>
<td>80.60±4.45</td>
<td>80.00</td>
<td></td>
</tr>
<tr>
<td>Do not know</td>
<td>5</td>
<td>75.19±11.30</td>
<td>78.00</td>
<td></td>
</tr>
<tr>
<td>Changes after pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional problems</td>
<td>26</td>
<td>74.81±11.36</td>
<td>78.00</td>
<td>0.040¹</td>
</tr>
<tr>
<td>Physical problems</td>
<td>35</td>
<td>80.17±6.99</td>
<td>82.00</td>
<td></td>
</tr>
<tr>
<td>How do you deal with the pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative attitude</td>
<td>19</td>
<td>76.42±11.90</td>
<td>81.00</td>
<td>0.486¹</td>
</tr>
<tr>
<td>Positive attitude</td>
<td>42</td>
<td>78.55±8.12</td>
<td>79.50</td>
<td></td>
</tr>
</tbody>
</table>

¹p-value for t-test for independent samples at p<0.05; ²p-value referring to the Analysis of Variance (ANOVA) test at p<0.05.

### Table 3. Descriptive statistics of EMEP scores in patients with neuropathic pain. São José do Rio Preto/SP, 2017

<table>
<thead>
<tr>
<th>Factors</th>
<th>n</th>
<th>Mean±standard deviation²</th>
<th>Median</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focusing on problem</td>
<td>61</td>
<td>3.34±0.58 a</td>
<td>3.38</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Focusing on emotion</td>
<td>61</td>
<td>2.75±0.71 b</td>
<td>2.73</td>
<td></td>
</tr>
<tr>
<td>Religious practices</td>
<td>61</td>
<td>3.45±0.75 a</td>
<td>3.57</td>
<td></td>
</tr>
<tr>
<td>Social support</td>
<td>61</td>
<td>3.15±3.40 a</td>
<td>3.40</td>
<td></td>
</tr>
</tbody>
</table>

¹p-value referring to the Analysis of Variance (ANOVA) test at p<0.05. ²Different letters in the same column differ from each other by Tukey’s multiple comparison test at p<0.05.

As only factor 2 presented a significant difference, the score of this factor was assessed according to the sample characterization variables (Table 4). According to factor 2 analysis in relation to the characterization variables, there were no cases of significant differences, assuming that the assessed variables did not influence the focusing of emotion to deal with neuropathic pain.
two institutions in the city of São Paulo, where most were male, aged between 30 and 39 years old. This study observed results similar to the findings of this study in which the patients assessed with CNP did not have significant differences regarding marital status, education, gender, cause of pain, and changes after pain.

Regarding the age group, this study found that young people and adults had higher CNP scores when related to the elderly, who have a better attitude towards pain, possibly because they believe this symptom is natural to the physiological process of aging and associated chronic comorbidities. Thus, it is more challenging to obtain real results when this item is assessed, which may generate erroneous results, and hinder an adequate therapeutic approach.

In a study conducted with patients from Canada, Denmark, India, and Taiwan, it was observed that individuals who had more significant depression and catastrophization had greater intensity of pain and comorbidities, corroborating the results found in this study, in which individuals who tend to think negatively experience greater pain intensity, thus helping the development of depression and anxiety.

This study observed that most men with CNP had alexithymia; that is, they may have greater difficulty in communicating their body emotions and feelings to others when compared to women. Regarding changes after pain, physical problems were statistically relevant when compared to emotional ones. Given this, alexithymia was significantly related to factor 3, which are religious practices/unrealistic thinking. The results of this study disagree with research on chronic renal patients undergoing hemodialysis, who had no alexithymia, which may be justified by the continuous psychological support during their treatment.

In the case of alexithymia, a higher prevalence was observed in males. Corroborating the present results, a research was conducted at the University of Porto, in Portugal, which found higher scores in men with greater difficulty in describing feelings, highlighting the Normative Male Alexithymic Theory. This theory holds that men in their childhood are discouraged from expressing and talking about their feelings and emotions. Thus, a higher score for physical changes after the pain is noted in these patients, affiriming man’s social creation process.

Many have a psychosocial impairment, and through spirituality, they can have positive thoughts and feelings, more easily cope with difficult situations and a better look at everyday situations.

Longitudinal research on pain coping strategies in patients during the first year after spinal cord injury found that psychosocial factors and pain coping strategies correlated with pain intensity and discomfort, that is, pain disrupts their life and has negative impact.

Emotion-focused coping refers to people’s attempt to regulate the emotional response that has been generated by the stressful pain situation and is often used when a problem is uncontrollable, and some behavioral or cognitive strategies can be used such as excessive alcohol use, tobacco, drugs, excessive

### Table 4. Descriptive statistics of factor 2 scores (focusing on emotion) according to EMEP for patients with neuropathic pain. São José do Rio Preto/SP, 2017

<table>
<thead>
<tr>
<th>n</th>
<th>Mean±SD</th>
<th>Median</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>35</td>
<td>2.76±0.71</td>
<td>2.73</td>
</tr>
<tr>
<td>Male</td>
<td>26</td>
<td>2.72±0.72</td>
<td>2.73</td>
</tr>
<tr>
<td>Age group (years old)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 59</td>
<td>44</td>
<td>2.84±0.67</td>
<td>2.80</td>
</tr>
<tr>
<td>60 or more</td>
<td>17</td>
<td>2.50±0.76</td>
<td>2.46</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With partner</td>
<td>38</td>
<td>2.88±0.69</td>
<td>2.86</td>
</tr>
<tr>
<td>Without partner</td>
<td>23</td>
<td>2.52±0.69</td>
<td>2.53</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary school</td>
<td>36</td>
<td>2.76±0.75</td>
<td>2.73</td>
</tr>
<tr>
<td>High school</td>
<td>15</td>
<td>2.84±0.76</td>
<td>2.73</td>
</tr>
<tr>
<td>Higher education</td>
<td>10</td>
<td>2.55±0.49</td>
<td>2.60</td>
</tr>
<tr>
<td>Cause of pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accident</td>
<td>16</td>
<td>2.94±0.61</td>
<td>2.80</td>
</tr>
<tr>
<td>Disease</td>
<td>24</td>
<td>2.65±0.79</td>
<td>2.73</td>
</tr>
<tr>
<td>Others</td>
<td>16</td>
<td>2.56±0.61</td>
<td>2.60</td>
</tr>
<tr>
<td>Do not know</td>
<td>5</td>
<td>3.21±0.76</td>
<td>3.46</td>
</tr>
<tr>
<td>Changes after pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional problems</td>
<td>26</td>
<td>2.83±0.67</td>
<td>2.86</td>
</tr>
<tr>
<td>Physical problems</td>
<td>35</td>
<td>2.68±0.74</td>
<td>2.66</td>
</tr>
<tr>
<td>How do you deal with the pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative attitude</td>
<td>19</td>
<td>2.66±0.81</td>
<td>2.66</td>
</tr>
<tr>
<td>Positive attitude</td>
<td>42</td>
<td>2.78±0.66</td>
<td>2.73</td>
</tr>
</tbody>
</table>

1p-value referring to t-test for independent samples at p<0.05. 2p-value referring to the Analysis of Variance (ANOVA) test at p<0.05.

### DISCUSSION

Of the 61 patients with CNP, most had low education, lived with a partner, diseases as the main cause of pain, coping with CNP positive attitudes, despite physical problems as the main changes after pain. Another point observed is that most were female. This finding is in line with other studies, where the majority affected by CP were women compared to men. In addition, females were more frequent in absences and medical seeking. In this study, the mean age was 50.67±13.12 years old. The population of the institute who reported suffering from CP had a median of 35.5 years old, showing that CP is increasingly affecting the young adult population.

When the variables were crossed, no significant differences were observed regarding the coping of these patients regarding gender, marital status, education, cause of pain, and changes after pain.

Nevertheless, there was a statistically significant difference regarding age and the way to deal with pain. These results differ from the results of the study that assessed the patients with CNP due to traumatic spinal cord injury, performed in
physical exercise, escape, problem minimization, distancing and selective attention. In this study, the application of EMEP in the 61 patients with CNP obtained the highest scores on religious practices, social support, and focusing on the problem. Regarding religious practices, the results are in agreement with a study that observed that the incorporation of spirituality has relevance and recognition as an indicator of health, in the search for the promotion of comprehensive care and for portraying the already known profile of Brazilians related to religiosity. Similar results were also found in research on coping with pain, in which religiosity and spirituality were associated with the control of stress involved in the pain process.

Social support had the second-highest score by patients with CNP and indicated the search for support in the health system, highlighting the importance of quality and availability of the health sector to help such patients. A review study of the psychosocial, intrapsychic, psychiatric, and psychobehavioral factors that influence the nature, severity, and persistence of the neuropathic pain found that social support is an important component to control and manage the active participation of patients in their healthcare in relation to pain.

Focusing on the problem was the third-highest score, and this factor indicates the portion of the rationality of patients who focus on understanding the problem. A literature review study highlights that CNP is a serious world public health problem, being considered a chronic disease whose management in the control of CNP is still inadequate. In contrast, the factor of focusing on emotion was the one with the lowest score, assuming that patients with CNP do not use emotion to overcome the pain problem, and this factor was the only one that showed a significant difference, having been assessed according to sample characterization variables.

It can be said that these are practices with a great cultural focus, corroborating the books and research by David Le Breton, a French anthropologist, and sociologist who devoted a portion of his studies to pain. He concluded that the pain is intimate with each other, but its basis is usually in culture, society, relationships, and education, and thus the social bond. It is therefore present, both in body expression and in the impression that each individual has. Some researchers point out that the most commonly used strategy for coping with CD is a religious activity, and stress can be controlled by acting on the hypothalamus-pituitary-adrenocortical. Improvement in mental health indicators is also proven, as well as better adaptation to stress and greater encouragement in daily life with religious practice. However, the physiological effect of religious practices on their physical symptoms in pain control has not been proven. Regarding CP, another study conducted with 281 patients observed an association between pain coping strategies and mood measures in relation to health functioning.

There is a search for psychoeducational programs coordinated by psychologists through texts, lectures, demonstrations, training, relaxation techniques, problem-solving, encouraging, and creating pain-coping strategy. Thus, health professionals need to develop care holistically, valuing not only the religiosity but also the spirituality of the patient, regardless of creed or religious beliefs, thus contributing to their well-being, coping with the disease and improving the quality of life.

**CONCLUSION**

This research found a relationship between alexithymia and chronic neuropathic pain. The prevalence of this phenomenon was higher among men. What is the nature of this complex relationship, how the predisposing and triggering factors of the alexithymia phenomenon would act are questions that need further investigation. The highest coping strategies scores for patients with chronic neuropathic pain, according to the application of EMEP, were religious practices, social support, and focusing on the problem. Thus, it can be concluded that these factors are important in terms of this clash between the body and mind, helping in the process of higher physical and mental quality of life.

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BrJP. São Paulo, 2019 jul-sep;2(3):260-6


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Proposal of the instrument work-related musculoskeletal disorders index
Proposta do instrumento índice de distúrbios osteomusculares relacionados ao trabalho
Paulo Wenderson Teixeira Moraes¹, Antonio Virgílio Bittencourt Bastos²

ABSTRACT

BACKGROUND AND OBJECTIVES: The measurement of pain and discomfort from work-related musculoskeletal disorders is a conceptual and empirical challenge, considering the cognitive and subjective processes involved in the evaluation of somatic symptoms. The objective of this study was to construct a work-related musculoskeletal disorders index to evaluate musculoskeletal discomfort in workers with and without repetitive strain injuries/work-related musculoskeletal disorders, a syndrome that affects thousands of workers every year.

METHODS: The sample was composed of 182 bank clerks from the State of Bahia, 91 of whom were diagnosed with the syndrome.

RESULTS: The work-related musculoskeletal disorders index had a frequency distribution similar to the normal curve, with averages of 7.1 and 4.1 for the groups with and without a diagnosis, respectively.

CONCLUSION: In addition to the adequate psychometric properties, the proposed index was able to differentiate, satisfactorily, workers with and without a diagnosis of repetitive strain injuries/work-related musculoskeletal disorders.

Keywords: Pain, Pain measurement, Repetitive strain injuries, Work-related musculoskeletal disorders.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A mensuração da dor e do desconforto oriundos de distúrbios osteomusculares relacionados ao trabalho é um desafio conceitual e empírico, tendo em vista os processos cognitivos e subjetivos envolvidos na avaliação de sintomas somáticos. O objetivo deste estudo foi construir um índice de distúrbios osteomusculares relacionados ao trabalho para avaliar o desconforto osteomuscular entre trabalhadores com e sem lesões por esforço repetitivo/distúrbios osteomusculares relacionados com o trabalho, uma síndrome que acomete milhares de trabalhadores todo o ano.

MÉTODOS: Participaram da amostra 182 bancários do Estado da Bahia, sendo que 91 deles tinham o diagnóstico da síndrome.

RESULTADOS: O índice de distúrbios osteomusculares relacionados ao trabalho apresentou distribuição de frequência semelhante à da curva normal, com médias de 7,1 e 4,1 para os grupos com e sem diagnóstico, respectivamente.

CONCLUSÃO: Além das propriedades psicométricas adequadas, o índice proposto se mostrou capaz de diferenciar, satisfatoriamente, trabalhadores com e sem diagnóstico de lesões por esforço repetitivo.

Descritores: Distúrbios osteomusculares associados ao trabalho, Dor, Lesões por esforço repetitivo, Mensuração da dor.

INTRODUCTION

Repetitive strain injuries or work-related musculoskeletal disorders (RSI/WRMD) is a syndrome that has become the subject of worldwide debate, impacting the workers’ psychological distress and generating billionaire losses to society, according to literature reviews in the area¹⁻³. The term RSI, however, is not yet consolidated as a scientific concept and is not cited in the International Classification of Diseases (ICD-10), although it presents itself as a notion widely used in the daily lives of many workers and has a significant effect on the description of musculoskeletal symptoms⁴⁻⁸. Pain is included in the International Classification of Functioning, Disability and Health (ICF)⁹ under code b280-b289, and pain sensation is defined as an unpleasant feeling, indicating an actual or potential injury to a body structure and is generally classified as acute or chronic¹⁰⁻¹². Chronic pain, typical of musculoskeletal disorders, is the focal element in a “complex network of suffering that involves depression, somatic concern, physical limitation, sleep disorders, and hopelessness”¹³. The US Institute of Medicine has reported that chronic pain affects 100 million adults in the United States, resulting in an estimated cost of USD 635 billion due to spending on medical interventions and the poor productivity of those affected. With this in mind, an agenda was created to prevent the disease and increase research efforts¹⁴.

In this context, what effectively communicates when a person complains of pain? According to Cioffi¹⁵, from the point of view of social cognition, three dimensions stand out in the interpretation of organic stimuli. 1) Somatic stimuli are guided by the
individual’s implicit theories about his physical symptoms, particularly by alleged cause-and-effect relationships between these symptoms and events that could potentially explain them; 2) the implicit theory and processes in which it is formed are greatly affected by the social context of the person; 3) personal, biomechanical, social and organizational factors converge and interact. Given these propositions, what is actually measured in the application of pain assessment instruments? In addition to representing the discomfort in the face of uncomfortable body sensations, the scores, or “degree of pain,” also reflect the implicit theories that individuals have which, in turn, reflect the socio-historical context in which alleged cause-and-effect relationship is constructed, “regarded as shared” by all. What can be said is that the human being, in general, does not have the ability to access the “pain itself,” but only the “pain” phenomenon that is mediated by his cognitive assessment. The meaning of pain is the “epistemological Achilles’ heel” of the various constructs that are used in research and clinical practice, which can generate inaccurate diagnostic processes and support not always effective therapeutic practices.\(^{16,17,19,21}\)

The different pain keywords were analyzed in the construction of the McGill Pain Questionnaire (MPQ)\(^{22,23}\) and provided a fundamental repertoire for the assessment of different types of diseases, including musculoskeletal disorders. With the same objective, Couto\(^{24}\) elaborated the Ergonomics Census to assess RSI/WRMD by selecting the following keywords: tiredness, shocks, pain, cracking, numbness, weight, loss of strength, aching sensation and tingling. These keywords are found in the Norms and Technical Manuals\(^{25}\) and Normative Instruction No. 98\(^{26}\), as a reference for the characterization of the diagnosis, which consists of the usual clinical investigation steps, aiming to verify the existence of one or more of the nosological entities, the etiological factors, and aggravation. Despite this diversity of pain keywords, the most widely used instrument for assessing work-related musculoskeletal symptoms, the Standardized Nordic Questionnaire\(^{27}\), uses only “pain” and “discomfort.” In addition to having the human figure to mark the place of discomfort, there is the following general instruction: “have you had any kind of problem (pain, discomfort) during the last 12 months”? Then, it is asked if the person has avoided doing routine tasks at work or home because of the pain. It is also asked if the person has experienced such problems in the last seven days. A second part of the questionnaire is the detailing of neck and shoulder pain. However, besides few keywords for pain, there is no assessment of the intensity dimension, and the analyzes are made by dichotomous variables, which indicate whether or not the person has a problem in a particular region. Given the “stages of RSI/WRMD” described in the Brazilian technical norms\(^{25,26}\), and the different instruments to assess chronic pain, it is necessary to build an instrument that reflects the fundamental characteristic of RSI/WRMD, which is a chronic pain, but also incorporating the information on the impact on work and daily activities; thus discriminating the different stages of the syndrome and representing the various symptoms complaints. Moreover, for research in this domain, it is very relevant to produce a numerical variable capable of summarizing the information set of each subject about the RSI/WRMD phenomenon, enabling psychometric analysis and empirical testing of explanatory models.

Thus, this article aimed to construct a “musculoskeletal disorder index” (IDORT) to discriminate the chronicity of RSI/WRMD-related symptoms, presenting data for index validation.

**METHODS**

Five expert doctors were asked to assess IDORT (Annex 1) and five people affected by RSI/WRMD syndrome to ascertain clarity and objectivity before applying the instrument on a large scale. Their considerations have been taken into account and corrected in the final version. The instrument is an adaptation of the Ergonomics Census proposed by Couto\(^{24}\) and the Nordic Musculoskeletal Questionnaire (MSQ)\(^{27}\), but which also generated an overall score similar to that proposed in the Neuropathic Pain Symptom Inventory\(^{21}\). The IDORT index serves to measure an individual’s cognitive assessment of discomfort in various areas of his body.

In order to improve pain severity assessment levels, ICF\(^{29}\) model was taken into account, which suggests that the consequences of a person’s pain capacity limitations be assessed from the amplitude of the following interval: “no” problem or “insignificant”, “mild”, “moderate”, “severe” problem and ultimately “totally problematic”.

The first question of IDORT referred to the size of the location of discomfort in the body. Questions 2 and 6 are work-related and signal the influence of work on discomfort. The questions indicating the dimension of discomfort intensity are 4, 7, and 10. The dimension of symptom duration is represented in question 3. Regarding the dimension of pain quality, question 5 represents the pain keywords that best express what the subject feels. Finally, questions 8 and 9 assess the impact of discomfort on other non-work activities and work productivity, respectively. These 10 questions are the items that were analyzed later. From an aggregate measure of the questions of this instrument, the Musculoskeletal Disorders Index, which varies from 0 to 10, was obtained. The calculation of the score is a weighting of the 10 items as follows:

$$\text{IDORT} = \left( \frac{\sum p \cdot 10/8 + (t \cdot 10/30) + (d \cdot 0/6) + (i \cdot 10/6) + (\sum s \cdot 10/9) + (t \cdot 2/30) + (10 - t \cdot q) + (a \cdot 10/6) + (i \cdot 10/6) + (t \cdot 10/6)}{10} \right).$$

Table 1 shows the keywords of the components of the equation. Each of the ten items is represented in the equation in its parenthesis and ranges from zero to 10. The total sum is 100, which was divided by 10 to return to the original scale. The reason there are different multipliers per item is so that all items receive equivalent weights in the equation, even though they have been measured differently.

The sample was exploratory and not random, based on the availability of bank clerks, who were approached in 38 different branches of the state of Bahia, from various public and private banks. Of the 320 subjects who received the questionnaire, only 220 consented to participate in the study and returned it duly completed. Of this total, 182 bank clerks said they had some
musculoskeletal disorder, and 91 also indicated that they were diagnosed with RSI/WRMD by a doctor.

All participants signed the Free Informed Consent Form (FICF). This article is the result of a research project submitted to the UEMS Ethics Committee, registered in this CEP under protocol 045/2011 (CAAE no 0043.059.000-11).

Statistical analysis

A post hoc analysis by the G*Power program revealed that a sample of two groups of 91 individuals has a power (1-β) of more than 95% to find a difference between means of a test applied to such groups if genuinely there is a difference in the population studied. Descriptive analyses of data frequency, variance (ANOVA), and factor analysis were performed. Also, to increase the reliability of the analysis of the factors of the scale, some basic prerequisites had to be checked. With this in mind, when performing the principal component analysis (PCA) of the 10 items of the IDORT, the adequacy measure of the Kaiser-Meyer-Olkin sample was verified, which pointed out excellent adequacy. Bartlett's sphericity test χ²(45) = 727.28, p<0.001, indicated that the correlations between the items were large enough for a PCA. Observing the eigenvalues for each component, three of them obtained eigenvalues above 1, which corresponds to the Kaiser criterion.

RESULTS

The average age of the 182 bank clerks was approximately 41 years old, with a standard deviation of 10 years, with 40% being men. For a more detailed description of demographic data, it was possible to consult previous works on this sample. There are three important prerequisites for using parametric tests that contribute to the reliability of statistical analysis: the variable must have a distribution similar to a normal distribution, the variance must be the same throughout the distribution (homogeneity of variance), and the measurement should be independent among participants. In the case of IDORT, kurtosis and asymmetry were not significantly different from zero, indicating a close to normal distribution. The completion of the questionnaire was individual, and, probably, there was independence of the answers of each participant. Therefore, the IDORT was able to satisfactorily describe the symptoms of RSI/WRMD and effectively discriminate the group diagnosed with RSI/WRMD in relation to those with only musculoskeletal disorders.

By visually analyzing figure 1, a histogram of the frequency distribution of IDORT, a behavior similar to a normally distributed variable with little kurtosis and little asymmetry was observed.

![Figure 1. Histogram of the frequency distribution of the musculoskeletal disorders index](image-url)
Figure 2 shows the means of IDORT by group. Those diagnosed with RSI/WRMD had a much higher mean than those who only had musculoskeletal discomfort (MD), respectively, 7.13 (SD=1.21) and 4.12 (SD=1.17).

Through table 2, it is possible to observe that IDORT is structured based on three factors: 1- scope and intensity of pain; 2- relationship with work; and 3- chronicity of pain. The correlation of each item with its respective factor is significant. The correlation of each item with the other factors proved to be insignificant, except for item Q3. Cronbach’s alpha coefficient was 0.884 for the first factor and 0.701 for the second. Only the third factor obtained an unsatisfactory result of 0.325. Item Q3 showed a significant correlation in both factor 3 and factor 1, indicating that this item has some ambiguity or wider association with pain. Thus, “the time you feel the pain” is also slightly associated with the factor “scope and intensity of pain.”

The variance explained by the first factor was 44.4%, the second factor was 13.2% and the third 10.9%. The three factors combined explained 68.5% of the variance. By the Catell’s scree plot criterion, the inflection points also had three dimensions. To verify the alleged correlation between these three factors, it was decided to perform the oblique rotation of the factors, using the Promax method, with kappa equal to four (4). Table 2 shows that the first factor consists of items related to impact (Q8 and Q9), intensity (Q4 and Q10), location, and type of pain (Q1 and Q5).

Therefore, the impact on daily activities, the number of sites and types of pain merged with the intensity forming the dimension “scope and intensity of pain”. The second dimension was named “relationship with work” and brought together the items “started with current work” (Q2) and “how do you feel increases with work” (Q6). These two items were multiplied by the length of service in the company and, therefore, are closely correlated. This explains the high factorial loads. Finally, the third dimension was “chronicity of pain,” since the two items aggregated in this factor are aspects that describe chronic pain, namely, “time” (Q3) and “does not improve with rest” (Q7). The oblique rotation of the factors proved to be a more appropriate solution, considering that through it was verified and evidenced the significant correlation between the factors.

Table 2. Summary of results of the exploratory factor analysis of musculoskeletal disorders index (n=182)

<table>
<thead>
<tr>
<th>Components</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope and intensity of pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q8 Affects other activities outside of work</td>
<td>.869</td>
<td>-.207</td>
<td>.054</td>
</tr>
<tr>
<td>Q9 Affects productivity</td>
<td>.868</td>
<td>-.053</td>
<td>-.126</td>
</tr>
<tr>
<td>Q10 Has been taking drugs to work</td>
<td>.803</td>
<td>.015</td>
<td>.057</td>
</tr>
<tr>
<td>Q4 Pain intensity</td>
<td>.766</td>
<td>.002</td>
<td>.198</td>
</tr>
<tr>
<td>Q1 No. of body parts</td>
<td>.758</td>
<td>.072</td>
<td>-.054</td>
</tr>
<tr>
<td>Q5 No. of sensations</td>
<td>.749</td>
<td>.138</td>
<td>-.211</td>
</tr>
<tr>
<td>Relationship with work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2 Started at current job*</td>
<td>-.147</td>
<td>.925</td>
<td>.057</td>
</tr>
<tr>
<td>Q6 What you feel increases with work*</td>
<td>.121</td>
<td>.819</td>
<td>-.063</td>
</tr>
<tr>
<td>Chronicity of pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q7 Improves with rest</td>
<td>-.092</td>
<td>-.022</td>
<td>.943</td>
</tr>
<tr>
<td>Q3 Time when you feel discomfort</td>
<td>.393</td>
<td>.163</td>
<td>.403</td>
</tr>
<tr>
<td>Eigenvalues</td>
<td>4.436</td>
<td>1.319</td>
<td>1.100</td>
</tr>
<tr>
<td>% f variance explained</td>
<td>44.4</td>
<td>13.2</td>
<td>10.9</td>
</tr>
<tr>
<td>Cronbach’s Alpha</td>
<td>0.884</td>
<td>0.701</td>
<td>0.325</td>
</tr>
</tbody>
</table>

* multiplied by the length of service
IDORT’s overall Cronbach’s alpha (α) was 0.843. The value of α for the first factor was 0.884, for the second 0.701 and the third 0.325. The item “improvement with rest” (Q7) when removed increases α reliability from 0.843 to 0.861 and its correlation with IDORT was the only correlation of an item with a total score below 0.4. Despite this unfavorable result only for this aspect, the item was maintained because it represents a relevant data of the diagnosis of chronic symptoms and, even with its presence, the global α remained at a very satisfactory level.

**DISCUSSION**

The proposed factors “Scope and intensity of pain”, “Relationship with work”, and “Chronicity of pain” only validated a possibility of describing symptoms related to RSI/WRMD syndrome. Communication of such symptoms is a complex process involving cognitive assessment and cultural context. Objectifying this information is a strategic step in analyzing the relationships of these symptoms to psychosocial factors in large samples. The full meaning of pain communication, however, requires a multidisciplinary effort. The words that are used to characterize feelings and sensations are only the superficial dimension of a more profound phenomenon. From the psychic point of view, there may be pain-latent contents that are revealed only through careful analysis of the subject’s unconscious. In a previous study²⁹, the IDORT showed significant correlations with psychosocial factors such as psychological stress, assessment of reward received, work autonomy and career commitment, demonstrating the feasibility of using the index as an outcome marker in epidemiological studies. This also indicates that IDORT is related to broader phenomena in the world of work that are often revealed by pain.

Regarding psychosocial factors, some suggestions may be useful for future studies. The first relates to the research design that should incorporate the longitudinal aspect, enabling the foundation of causal relationships in the development of symptoms. In addition, longitudinal studies may generate greater consistency in the use of indices for the assessment of treatments and intervention in RSI/WRMD. Also, in professional practice, in the area of occupational health, IDORT can be an indicator to assess the effectiveness of treatments, and it is possible to follow, briefly, the evolution of musculoskeletal symptoms.

Another way to validate an index is to invest in building an item bank and calibrating it through the Item Response Theory. This methodology can positively impact the ability to predict RSI/WRMD cases, as well as assist in understanding the impact of psychosocial factors through the analysis of more complex models, possible in this type of approach.

The analysis of psychometric properties corroborated the validity of the scale in assessing pain dimensions, comparable to other studies in the area¹¹,¹⁷,¹⁸. The self-assessment, made possible by the questionnaire, successfully allowed the discrimination and quantification of the dimensions relevant to the assessment of chronic pain. Comparing with other instruments¹¹, the IDORT obtained a satisfactory psychometric validation, confirming the factors that constitute the scale through the internal consistency of the correlations between the items, but the “intensity” factor was separated from the “dysfunction” factor, in some studies¹⁸,²⁰, while it was combined in another²¹, similar to this work. The time in which pain arose was associated with pain intensity, differing from other research that did not find such association¹¹.

The IDORT instrument, which represents, among other things, musculoskeletal symptoms and signs that indicate one piece of the worker’s health and well-being, was successful in discriminating bank clerks who reported being diagnosed with RSI/WRMD by some doctor, generating a new possibility to assess the characteristic discomfort of this syndrome. Given the conceptual fragility that implies difficulties in diagnosis, the possibility of creating a criterion arising from the chronicity of symptoms can be a useful tool to support the diagnosis.

This research did not rely on the diagnosis of medical experts to confirm the self-report of workers, making the results vulnerable to criticism. However, even not controlling the reliability of the self-report, the results of this work point to the discriminative power that the term RSI/WRMD produced in the studied sample. Although not yet a concept in itself, but only a “notion” that has been strengthened by widespread use by health professionals and society, the term RSI/WRMD characterizes a specific group of people who have more severe musculoskeletal symptoms and have been discriminated by IDORT.

**CONCLUSION**

This study described the development of a new instrument to measure pain in its different dimensions: intensity, relationship with work, and dysfunction. The resulting score synthesized the information of the self-report of the symptoms and proved to be a promising alternative for organizing the dimensions of the phenomenon that are usually assessed separately. In addition to the practicality of the resulting score, IDORT assists in researching the association of RSI/WRMD symptoms with psychosocial work factors.
Annex 1. Work-related Musculoskeletal Disorders Self-Assessment Instrument
Available at https://pospsi.ufba.br/sites/pospsi.ufba.br/files/paulo_wenderson_tese.pdf

This work-related musculoskeletal disorders self-assessment tool consists of objective questions that demand your attention to body perception and the assessment of the impact of work-related musculoskeletal disorders. ALL questions must be answered carefully, avoiding to leave them blank, not to compromise the analysis of the results. It consists of 3 parts:

I. Characterization data;
II RSI/WRMD data;
III Self-assessment of body discomfort symptoms.

We are grateful for your participation and contribution to the advancement of scientific knowledge in the area of occupational health of the worker.

I. Characterization data:

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td>❖ Male ❖ Female</td>
</tr>
<tr>
<td>2. Idade</td>
<td>anos</td>
</tr>
<tr>
<td>3. Marital status</td>
<td>4. Nº de dependentes</td>
</tr>
<tr>
<td>5. Nº of children</td>
<td>6. Idade do filho caçula:</td>
</tr>
<tr>
<td>7. What is your level of education? (Specify the course)</td>
<td>7.1 Are you studying? ❖ Yes ❖ No</td>
</tr>
<tr>
<td>❖ High school completed ❖ Incomplete higher education</td>
<td>❖ Completing higher education</td>
</tr>
<tr>
<td>❖ Maters’ degree ❖ Complete higher education</td>
<td>❖ Post-Graduation</td>
</tr>
<tr>
<td>8. How old were you when you start working? years</td>
<td>8.1 Length of service in the organization years</td>
</tr>
<tr>
<td>9. What’s your religion?</td>
<td>❖ I have no religion ❖ Are you practising? ❖ Yes ❖ No</td>
</tr>
<tr>
<td>❖ Catholic ❖ Protestant ❖ Spiritist ❖ UDV ❖ Buddhist ❖ Candomblé</td>
<td>❖ Other:</td>
</tr>
<tr>
<td>II. Data about RSI/WRMD (IF ANSWERING “NO” TO QUESTION 1, GO TO PART III)</td>
<td></td>
</tr>
<tr>
<td>1. Have you ever been diagnosed with RSI/WRMD? ❖ No ❖ Yes</td>
<td>❖ When?</td>
</tr>
<tr>
<td>a. Which doctor made the diagnosis?</td>
<td>❖ From the public health service ❖ From the bank ❖ Private</td>
</tr>
<tr>
<td>❖ From the Union ❖ Other:</td>
<td>❖ Carpal tunnel syndrome ❖ Bursitis ❖ Other:</td>
</tr>
<tr>
<td>b. Do you have a specific diagnosis?</td>
<td>❖ Tendonitis ❖ Tenosynovitis ❖ Epicondylitis</td>
</tr>
<tr>
<td>❖ Other:</td>
<td>❖ Other:</td>
</tr>
<tr>
<td>2. Are you currently:</td>
<td>❖ Recovered ❖ Under treatment ❖ In professional rehabilitation</td>
</tr>
<tr>
<td>3. Have you ever missed work because of RSI/WRMD? ❖ No ❖ Yes</td>
<td>❖ For how long?</td>
</tr>
<tr>
<td>4. Have you been on sick leave due to RSI/WRMD? ❖ No ❖ Yes</td>
<td>❖ For how long?</td>
</tr>
<tr>
<td>5. Are you currently on sick leave? ❖ No ❖ Yes</td>
<td>❖ For how long?</td>
</tr>
<tr>
<td>III. Self-assessment of body discomfort symptoms</td>
<td></td>
</tr>
<tr>
<td>1. Have you experienced any discomfort in your upper limbs or spine in the past 40 days? Mark the site(s) with an “X” in the figure below.</td>
<td></td>
</tr>
</tbody>
</table>

(A) No discomfort. Then, you do not need to answer questions 2 through 9 below.
2. When did the discomfort begin, were you at the current job? ☐ No ☐ Yes

3. How long have you been feeling this discomfort?
☐ Up to 1 month ☐ 1 to 3 months ☐ 3 to 6 months ☐ 6 to 12 months ☐ 1 to 2 years ☐ more than 2 years

4. What you feel, you rate as:

5. Write down the most critical site(s) of discomfort (1st to 3rd) and tick the types of sensation below.

Body site: 1º: ☐ Fatigue ☐ Shock ☐ Pain ☐ Crackling ☐ Numb ☐ Weight ☐ Loss of strength ☐ Feeling sore ☐ Tingling
2º: ☐ Fatigue ☐ Shock ☐ Pain ☐ Crackling ☐ Numb ☐ Weight ☐ Loss of strength ☐ Feeling sore ☐ Tingling
3º: ☐ Fatigue ☐ Shock ☐ Pain ☐ Crackling ☐ Numb ☐ Weight ☐ Loss of strength ☐ Feeling sore ☐ Tingling

6. Does what you feel increase when you are working? ☐ No ☐ Yes When? (Answer below)
☐ During the normal working hours ☐ During overtime ☐ At night work ☐ At peak times

7. What do you feel improves with rest?
☐ No ☐ Yes When? (Answer below)
☐ When taking turns with other tasks ☐ During break time ☐ At lunch break

8. When worktime is over ☐ At night ☐ On weekends ☐ On vacation

9. Has the discomfort affected other activities outside of work?
☐ No ☐ Very little ☐ A little ☐ Somehow ☐ A lot ☐ Very much ☐ Completely

10. Have you had any medical treatment?
☐ No ☐ Yes ☐ Which:

11. Are you taking drugs or using patches or bandage to work?
☐ No ☐ Very little ☐ A little ☐ Sometimes ☐ A lot ☐ Almost always ☐ Everyday

12. Do you practice physical activity?
☐ No ☐ Very little ☐ A little ☐ Somehow ☐ A lot ☐ Almost always ☐ Everyday

13. What type of physical activity?

REFERENCES


Systemic alterations in plasma biomarkers levels in patients with chronic pain

Alterações nos níveis plasmáticos de biomarcadores de pacientes com dor crônica

Leticia Meda Vendrusculo-Fangel¹, Renan Fangel², Rita de Cássia Marqueti³

ABSTRACT

BACKGROUND AND OBJECTIVES: To analyze the scientific evidence on the changes in plasma levels of interleukins, nitric oxide, extracellular matrix metalloproteinases, bradykinins, and cortisol in patients with chronic pain.

CONTENTS: The studies were identified by searching the following electronic databases: Pubmed/Medline, Scopus, LILACS, and Web of Science, published from June of 2016 to December of 2016. The selected articles were presented in a flow chart based on their identification, selection, eligibility and inclusion and exclusion criteria. The content of the included articles in the study was analyzed to identify the biomarkers present in patients with chronic pain. Thirteen articles that addressed the plasma biomarkers levels in humans with chronic pain were selected. Most of the articles presented the cytokines levels, followed by cortisol. Only one article mentioned the nitric oxide, and none mentioned what plasma levels of extracellular matrix metalloproteinases and bradykinins were identified.

CONCLUSION: Changes were observed in inflammatory and anti-inflammatory cytokine plasma levels, and that cortisol is related to anxiety and depression symptoms in patients with chronic pain. However, it was not possible to identify the changes in plasma levels of nitric oxide, bradykinin, and extracellular matrix metalloproteinases due to the absence of scientific evidence.

Keywords: Biomarkers, Chronic pain, Plasma.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Analisar as evidências científicas sobre alterações nos níveis plasmáticos de interleucinas, óxido nítrico, metaloproteinases de matriz extracelular, bradicinina e cortisol em pacientes com dor crônica.

CONTEÚDO: Os estudos foram identificados por meio das bases de dados eletrônicas: Pubmed/Medline, Scopus, LILACS e Web of Science, publicados no período de junho a dezembro de 2016. Os artigos selecionados foram classificados em ficha de identificação, seleção dos participantes, elegibilidade, critérios de inclusão e exclusão. Os artigos selecionados foram avaliados por meio de análise de conteúdo, buscando identificar os biomarcadores presentes nos pacientes com dor crônica. Foram selecionados 13 artigos que abordavam a dosagem plasmática de biomarcadores em humanos com dor crônica. A maior parte dos artigos apresentou a dose de citocinas, seguidos pelo cortisol. Apenas um artigo apresentou a dose de óxido nítrico e nenhum artigo identificou a dosagem de níveis plasmáticos de metaloproteinases de matriz extracelular e bradicinina.

CONCLUSÃO: Pôde-se verificar modificações nos níveis plasmáticos de citocinas inflamatórias e anti-inflamatórias, e que os níveis plasmáticos de cortisol estão relacionados com os sintomas de ansiedade e depressão nos pacientes com dor crônica. No entanto, não foi possível verificar as alterações nos níveis de plasma do óxido nítrico, bradicinina e metaloproteinase de matriz extracelular devido à ausência de evidências científicas.

Descritores: Biomarcadores, Dor crônica, Plasma.

INTRODUCTION

Chronic pain is generally defined as persistent pain lasting longer than three months. However, other definitions favor the inclusion of psychosocial factors and the severity of pain in the diagnosis of chronic pain. The severity is graded based on its intensity, suffering, and impacts related to pain and functional impairment¹.

Due to these characteristics, it is considered a complex and multi-factorial affliction, which makes it difficult to evaluate and justify the need for several techniques, such as questionnaires, numeric scales, and non-verbal indices, as well as biochemical and biomechanical parameters²,³ that although provide for an adequate investigation of the disease, make it difficult for the use at a large scale. Therefore, it is necessary to understand the biological and psychosocial parameters to facilitate the diagnosis of the patient with chronic pain.

Due to the complex features of chronic pain, it remains a major challenge for clinical management and assessment as it is often

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only examined with one-dimensional scales that do not reflect the diversity of factors that encompass the care and the experience of chronic pain. An aspect that could facilitate the control and treatment of chronic pain could be the use of blood biomarkers. However, the relationships between chronic pain and the continuous presence of nociceptors or inflammatory markers in the plasma of patients with chronic pain are not yet understood. In addition, there is a lack of clinical diagnostic requirements regarding the use of physiological and biochemical biomarkers.

Biomarkers are biochemical molecules that aid in the diagnosis and the accompaniment of diseases. In pain, the relationship between proinflammatory biomarkers and pain has been examined in patients with painful inflammation such as a key pathological feature of the disease process. In these cases, high-stress levels may compromise the hypothalamic-pituitary-adrenal axis, interfering with cortisol secretion, and alter cytokine expression and tumor necrosis factor (TNF-α) and interferon gamma (INF-γ). Inflammatory cytokines, as well as nitric oxide (NO), play a key role in the pathogenesis of persistent and exacerbated pain. In these cases, high-stress levels may compromise the hypothalamic-pituitary-adrenal axis, interfering with cortisol secretion, and alter cytokine expression and tumor necrosis factor (TNF-α). Inflammatory cytokines, as well as nitric oxide (NO), play a key role in the pathogenesis of persistent and exacerbated pain.

Regarding biomarkers analyses (Table 1), it is possible to observe that with a total of thirteen articles, nine studies presented cytokine analyses, one study showed NO analyses and four articles described cortisol analyses, all in plasma samples. Among the most common cytokines were interleukins 6, 2, and 10 (IL-6, IL-2, IL-10), tumor necrosis factor alpha (TNF-α) and interferon gamma (INF-γ). In summary, six articles identified an increase in interleukins correlated to chronic pain. The biomarker with the highest number of alterations was IL-6 with three articles reporting increases in patients. One study reported decreased levels of IL-6, IL-4, IL-1, IL-2, IL-8, and TNF-α, was also indicated to increase in serum levels in the chronic pain group. Anti-inflammatory cytokines, IL-4, IL-5, and IL-13 are reported to have decreased in these studies. Finally, one study reported a direct correlation between increased NO plasma concentration and disease severity. Moreover, in relation to cortisol, it was observed that despite being related to depression and other emotional aspects, such as the response to stress, there is no difference in plasma concentrations between the patient and control group.

In this scoping review, no study was found evaluated plasma bradykinin and MMP in patients with chronic musculoskeletal pain.
Table 1. Biomarker analysis of selected articles

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Biomarkers</th>
<th>Result / comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Koch et al.</td>
<td>Chronic pain (94) Healthy controls (6)</td>
<td>Cytokines (TNF-α, GM-CSF, IL-1β, IL-6, IL-8, INF-γ, IL-2, IL-4, IL-5, IL-10; nitric oxide (NO))</td>
<td>Patients with mild pain x control: increased IL-6. Patient with severe pain x control: significant increase of IL-6 and NO. Non-significant increase IL-1b, TNF-a, IL-2, and IL-4.</td>
</tr>
<tr>
<td>2 Vaisberg et al.</td>
<td>Handball athletes with pain (14) Handball athletes without pain (41)</td>
<td>Plasma cortisol; adrenaline; prolactin; growing hormone; dopamine; L-dopa; epinephrine, norepinephrine, cytokines (IL-1, IL-2, IL-4, IL-6, TNF-α, IFN-γ, PGE2).</td>
<td>There was no difference between the groups in the hormones; IL-1, IL-2, TNF-α, IFN, and PGE were significantly higher in the chronic pain group.</td>
</tr>
<tr>
<td>3 Wingenfeld et al.</td>
<td>Chronic pelvic pain (18) Fibromyalgia (17) Healthy control (24)</td>
<td>Plasma cortisol; salivary cortisol; hormone adrenocorticotrophic (ACTH); inhibition of the hypothalamic-pituitary-adrenal (HPA) axis by dexamethasone.</td>
<td>Plasma cortisol: there was no difference between groups, but with a significant increase after stress. Fibromyalgia group has a higher concentration than the chronic pelvic pain and control.</td>
</tr>
<tr>
<td>4 Anderson et al.</td>
<td>Chronic pelvic pain (60) Healthy controls (30)</td>
<td>Plasma cortisol; ACTH; salivary cortisol.</td>
<td>Decrease in ACTH hormonal response, with an average response of 30% less to control. Regarding cortisol, there was no difference between groups.</td>
</tr>
<tr>
<td>5 Behm et al.</td>
<td>Fibromyalgia (110) Healthy controls (91)</td>
<td>Cytokines (IFN-γ, IL-5, IL-6, IL-8, IL-10, MCP-1 and MIP1-α).</td>
<td>The concentrations of most cytokines were lower in stimulated patient samples than in controls. IL-6 was the one with the greatest decrease.</td>
</tr>
<tr>
<td>6 Malhotra et al.</td>
<td>Fibromyalgia (26) Healthy controls (26)</td>
<td>Cytokines (IFN-γ, IL-2, IL-4, IL-6, IL-10).</td>
<td>IL-6: Mean increase of 242.8% in the patient group when compared to healthy controls. The level of IL-6 correlates directly with the severity of pain. IL-4: Mean increase of 136.4% in the patient group when compared to healthy controls. Anti-inflammatory cytokines: There was a statistically significant decrease among the patient group when compared to healthy controls.</td>
</tr>
<tr>
<td>7 Lundh et al.</td>
<td>Chronic pelvic pain (32) Healthy controls (37)</td>
<td>Testosterone; MIF (factor of inhibition of the migration of macrophages); cytokines (TNF-α, TNF-β, IL-2, IL-1β); salivary cortisol.</td>
<td>MIF: Significantly higher in patients than in control. Testosterone: Less in patients than in control TNF-α significantly higher in patients than in control.</td>
</tr>
<tr>
<td>8 Koike et al.</td>
<td>Burning mouth Syndrome (47) Healthy controls (47)</td>
<td>Adrenaline; noradrenaline; ACTH; plasma cortisol.</td>
<td>Adrenaline: significantly lower in patients. Depression levels significantly associated with plasma levels of noradrenaline and cortisol.</td>
</tr>
<tr>
<td>9 Sturgill, McCgee and Menzies</td>
<td>Fibromyalgia (105)</td>
<td>Cytokines (IL-1, IL-2, IL-4, IL-5, IL-6, IL-7, IL-10, IL-12, IL-13, IL-17, G-CSF, GM-CSF, IFN-γ and TNF-α); chemokines (CXCL8, CCL2 (MCP-1) e CCL4 (MIP1-α)).</td>
<td>There were no significant correlations between cytokine levels and fatigue, depression or stress; there is a trend of significance when we compare levels of cytokines and pain. After post-hoc analysis, there was a marked reduction of IL-4, IL-5, and IL-13 cytokines.</td>
</tr>
<tr>
<td>10 Ciszek et al.</td>
<td>Vulvodynia (33), vulvodynia and irritable bowel syndrome (23) Healthy control (22)</td>
<td>Cytokines (MCP-1, MIP-1α, MIP-1β, RANTES, ENA-78, FGF basic, G-CSF, GM-CSF, IFN-γ, IL-1α, IL-1β, IL-1ra, IL-2, IL-4, IL-5, IL-6, IL-8, IL-10, IL-17, TNF-α, Thrombopoietin, VEGF endothelial growth factor); RNA expression.</td>
<td>RNA expression: deregulation of miRNA in VBD affects relevant estrogen pathways, whereas, in generalized pain, it is related to muscle, nerve cells, and glial cells. IL-8 and IL-1ra were statistically significant between the groups, being higher in the patient group. Women with VBD and VBD + IBS have increased expression of proinflammatory cytokines.</td>
</tr>
<tr>
<td>11 Lenke et al.</td>
<td>Chronic pain (26)</td>
<td>Salivary cortisol; plasma cortisol.</td>
<td>Plasma cortisol: significant reduction in opioid users when compared to control, especially at 60 and 120 min. There was no difference in salivary cortisol.</td>
</tr>
<tr>
<td>12 Bäckryd et al.</td>
<td>Neuropathic chronic pain (14) Healthy control (17)</td>
<td>Cytokines (IL-1, IL-6, IL-8, and GM-CSF).</td>
<td>IL-6: significantly higher in patients than in controls. IL-1, IL-8, and GM-CSF: no difference between the two groups. A multivariate analysis showed a tendency for patients to have higher GM-CSF plasma levels than controls.</td>
</tr>
<tr>
<td>13 Park and Chung</td>
<td>Temporomandibular pain (40) Healthy control (20)</td>
<td>Cytokines (IL-1β, IL-6, IL-10, and TNF-α); C-Reactive protein.</td>
<td>Patients with major changes had higher scores on pain and sleep scores. The patient group had statistically higher levels of cytokines than the control group. Cytokines had a significant positive relationship with the Pittsburgh Sleep Quality Index (PSQI). IL-10 and TNF-α were associated with the sleepiness scale.</td>
</tr>
</tbody>
</table>
DISCUSSION

The present scoping review sought to understand the changes in plasma levels of biomarkers cytokines, nitric oxide, bradykinin, MMP, and cortisol presented in patients with chronic pain. In this review, thirteen articles were found to address these questions. A greater number of articles with cytokines were identified, followed by cortisol, only one article regarding NO and none for the other biomarkers.

Among the articles which included cytokines, it was possible to observe that cytokines were the most evaluated biomarker, mainly IL-6, IL-2, and IL-10. However, the one that had the strongest relationship to chronic pain was IL-6. Interleukin-6 is related to both the innate and adaptive immune response. It arises in response to microorganisms, but also to stimulation by other cytokines such as IL-1 and TNF-α. It is also considered the main myosin produced by active skeletal muscles and has an acute pro-inflammatory effect, but its presence stimulates the increase of other interleukins, such as IL-10, which presents a chronic anti-inflammatory effect. In studies by Koch et al. and Malhotra et al., a direct relationship was found between the concentration of pro-inflammatory interleukins, mainly IL-6, and the severity of chronic pain. Pro-inflammatory cytokine concentrations in this review were related to the presence of chronic pain, as six articles have shown that these cytokine concentrations were higher in patients with chronic pain than in healthy controls. These studies presented different chronic pain charts, so this finding may be related to chronic musculoskeletal pain of different origins. Another relationship found in the cytokine and chronic pain ratio was the decrease of anti-inflammatory cytokines in patients with chronic pain when compared to controls. This information may facilitate the modification of pain perception, since IL-10, for example, plays an important role as a pain perception blocker.

Concerning NO, only one article was found to evaluate plasma dosage. A study by Koch et al. showed that serum NO levels increase in patients with chronic pain at all severity levels when compared to healthy controls. However, although these authors also find modifications in the dosages of cytokines, there are no references as to the correlation between these variables. It is known that NO plays an important role in the synthesis of cytokines and inhibitory factors involved in inflammation.

Regarding plasma cortisol levels, five studies with this type of analysis were found. Among them, only Vaisberg et al. evaluated plasma cortisol and cytokine levels for chronic pain in athletes, but it did not show a relationship between the two biomarkers. In Vaisberg et al., no significant changes were found between the groups with chronic pain or chronic pain in serum cortisol levels. Additionally, no studies showed a relationship between cytokines and cortisol. Cytokines can aid in the activation of the neuroendocrine axis, increasing the cortisol secretion, and a modification in this system, due to the cytokines, the increase could explain a chronic release and increase in plasma cortisol.

Among the five articles that measured plasma cortisol, three presented significant changes. Wingenfeld et al. showed higher concentrations of plasma cortisol in the fibromyalgia group than in the other groups, which is related to a difficulty in responding to stress. Koike et al. reported a direct relationship between depressive symptoms and serum cortisol rates. Henke et al. showed that patients on opioids treatment had reduced cortisol rates. In this view, it seems that patients experiencing chronic pain with emotional changes may present changes in plasma cortisol levels. Taken together, our findings provide evidence that chronic musculoskeletal pain can increase pro-inflammatory cytokines, mainly IL-6 and NO in serum, as well as decrease IL-10. Cortisol seems to be related to the presence of anxiety and depression symptoms, which may make it difficult for these patients to cope in the face of chronic pain. Another important aspect is the type of chronic pain evaluated. The most cited were not fibromyalgia and chronic pelvic pain but unspecified chronic pain. This aspect identifies many possible factors that develop chronic pain, which, after being established, becomes a health problem itself, with its own particularities.

No study was found in the literature to have measured plasma MMP or bradykinin content in patients with chronic musculoskeletal pain. This may be related to the fact that MMP and bradykinins influence the local inflammatory process when patients present tissue injury, but this not always happens in patients with chronic pain. However, it would be important to understand the systemic impact of the presence of these biomarkers and their impact on chronic pain processes when acute tissue injury ceases. In this review, it was found that most of the articles dealt with a cross-sectional observational study, which is justified by the guiding question used since this study sought to identify the modifications in the biomarkers in patients with chronic pain. However, despite being observational studies, they presented a high level of evidence, which makes it possible to use them as scientific evidence for these biomarkers modifications. Because of the guiding question, this study did not include randomized clinical trials that could better explain the relationships between these biomarkers as well as factors that aggravate or ameliorate clinical symptoms and possibly modify biomarker dosages. Further studies are required to understand the relationship between biomarkers and other problems associated with chronic pain, such as psycho-social aspects.

CONCLUSION

This scoping review can conclude that there are changes in inflammatory and anti-inflammatory cytokine plasma levels of patients with chronic pain, and that cortisol is related to anxiety and depression symptoms. Regarding NO, bradykinin, and MMP, it was not possible to establish this relationship due to the absence of studies.

REFERENCES


Pain rehabilitation treatment for women with breast cancer

Tratamento de reabilitação para dor em mulheres com câncer de mama

Tatiana de Bem Fretta1, Leonessa Boing1, Regina Maldonato Bussmann2, Adriana Coutinho de Azevedo Guimarães3

ABSTRACT

BACKGROUND AND OBJECTIVES: Breast cancer is a public health problem due to its high rates of incidence and mortality, and the presence of pain in the arm and breast is a very frequent symptom in these women. The objective of this study was to organize scientific evidence on rehabilitation treatments for women after breast cancer surgery.

CONTENTS: The search was performed based on the Medline, LILACS, and Scielo database on articles published in the last 10 years, from January 2008 to January 2018. The survey was carried out with the following keywords: “Breast Cancer” and “Upper Limb” and “Pain” and “Rehabilitation”. Randomized clinical trials, pilot study, and quasi-experimental study were included. The search totaled 92 articles, of which only seven articles were selected. The visual analog scale was used in most articles.

CONCLUSION: Physiotherapy and physical exercise can benefit women with breast cancer, reducing pain, and increasing the upper limb’s functionality, as well as minimize the lymphedema.

Keywords: Breast cancer, Pain, Rehabilitation, Upper limb.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O câncer de mama é um problema de saúde pública devido às altas taxas de incidência e mortalidade, e a presença de dor no braço e na mama é um sintoma de maior frequência nessas mulheres. O objetivo deste estudo foi organizar as evidências científicas sobre os tratamentos de reabilitação para dor utilizados com mulheres após a cirurgia do câncer de mama.


CONCLUSÃO: A fisioterapia e o exercício físico podem beneficiar mulheres com câncer de mama, reduzindo a dor e aumentando a funcionalidade de membro superior, além de minimizar o linfedema.

Descritores: Câncer de mama, Dor, Extremidade superior, Reabilitação.

INTRODUCTION

Breast cancer (BC) is a public health problem due to the high incidence and mortality rates. Among the types of cancer, breast cancer has the highest incidence among women. In the world, the growth rate has reached 20% in the last decade, and the impact of cancer will correspond to 80% in the population between developed and developing countries.

BC surgery, axillary lymphadenectomy, and manipulation of the pectoral muscles bring a risk of tissue injury and complications in up to 70% of cases. Complications due to axillary alterations include chronic pain, shoulder movement limitations, and muscle atrophy.

Thus, the presence of moderate or severe pain is more frequent in patients undergoing axillary dissection compared to those who underwent sentinel node biopsy. The occurrence of pain in the arm that is homolateral to the surgery is more related to the extension of the axillary surgical procedure and injuries to some structures such as the intercostobrachial nerve and the serratus anterior. Arm and breast pain is the most frequent symptom in these women, corresponding to 51.6%. In patients under 40 years old, the presence of lymphedema significantly increases the risk of post-mastectomy pain syndrome, and the literature converges on sedentary behavior as a predictor of pain.

Thus, rehabilitation may be an acceptable non-pharmacological alternative to minimize pain in women with BC to promote an improvement in physical recovery.

To minimize the pain caused by the treatment of BC, rehabilitation becomes essential and an integral part in the adjunctive treatment of these women. Given the above, this study aimed to organize the scientific evidence on pain rehabilitation treatments used with women after BC surgery.
The systematic review was performed based on a retrospective consultation of the Scielo, Pubmed, and LILACS databases, in January 2018, and the search strategy was formulated by crossing descriptors (DeCS and MeSH). Only studies conducted with women diagnosed with BC and treated with pain rehabilitation techniques were included. In addition, the studies should be in Portuguese, English, or Spanish, published in the last 10 years (January 2008 to January 2018). Articles that did not present any intervention to treat pain were excluded.

In the Scielo, LILACS (DeCS) and Medline databases, the following crosses were used: “Breast Cancer” AND “Upper Limb” AND “Pain and Rehabilitation”. In the initial phase, titles and abstracts were independently identified and assessed by two reviewers to select those that met the eligibility criteria. Articles that did not meet the criteria described were excluded by title analysis, followed by exclusion by the abstract. Finally, potentially relevant studies were retained for further analysis of the full text. The prominent information was presented in a descriptive table, considering the following variables: authors, sample, assessed outcomes, methodological design, intervention, and effects found. In the initial search in the databases, 92 articles were found. After a first selection by title, 75 articles were excluded, staying 17 for analysis of the abstracts. Of these, eight articles were selected that met the inclusion criteria established.

Figure 1 shows the selection process of the included articles, and table 1 shows the list of selected studies that used rehabilitation to treat pain in women with BC. Analyzing the results obtained by the search strategy, there was a higher concentration of studies in 2016, with a single publication in 2008. It is also evident that the study participants were volunteers of different age groups, but the average age of the analyzed samples corresponded to the middle-age population. Of the eight articles that were used in this study, four used the abstracts. Of these, eight articles were selected that met the inclusion criteria established.

Table 1. Description of the selected studies that used rehabilitation to treat pain in women with breast cancer

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Assessed outcomes</th>
<th>Methodological design</th>
<th>Intervention</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Groef et al.</td>
<td>147 women in CG 53±9 years old and IG 54±7 years old.</td>
<td>A question regarding the prevalence point of pain, shoulder and neck region, arm, armpit, trunk side, and breast region (yes/no), VAS and McGill pain, DASH upper limb (UL) functionality, QoL SF-36.</td>
<td>Randomized clinical trial divided into 2 groups. CG (n=74), IG (n=69). All patients were assessed before surgery and at 2, 4, 9, and 12 months after surgery.</td>
<td>All participants (n=147) four months before randomization received physical therapy. CG received physical therapy and placebo treatment. IG received physical therapy and myofascial therapy.</td>
<td>There were no significant differences in pain prevalence rate and intensity between IG and CG. No significant differences in shoulder function and QoL in both short- and long-term groups.</td>
</tr>
<tr>
<td>Ibrahim et al.</td>
<td>59 women aged 39.2±5.0 years old.</td>
<td>General information ROM was used the goniometer for flexion, abduction, adduction, ER and IR movements. Presence of pain (yes/no) during isolated movements. Wrist strength was measured using a hand dynamometer.</td>
<td>Prospective randomized study. 6 assessments (T1) after surgery and before radiotherapy, (T2) after radiotherapy completion, (T3) 3 months, (T4) 6 months, (T5) 12 months and (T6) 18 months after radiotherapy.</td>
<td>CG (n=30) received standard care (general information and encouragement of a healthy lifestyle with physical exercise). IG (n=29) 12-week exercise program that began in the first three to four weeks after radiotherapy.</td>
<td>T1-T2 postoperative pain levels were lower in IG for ER, flexion, and abduction movements. T3-T4 IG improved ROM in ER and abduction movements; the same movements were decreased in CG. Pain levels were decreased in IG for flexion, abduction, and ER movements and increased incidence of pain in the same movements in CG. T5-T6 12 months after radiotherapy IG did not report pain in all movements except for ER. Recurrence of IG pain at 18 months after radiotherapy was present in all shoulder movements. In contrast, CG at 12 months after radiation reported pain in all movements and persisted at 18 months after radiotherapy in flexion and ER movements.</td>
</tr>
<tr>
<td>Authors</td>
<td>Sample</td>
<td>Assessed outcomes</td>
<td>Methodological design</td>
<td>Intervention</td>
<td>Results</td>
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<tr>
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</tr>
<tr>
<td>House et al.¹³</td>
<td>6 women aged 57±8 years old.</td>
<td>Pain assessed by NRS. UL, FMA, and CAH-AI-9 function. JHFT hand function. BDI</td>
<td>Pilot study</td>
<td>Twice a week training for eight weeks with robotic rehabilitation, each session lasted 20 to 50 minutes.</td>
<td>The pain was measured at the beginning and end of each session, with a 20% decrease in reported severity. UL movements improved (p&lt;0.02). The BDI scale results were statistically significant after training (p&lt;0.01).</td>
</tr>
<tr>
<td>Cho et al.¹⁴</td>
<td>48 women aged 50±7 years old in the physical therapy group (PT) and 46±6 years old in the physical therapy combined with manual lymphatic drainage (PTMLD) group.</td>
<td>Assessment of perimeter lymphedema. Manual dynamometer force. Digital inclinometer shoulder ROM. QL EORT QLQ-C30. DASH functionality. Visible and palpable presence of the axillary cord.</td>
<td>Randomized</td>
<td>Two groups, one PT (n=24) and another PTMLD group (n=24). Three times a week for four weeks.</td>
<td>In both groups, there was a significant improvement in physical, emotional, and social role, fatigue, and pain (p&lt;0.05). Arm volume increased significantly over time in the PT group (p&lt;0.05). The PTMLD group significantly decreased the NRS score compared to the PT group (p&lt;0.05). The same occurred based on the EORT QLQ-C30. The pain was also significantly decreased in the PTMLD group compared to the PT group (p&lt;0.05). Significant decrease in arm volume was observed in the PTMLD group (p&lt;0.05).</td>
</tr>
<tr>
<td>Zengin Alpozgen et al.⁵</td>
<td>57 women aged 46.2±11.19 years old in the Pilates group (PE), 51.94 ± 8.05 in the exercise group (CE) and 51.53 ± 13.81 in the home-exercise group (HE).</td>
<td>Pain assessed by VAS. Digital force dynamometer shoulder ROM. UL DASH and Constant-Murley Functionality.</td>
<td>Randomized</td>
<td>Three groups: PE (n=18), Stretching, strengthening, and shoulder range of motion (CE) exercise group (n=18) and the home exercise (HE) group (n=19). PE and EC groups were supervised by a physical therapist three times a week for eight weeks.</td>
<td>Pain on movement decreased significantly in all groups (p&lt;0.001). Resting pain also improved significantly in all PE (p=0.004), CE (p=0.002), and HE (p=0.005) groups. Muscle strength increased in the PE and CE groups. In ROM, the CE group had an improvement in all shoulder movements (p&lt;0.001), in the PE group only in shoulder flexion (p=0.001) and shoulder abduction movements (p=0.002) and in the HE group only. In shoulder abduction movement (p=0.002). There was a significant improvement in UL functionality for PE and CE groups (p&lt;0.001).</td>
</tr>
<tr>
<td>Angooti Oshnari et al.¹⁵</td>
<td>36 women aged 53±10.28 years old</td>
<td>Arm volume was calculated as arm percentage volume reduction (PVR) VAS pain</td>
<td>Quasi-experimental study.</td>
<td>1st phase - six times a week for two weeks. It was performed by manual lymphatic drainage (MLD) physical therapist. 2nd phase - maintenance, for two weeks included daily lymphatic drainage performed by the patient (SLD) with monitoring of the physical therapist twice a week</td>
<td>Lymphatic drainage was effective in reducing lymphatic edema and pain in women after breast cancer surgery.</td>
</tr>
<tr>
<td>Rett et al.¹⁶</td>
<td>39 women aged 50.6±10.8 years old</td>
<td>ROM by Goniometry. VAS - intensity of pain. McGill (Br-MPQ) pain characterization.</td>
<td>Descriptive and longitudinal analytical study.</td>
<td>There were 20 physical therapy sessions, 3 times a week, lasting 60 minutes. The exercises were cervical stretching and active-free exercises of flexion, extension, abduction, adduction, IR, and ER. VAS pain decreased from 3.8±1.7 to 3.0±1.9 when compared from the 1st session to the 10th session. From the 1st session to the 20th session, there was no decrease in pain (p=0.09), and from the 10th session to the 20th session (p=0.79). In the Br-MPQ scale from the 1st session (p=0.0021) and the 10th session (p=0.0159) and from the 1st (p=0.0001) session to the 20th (p=0.0003). ROM improved in all movements, and no association was found between ROM and pain intensity.</td>
<td></td>
</tr>
</tbody>
</table>

Continue...
Ibrahim et al. 8, Zengin Alpozgen et al. 9 and Keays et al. 10 cause reduced upper limb functionality. Impaired function—upper limb muscle weakness homolateral to the surgery, decreased upper limb functionality, and increased muscle strength 8-10. The duration of pain treatment in these women can be from 4 to 12 weeks. However, some authors suggest the need to treat this symptom for a longer period of time8-10.

In the specific exercise program, Ibrahim et al.8 were able to improve shoulder ROM three months after radiation compared to the control group, and it was found that increased ROM is associated with a reduction in the incidence of pain. Participants had pain in all shoulder movements at 12 months after radiation. However, there was a decrease in pain in the intervention group compared to the control group. On the other hand, shoulder movement pain remained in both groups at 18 months after radiation.

The Pilates method was used in rehabilitation in the studies by Zengin Alpozgen et al.9 and Keays et al.10. The method has been shown to be adequate and capable of eliminating adverse effects of BC treatment, relieving or reversing the reduction of shoulder mobility, improving ROM, decreasing pain at movement and at rest, and consequently promoting the improvement of upper limb functionality.

Robotic rehabilitation for eight weeks was used by House et al.13. The authors observed improvement in activities of daily living due to increased muscle strength and ROM. Also, the study’s most notable finding was a significant improvement in depression. This finding facilitates the hypothesis that the ability to interact with virtual media may be beneficial to the mental health of this population.

The upper trapezius muscle region has been described as one of the most sensitive areas in patients with BC. Pain caused by myofascial dysfunction may, in fact, manifest as increased pressure and hypersensitivity in the upper limb region12. Myofascial therapy, however, had no beneficial effects on the prevalence, quality, and intensity of postoperative pain after BC surgery12.

It is noteworthy that lymphedema causes pressure on the vessels and peripheral nerves of the skin and muscles of the upper limb and trunk, causing pain. In this context, in studies by Cho et al.14 and Angooti Oshnari et al.15, lymphatic drainage reduced muscle pain and lymphedema, which is a painful condition that limits upper limb functioning and leads to low QoL14,15.

Kinesiotherapy improves the ROM of these women and reduces pain when performed at the beginning of treatment, even without showing a direct relationship between increased ROM and decreased pain16. Knowing the interference in daily life with the physical and social tasks that the pain can lead, it is extremely relevant and valid to think about this strategy within rehabilitation.

Rehabilitation has been shown to be effective in improving pain in patients with BC. From this review, it was noted that several features such as manual therapy, stretching and muscle strengthening exercise, upper limb mobility, lymphatic drainage, and Pilates exercises bring notable benefits for women with BC8-16.

TABLE 1. Description of the selected studies that used rehabilitation to treat pain in women with breast cancer – continuation

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Assessed outcomes</th>
<th>Methodological design</th>
<th>Intervention</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keays et al.10</td>
<td>4 women</td>
<td>ROM by Goniometry. UL functionality self-reported 12-item questionnaire. Pain - BPI</td>
<td>Not shown</td>
<td>Pilates specific exercises for 12 weeks, three times a week.</td>
<td>All women improved shoulder flexion and ER, and 2 women improved abduction and RI. 3 women had zero pain score. 3 women showed improved mood. In the analysis of UL functionality, 2 women reported improvement, and only 1 woman kept UL functionality stable.</td>
</tr>
</tbody>
</table>

VAS = visual analog scale; QoL = quality of life; ER = external rotation; IR = internal rotation; Br-MPQ = McGill Pain Questionaire; BPI = Brief Pain Inventory Short; DASH = Disabilities of the Arm, Shoulder and Hand; ROM = range of motion; NRS = Numeric Rating Scale; FMA = Fugl-Meyer Assessment; CAHAI-9 = Chedoke arm and hand activity inventory; JHFT = Jebson-Taylor Hand Function Test; UL = upper limb; BDI = Beck Depression Inventory; EORTC QLQ-C30; European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30; POMS = Profile of Mood States.
CONCLUSION

Physical therapy and physical exercise can benefit patients with BC by reducing pain and increasing upper limb functionality and improving lymphedema.

REFERENCES

Gua-sha: application and therapeutic results in musculoskeletal pain situations. Systematic review

Gua-sha: aplicação e seus resultados terapêuticos em condições dolorosas musculoesqueléticas. Revisão sistemática

Dérrick Patrick Artioli¹, Gladson Ricardo Flor Bertolini²

ABSTRACT

BACKGROUND AND OBJECTIVES: Gua-sha is a Traditional Chinese Medicine technique, which consists of scraping the skin with a smooth and rounded edges object until the appearance of petechiae. Used domestically in Asia, it is described as capable of promoting the improvement of several conditions (e.g., respiratory, digestive, fever, and insomnia), such as painful conditions. However, there is a shortage of systematic reviews in this respect in Western literature, so this study aimed to analyze the common use of Gua-sha and the methodological quality of the studies.

CONTENTS: The PEDro, Pubmed, Scielo and LILACS Databases were consulted, searching for clinical trials with the following keywords and Boolean index: Gua-sha AND pain; Scraping therapy AND pain (English, Portuguese and Spanish). Thirty-two articles were pre-selected, but only six met the inclusion criteria (clinical trial, pain as one of the evaluation criteria, musculoskeletal pain). The disorders reported were related to the spine, with a mostly superior response or similar to the control group, being investigated in the short term (7-21 days). The studies methodological quality were considered moderate according to the PEDro scale.

CONCLUSION: Gua-sha is a simple, inexpensive alternative with short-term effects for the treatment of conditions involving the spine and surrounding areas, such as a single intervention or in combination. Its practice is already well referenced but requires studies of high methodological quality and analysis of its effects also in the appendicular skeleton.

Keywords: Chinese Traditional Medicine, Pain, Physical therapy modalities, Physical therapy speciality, Rehabilitation.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Gua-sha é uma técnica da Medicina Tradicional Chinesa, que consiste em raspar a pele com objeto de bordas lisas e arredondadas até o surgimento de petéquias. De uso doméstico na Ásia, é descrita como capaz de promover a melhora de uma série de afecções (ex. respiratórias, digestivas, febre e insônia), como a de quadros dolorosos. Contudo, há escassez de revisões sistemáticas a esse respeito na literatura ocidental, assim o objetivo deste estudo foi analisar a aplicação usual de Gua-sha e a qualidade metodológica dos estudos.

CONTEÚDOS: Foram consultadas as bases de dados PEDro, Pubmed, Scielo e LILACS, buscando por ensaios clínicos com as seguintes palavras chaves e índice booleano: Gua-sha AND pain; Scraping therapy AND pain (inglês, português e espanhol). Foram pré-selecionados 32 artigos, mas apenas 6 atenderam os critérios de inclusão (ensaio clínico, dor como um dos critérios de avaliação, quadros algicos musculoesqueléticos). Os distúrbios registrados foram relacionados à coluna vertebral, com resposta superior em sua maioria ou semelhante ao grupo controle, sendo investigados em curto prazo (7-21 dias). A qualidade metodológica aponta para estudos moderados de acordo com a escala PEDro.

CONCLUSÃO: Gua-sha é uma alternativa simples, de baixo custo, com efeitos estudados em curto prazo para tratamento de afecções envolvendo a coluna vertebral e áreas próximas, como intervenção única ou em associação. Sua prática já se encontra bem retratada, porém necessitando de estudos de alta qualidade metodológica e análise de seus efeitos também no esqueleto appendicular.

Descritores: Dor, Fisioterapia, Medicina Tradicional Chinesa, Modalidades de fisioterapia, Reabilitação.

INTRODUCTION

Gua-sha, Scraping Therapy, Coining Therapy or Rubbing Technique are synonyms of a Traditional Chinese Medicine (TCM) technique, performed by “scraping” (Gua), unidirectional pressure on the patient’s skin, usually lubricated, with an object of smooth and rounded edges (Chinese soup spoon, coin, buffalo horn slice, cow rib, sharpened jade or metal lid or porcelain with rounded border (Figure 1), aiming to intentionally create therapeutic petechiae (Sha) which usually disappear within a few days (3-5 days). In Asian communities, this technique is used as a homemade treatment, but, at first, it may be seen with suspicion by people unfamiliar to the technique, because of the transient marks left behind, and even mistaken for abuse¹⁻³ (Figure 2). Its first description...
dates back to the end of the Han Dynasty (220 AD), and from the perspective of the TCM, it is able to remove impurities from injured tissues (e.g., muscles) from blood stagnation and facilitate the arrival of oxygenated "Fresh Blood" (Xue, Blood), promoting healing at the cellular level. Diseases of the upper respiratory tract, headache, fevers, insomnia, perimenopausal syndrome, and digestive disorders are within the indications for treatment with Gua-sha, as well as acute, chronic, and recurrent musculoskeletal pain. From a biomedical point of view, the resolution of painful conditions is justified by the increase of heme-oxygenase (HO-1) and its anti-inflammatory and immunomodulatory effect. In addition, three other possible mechanisms are described to support their effects on musculoskeletal pain: 1) increase of the local microcirculation, reducing distal myalgia; 2) stimulation of the serotonergic, noradrenergic, and opioid systems; and 3) minimization of the direct effects of pain on the nociceptors, their surroundings, and the interconnections within the spinal cord. A previous systematic review of the literature was found, showing the effects of this technique in conditions of musculoskeletal pain. However, there is no mention of the practice of its application in the selected studies (only time and number of sessions), and the authors did not quantify the methodology of the studies. These factors make possible a new analysis of the current literature, updating the studies, analyzing and complementing the information already published. Thus, the objectives of this study were: (1) to analyze the results of clinical trials with control group against painful pictures, using Gua-sha as an intervention; (2) to record the typical proposed application and (3) the methodological quality of the studies (PEDro scale).

**CONTENTS**

The databases PEDro, Pubmed, Scielo, and LILACS were consulted. The following keywords were used for the search: Gua-sha, scraping therapy, and pain (English, Portuguese, and Spanish). The Boolean index AND was used between the selected keyword and pain (Gua-sha AND pain; Scraping Therapy AND pain), directing to musculoskeletal pain and moving away from other variables (e.g., breast engorgement). These keywords should be present in the title or abstract topics of the article for inclusion. Also, "Clinical Trials" was one of the filters applied to eliminate other methodologies that did not mention comparative groups and needed to have pain as one of the analyzed variables. Other exclusion criteria were animal experiments, or when repeated in the databases, only one was selected. The studies that met the inclusion criteria were evaluated by the PEDro scale for clinical trials, applied by two professionals with experience in musculoskeletal physiotherapy, without eliminating the research according to the score obtained, that is, only indicating the methodological quality of the study. Table 1 presents the quantitative data of the search performed.

The analyzed studies, for the most part, showed superior results with Gua-sha compared to the counter-intervention group (control). The practice generally occurs in the lubricated area, with stimulation in flow direction until new petechiae cannot be added, applied with tools such as the Chinese spoon, and the methodological quality of the studies is considered moderate.
Table 1. Search and selection of studies in databases

<table>
<thead>
<tr>
<th>Databases</th>
<th>Matches</th>
<th>Repeated</th>
<th>Excluded</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEDro</td>
<td>10</td>
<td>1</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Pubmed</td>
<td>20</td>
<td>8</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Scielo</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>LILACS</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>9</td>
<td>17</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 2. Characteristics of the analyzed clinical trials

<table>
<thead>
<tr>
<th>Authors</th>
<th>Objectives</th>
<th>Counter-intervention</th>
<th>Population</th>
<th>Gua-sha</th>
<th>Duration and sessions</th>
<th>PEDro scale</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braun et al.</td>
<td>To assess the efficacy of Gua-sha (IG) in chronic neck pain (VAS: static and in movement pain; NDI: functional disability; SF-36: quality of life)</td>
<td>CG: hot-water bottle</td>
<td>Chronic cervicalgia; 48 patients: 24 in each group</td>
<td>All cervical to high thoracic, until additional petechiae could not be added</td>
<td>Single session, immediate reassessment and follow-up for the next 7 days</td>
<td>8</td>
<td>IG higher than CG (p&lt;0.01)</td>
</tr>
<tr>
<td>Yuen et al.</td>
<td>Comparing the elderly with the placebo group (CG) in chronic low back pain (VAS, RMDQ, SF-12, GDS, PSQI, TFnα, and HO-1)</td>
<td>CG: hot-water bottle</td>
<td>Chronic low back pain; 12 patients: all received Gua-sha (IG) or warm-bag (CG) with a 28-day interval between evaluations</td>
<td>T8-L5, about 25-30cm in length, until the appearance of petechiae (8-12 repetitions), 15 min.</td>
<td>Single session, re-evaluation after 24h and in the 7th day</td>
<td>7</td>
<td>IG similar to CG, with a tendency towards better results in IG</td>
</tr>
<tr>
<td>Wang et al.</td>
<td>Influence of Gua-sha on channels (IG) or acupuncture points (CG1, with or without petechiae (CG2, CG3), as well as conventional acupuncture (CG4), in low back muscle tension, as for pain (VAS) and functional capacity (Oswestry)</td>
<td>CG1: petechiae at acupuncture points; CG2: no petechiae in acupuncture channels; CG3: no petechiae at acupuncture points</td>
<td>Low back muscle tension; 210 patients: 42 in each group</td>
<td>IG and CGC: bladder channel (TCM); CG1, CG3, and CG4: points B23 and B40</td>
<td>IG and CG1: 4 days; CG2, CG3, and CG4: 2 days. The five groups were treated 7 times.</td>
<td>IG higher than CG (p&lt;0.01)</td>
<td></td>
</tr>
<tr>
<td>Lauche et al.</td>
<td>To analyze the effects of Gha-sha on VAS or acupuncture pain (Algometer) on neck pain and chronic low back pain</td>
<td>CG: waiting list</td>
<td>Neck pain and chronic low back pain; 39 patients: IG (20) and CG (19)</td>
<td>Cervical - C7-T12 longitudinal to paravertebral; from C7 horizontally to the shoulders; C7-T12 following ribs; C1-C7 longitudinally. Low back - C7-L5 longitudinal and then horizontally; along with the gluteus maximus; until petechiae appear, about 10-15 min</td>
<td>Single session, immediate reassessment and after 7 days</td>
<td>IG higher than control (p&lt;0.05); Pressure pain: IG higher than CG (neck pain, p&lt;0.05); CG similar to IG (low back pain, p&gt;0.05)</td>
<td></td>
</tr>
<tr>
<td>Xiao et al.</td>
<td>Compare Gua-sha (IG) and acupuncture (CG) in cervical spondylosis (VAS)</td>
<td>Systemic acupuncture</td>
<td>Cervical spondylosis; 85 patients: IG (44) and CG (41)</td>
<td>High cervical to the shoulders</td>
<td>IG: 1/week, for 3 weeks; CG: 1/day for 15 days</td>
<td>Higher than CG after the 1st session (p&lt;0.01); similar to the final one (p&gt;0.05)</td>
<td></td>
</tr>
<tr>
<td>Wang</td>
<td>To investigate the best method of treatment for paravertebral pain</td>
<td>Systemic acupuncture</td>
<td>Paravertebral pain; 100 patients: IG-50 and CG-50</td>
<td>Applied to the association of acupuncture and mobilization, in the painful points under pressure, palpable tension bands and acupuncture points B12, B13, ID12, ID13 and extra point Jiateng</td>
<td>5</td>
<td>IG higher than CG (p&lt;0.01)</td>
<td></td>
</tr>
</tbody>
</table>

IG = intervention group; CG = counter-intervention group; VAS = visual analog scale; TCM = Traditional Chinese Medicine; NDI = Neck Disability Index; SF-36 = Short-form Health Survey-36; min = minutes; RMDQ = Roland-Morris Disability Questionnaire; SF-12 = Short-form Health Survey-12; GDS = Short-form Geriatric Depression Scale; PSQI = Pittsburgh Sleep Quality Index; TFnα = tumoral factor alpha; HO-1 = Heme-oxygenase 1.
two studies with a better methodological quality used only a hot water bottle as control, not being the gold standard for treatment and rarely used in the outpatient setting. That is, the comparison between the hot water bottle and Gua-sha may be valid in the East as a home treatment method, however, in the West, confrontation with other therapeutic modalities would bring greater clarification of its benefits. The short period of analysis could also be pointed as a limiting factor, since the reassessment occurred immediately after the intervention or a follow-up of only a few days (7-21 days), not allowing long-term analysis. However, it is claimed that its hypoalgesic effect can be noticed immediately or that it needs a few sessions to maintain it or provide resolution of the case, justifying the criteria used by the studies mentioned. Other treatment strategies frequently used and studied for years in the West are based on studies, such as those in Gua-sha, that their results demonstrate short-term effects (e.g., Maitland and Mulligan, Kinesio taping and transcutaneous electrical nerve stimulation (TENS). Thus, patients’ long-term follow-up would provide more conclusive data not only on the treatment under review but also on other interventions that are commonly applied. Therefore, the superiority demonstrated by this method of treatment should not be undervalued.

There was agreement among the authors regarding the fact that the Gua-sha site should be lubricated, to perform the technique until petechiae appear or stop when they could no longer occur, and that after application, the area should be covered and wait a few minutes before releasing the patient. However, there was variability concerning the rationale of treatment lines, and three alternatives were described: the one initially described (Figure 2); in the bladder meridian of systemic acupuncture; in palpable tensile bands and points. These practices had similar responses, making it impossible to say what stands out from the other. In 2012, Nielsen, Kligler and Koll brought up an issue that was little described and glimpsed by this literature review, proposing a “security protocol” to the use of Gua-sha. Once the blood and other potentially infectious materials can pass beyond the epidermis, leading to instrument contamination and exposure by pathogens. Therefore, they suggest the same hospital safety standards for Gua-sha practice: wearing gloves; disposable or sterile instruments (such as stainless steel and not made of horn or bone); not to reuse lubricant that has been applied. Despite the increase in superficial microperfusion and the mentioned risk, stable patients (international normalized ratio) who use anticoagulants can be treated with Gua-sha. However, it is worth mentioning that sunburn, rash, and skinned areas are contraindications to the use of this method, as well as patients with hemophilia, acquired immunodeficiency syndrome, and anemia (Figure 3).

The results can be explained by different analgesic theories, as previously mentioned. The physiological base is characterized by the vasodilatation or extravasation of superficial sanguineous vessels, promoting an increase in the local cellular metabolism, absorption of inflammatory agents, reinforcement of the immunity (HO-1) and consequently the interruption of painful cycles. Antinociceptive and anti-irritative effects also are described to justify its results, as the therapeutic stimulation of mechanoreceptors and nociceptors are involved in the inhibition mechanism of the painful signing conductivity in the spinal cord. But by TCM, better results are obtained when its application is greater than 5 cm along a meridian of energy (e.g. systemic acupuncture bladder meridian) rather than just over acupuncture points, but combination of both could provide a more significant curative stimulus to the technique, these effects being linked to increased circulation of Qi (Chi, vital energy) and blood (Xue).

Braun et al. stated that the options for conservative treatment in cases of chronic cervicalgia are limited and that Gua-sha could be an alternative for such cases, with fast reduction of pain and improvement of function. It is important to remember that not all people experiencing pain in this area will benefit from the technique. For example, those with neurological manifestations were excluded from the study, and there are few publications yet. Therefore, the diagnosis of mechanical cervical pain indicates improvement for the potential patients benefited by the technique. One of the other studies under review also supports Gua-sha benefits in pain and overall health status, not only for chronic neck pain but also for chronic low back pain. With the premise of the neck area being more sensitive than the low back, authors justified the fact that Gua-sha provided a superior effect on pain at cervical pressure, but not at lower back pain. The chronic lower back pain was also approached by Yuen et al. In comparison of Gua-sha with hot-water bottle, having only a trend of Gua-sha being superior, however, there...
was a reduction of the levels of tumour factor alpha (TNF-α) and HO-1, both linked to the anti-inflammatory action, which lasted until the reevaluation (day 7) and not evidenced in the control group (hot-water bottle). This gave rise to speculate an anti-inflammatory effect longer lasting by chronic pain, which would last for about seven days after a single intervention. Besides the possibility of reconciling Gua-sha with other practices, as demonstrated by Wang, who obtained superior results together with moxibustion and systemic acupuncture instead of applying the latter alone.

Gua-sha has shown to be a simple and safe technique and, like other procedures in use, requires further studies to promote information on its long-term effects. Whether alone or in combination with other modalities, not just TCM. Gua-sha still lacks more scientific support, despite already presenting moderate methodological quality in most of the analyzed studies, being an arduous task, since it is postulated that there may be a strong associated placebo effect. However, the authors denote the difficulty in having these groups since the technique leaves marks (ecchymosis), making their camouflage complex.

CONCLUSION

Gua-sha has proved to be a relevant alternative for painful conditions involving the spine and the surroundings.

REFERENCES

Multidimensional instruments validated in Brazil for pain evaluation in the elderly: narrative review

Instruments multidimensionais validados no Brasil para avaliação da dor na pessoa idosa: revisão narrativa

Darcton Souza de Aguiar¹, Igor de Matos Pinheiro¹,²

ABSTRACT

BACKGROUND AND OBJECTIVES: Multidimensional instruments for the evaluation of pain in the elderly allows to identify the conditions that involve pain considering the emotional, physical, psychological, social, and economic aspects. They are ancillary tools in the prognosis of diseases, in addition to allowing a better approach to pain considering their assessed dimensions. The objective of this study was to review the literature on multidimensional instruments validated in Brazil for the evaluation of pain in the elderly, identifying instruments aimed at elderly people with neurocognitive disorders.

CONTENTS: This was a narrative review of the literature with scientific articles searched in the electronic databases Pubmed, Lilacs, and Scielo. The following keywords of the Portuguese language defined by the DeCS were used: pain, pain threshold, pain measurement, aging, and the elderly. Scientific articles on instruments validated in Brazil and published in the period from 2000 to 2018 were included. There were 38 articles, of which 33 were excluded, and only 5 articles were included. The validated instruments found for pain assessment in the elderly in Brazil were the McGill Pain Questionnaire, Geriatric Pain Measure, Pain Assessment Checklist for Seniors with Pain Assessment Checklist for Seniors with Limited Ability to Communicate, Non-Communicative Patient’s Pain Assessment Instrument, Pain Assessment in Advanced Dementia.

CONCLUSION: The five instruments found offer the health professional a range of tools to understand pain better. Of these, three instruments allow the assessment of pain in the elderly with neurocognitive disorders.

Keywords: Dementia, Elderly, Pain evaluation.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Os instrumentos multidimensionais para avaliação da dor em idosos permitem identificar as condições que envolvem a dor considerando os aspectos emocionais, físicos, psicológicos, sociais e econômicos. Trata-se de ferramentas auxiliares no prognóstico de doenças, que permitem melhor abordagem da dor considerando suas dimensões avaliadas. O objetivo deste estudo foi revisar a literatura sobre os instrumentos multidimensionais validados no Brasil para a avaliação da dor na pessoa idosa, identificando os instrumentos direcionados para idosos com transtornos neurocognitivos.


CONCLUSÃO: Os cinco instrumentos encontrados oferecem para o profissional de saúde uma gama de ferramentas para melhor compreensão da dor. Destes, três instrumentos permitem avaliar a dor em idosos com transtornos neurocognitivos.

DESCRITORES: Avaliação da dor, Demência, Idoso.

INTRODUCTION

Aging promotes adaptations in the organic systems and may be associated with chronic degenerative conditions that impact the biopsychosocial components of the elderly’s life.¹,² Under these conditions, the elderly may be in a favorable state for the occurrence of pain and functional limitations to perform their daily activities.¹,³ Socioeconomic conditions, previous diseases, psycho-affective relationships, and cognition are some factors that influence the presence of pain in the elderly.¹ Chronic pain (CP) is highly prevalent in the elderly (48 to 55%), with higher intensity in individuals with neurocognitive disorders.²,⁴,⁵
Pain is an intrinsic and self-reported sensation\(^6\)\(^-\)\(^8\), with abstract signs, which requires validated and adequate assessment instruments to understand better its unidimensional or multidimensional conditions\(^9\). Unidimensional scales only pre-establish data related to pain intensity, while multidimensional instruments address not only the physical aspects but also seek to interpret and understand the painful phenomenon\(^10\)\(^-\)\(^11\).

Multidimensional pain assessment instruments in the elderly allow us to identify the conditions that involve pain from the emotional, physical, psychological, social, and economic aspects. They refer to tools that help in establishing the prognosis of diseases, besides allowing a better treatment of pain, considering their assessed dimensions\(^12\). Understanding the dimensions of pain, especially CP, through multidimensional assessment allows a detailed description of the sensory and affective qualities of the painful phenomenon\(^13\)\(^-\)\(^14\).

This study aimed to review the literature on multidimensional instruments validated in Brazil for pain assessment in the elderly, identifying the instruments aimed at the elderly with preserved cognition and those with neurocognitive disorders.

**CONTENTS**

This study refers to a narrative literature review performed with scientific articles searched in the electronic databases Pubmed, LILACS, and Scielo. The crossing of the following keywords of the Portuguese language defined by DeCS (Health Sciences Descriptors) was used: pain, pain threshold, pain measurement, aging, and elderly.

Articles that assessed pain in older people (≥60 years old) using instruments validated in Brazil and published from 2000 to 2018 were included. Articles that assessed trauma pain, that were in duplicate in the databases or that used unidimensional pain assessment instruments were excluded. By selecting the articles, it was possible to identify the instruments validated in Brazil and the pain assessment tools in the elderly with neurocognitive disorders.

A total of 38 articles were found, 33 of which were excluded: 5 were duplicates, 12 used unidimensional instruments, 15 did not meet the criteria for pain management, and one for making an association between instruments. Table 1 shows the five articles of this review.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Objectives</th>
<th>Multidimensional pain assessment instrument</th>
<th>Domains</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thé et al.(^15)</td>
<td>To validate the PACSLAC in Portuguese in demented elderly and to analyze the properties of their measurements.</td>
<td>PACSLAC</td>
<td>Facial expressions, Body movements/activities sociability/personality/mood. Others.</td>
<td>PACSLAC-P mean score was 3.20±0.62, and the mean application time was 5 to 7min. Internal consistency, according to Cronbach’s alpha coefficient, showed values of 0.646 for facial expressions, 0.619 for body movements/activities, 0.618 for sociability/personality/mood, and 0.247 for the subscale named others, with a total scale score of 0.827. Reproducibility was 85.2%.</td>
</tr>
<tr>
<td>Pinto et al.(^16)</td>
<td>To perform semantic and cultural adaptation to Brazilian Portuguese of the PAINAD scale, and to assess its psychometric properties (validity, feasibility, inter-rater agreement, and clinical utility).</td>
<td>PAINAD</td>
<td>Breathing independent of vocalization. Negative vocalization. Facial expression. Body language. Comforting.</td>
<td>The items with the highest signs of pain were facial expression (18.2%), breathing independent of vocalization (15.2%) and body language (16.7%). The negative vocalization indicator was the one that best correlated with the total scale (0.524), and the 95% confidence interval (95%CI) from 0.679 to 0.862.</td>
</tr>
<tr>
<td>Araujo and Pereira(^17)</td>
<td>To describe the results of conceptual, item, and semantic equivalence between the original NOPPAIN in English and the Brazilian Portuguese version for pain assessment in non-communicative patients.</td>
<td>NOPPAIN</td>
<td>Behaviors of pain, intensity.</td>
<td>The NOPPAIN-Br of the 64 elements, 56.3% achieved an average of 10, equivalent to the “very good” agreement and 43.7%, an average between 7.0 and 9.9 - “good” agreement.</td>
</tr>
<tr>
<td>Motta, Gambaro and Santos(^18)</td>
<td>To study their GPM psychometric properties to see if they are appropriate.</td>
<td>GPM</td>
<td>Intensity, disengagement, walking pain, pain in vigorous activities, pain in other activities.</td>
<td>Internal consistency was adequate, reproducibility satisfactory (low variability and no statistically significant differences). GPM-P “Adjusted Total Score” showed low correlation, but it was regular for Q19 and Q20.</td>
</tr>
<tr>
<td>Santos et al.(^19)</td>
<td>To verify the intra and inter-examiner reliability of the application of Br-MPQ in elderly with chronic pain due to orthopedic and neurological diseases.</td>
<td>Br-MPQ</td>
<td>Sensory, affective, temporal, miscellaneous, spatial distribution, intensity.</td>
<td>Overall intra- and inter-examiner reliability in the elderly with orthopedic diseases were 0.86 and 0.89, respectively, and for the elderly with neurological diseases of 0.71 and 0.68, respectively. The results showed that Br-MPQ was easy to apply.</td>
</tr>
</tbody>
</table>

PAINAD = Pain Assessment in Advanced Dementia; PACSLAC = Assessment Checklist for Seniors with Limited Ability to Communicate; GPM = Geriatric Pain Measure; NOPPAIN = Non-Communicative Patient’s Pain Assessment Instrument; Br-MPQ = Brazilian Portuguese McGill Pain Questionnaire.
DISCUSSION

In this literature review, the following multidimensional pain assessment instruments for elderly people validated in Brazil were found: Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC), Pain Assessment in Advanced Dementia (PAINAD), Non-Communicative Patient’s Pain Assessment Instrument (NOPPAIN), Geriatric Pain Measure (GPM), Brazilian McGill Pain Questionnaire (Br-MPQ). Of these, the first three instruments are indicated for application in the elderly with neurocognitive disorders.

The pain in the elderly must be viewed in several aspects, beyond the physical domain. The emotional and psychosocial conditions that surround the elderly should also be investigated during pain assessment. Pain assessed and inadequately addressed can have negative consequences on the emotional component, body functions, and social aspects.

Pain has specific conditions in each individual because it is self-reported, subjective, and abstract. Multidimensional instruments portray these conditions by assessing the various dimensions involved in the life of the elderly, differing from each other according to the approach method. There are common domains among the instruments such as pain intensity, location, and duration, but there are specific domains in some scales such as mood assessment, pain during activities, and social aspects.

Pain intensity is a measure of assessment widely used in unidimensional instruments, being also components of multidimensional tools. The McGill pain questionnaire, developed by Melzack in 1975, aimed to assess the qualitative dimensions of pain such as sensory, affective, temporal regarding duration, spatial distribution, and pain intensity. The domains of this instrument are divided into 20 subgroups of words, from 1 to 10, referring to the sensitive questions, 11 to 15 affective questions, 16 general experiences of the individual, and 17 to 20 miscellaneous.

The evaluative measures adopted in this instrument are related to the experience of the elderly facing the painful condition, in addition to the neurophysiological aspects involved in pain perception.

Corroborating the Br-MPQ, the GPM instrument consists in assessing intensity (five items), disengagement (five items), walking (two items), vigorous activities (two items), other activities (three items), and these items are distributed at random at the time of the assessment. The GPM was designed to broaden and facilitate the assessment of pain in the elderly, but the elderly must have preserved cognition so the assessment will not present divergence of results.

The pain assessment in the elderly with a neurocognitive disorder is a challenge for health professionals because of the difficulty in applying the instruments that allow the understanding of the painful phenomenon in these patients. Proper reporting of painful experience requires preservation of cognition. Given the symptom, a self-report is required for the analysis of the phenomenon, verbal expression or perception skills, and interaction may be compromised due to cognitive decline, but sensory perception may be maintained. However, pain duration, intensity, and location can only be identified through some assessment instrument. Cole et al. investigated the brain areas responsible for pain perception in dementia patients to identify activation zones through functional nuclear magnetic resonance, which resulted in significant data on pain perception and emotional reactions. Thus, it has been shown that there are brain activation and excitability regarding painful stimulation in the elderly with cognitive disorders.

Thé et al. observed the need for an instrument to assess pain in older people with neurocognitive disorders and developed PACSLAC. It is an instrument composed of 60 observational items, separated by domains comprised of facial expressions, movement and body activities, sociability, personality/mood, and others.

The PAINAD is a multidimensional instrument with similar applicability to PACSLAC. It is based on philosophical (abstract) assessment and behaviors of the painful condition, corresponding to the domains of breathing, negative vocalization, facial expression, body language, and comforting. PAINAD quantifies its domains with quantitative variation from zero to 10 points, based on pain patterns. Scores of 1 to 3 points are considered mild pain, 4 to 6 reflect moderate pain, and 7 to 10 points are considered severe pain conditions.

In the literature reviewed for this study, a simplified instrument, NOPPAIN, was found. This tool consists of four assessment sessions involving nine daily care pictures. Six refer to pain-related behaviors, and a unidimensional figure numbered from zero to 10 to assess pain intensity, another session related to activities with pain responses yes or no, observing if the professional performed the activity or if the patient performed alone, and a numerical scale to quantify the pain intensity. The fourth session consists of the sum of the previous sessions formalizing a total score of the instrument. The literature does not provide detailed descriptions of its use, nor does it report the psychometric measures of this instrument for the Brazilian population.

This study allowed us to know the multidimensional instruments validated in Brazil for multidimensional pain assessment in the elderly. The presented tools provide a range of instruments for the healthcare professional to be able to select the most appropriate one according to the profile of their patients. Cognitive condition is a determining factor for choosing the most appropriate instrument for each patient. Although it was not the object of study, in this review, no scientific studies were identified that used the instruments for pain assessment in the elderly, except for the GPM and the Br-MPQ.

CONCLUSION

The five multidimensional instruments validated in Brazil to assess pain in the elderly presented in this review offer health
professionals a range of tools for better understanding of pain. Of these, three instruments allow the assessment of pain in the elderly with neurocognitive disorders. It was observed that the variability of domains present in the instruments helps in the identification and assessment of the painful condition in the elderly with preserved cognition or neurocognitive disorders, regardless of the degree of impairment.

REFERENCES


Temporomandibular joint arthrocentesis: a technique proposal. Case report

Artrocentese da articulação temporomandibular: uma proposta de técnica. Relato de caso

Eduardo Grossmann¹, Rodrigo Lorenzi Poluha², João Paulo Bezerra Leite³

ABSTRACT

BACKGROUND AND OBJECTIVES: Arthrocentesis is an effective treatment to reduce or eliminate pain, increase maximal interincisal distance, and to eliminate joint effusion in patients with disc displacement without reduction. This study aims to expose and to discuss a new technique proposal of temporomandibular joint arthrocentesis applied in the treatment of a single case of disc displacement without reduction.

CASE REPORT: Female patient, 18-year-old patient sought treatment due to joint pain and mouth opening limitation. The maximal interincisal distance was 30.28mm. Magnetic resonance imaging confirmed the diagnosis of disc displacement without reduction with signs of joint effusion in the right temporomandibular joint. Temporomandibular joint arthrocentesis was performed under selective sensory nerve block of the auriculotemporal, masseteric and posterior deep temporal nerves. Two needles were inserted in the upper compartment of the temporomandibular joint. In the second needle, a transparent catheter was connected into a vacuum pump. Clinically, after the arthrocentesis, the maximal interincisal distance increased to 46.25mm, and the patient referred no more pain. After six months, a magnetic resonance imaging was performed to observe the results, and there were no more signs of joint effusion.

CONCLUSION: Temporomandibular joint arthrocentesis was an effective treatment for this patient with disc displacement without reduction. The aspect of this technique that is particularly relevant for clinical practice was the connection of a transparent catheter to a vacuum pump. In fact, it allowed the visualization of the solution fluidity, as well as guides the flow of the solution used for joint washing, optimizing the irrigation. However, new studies are necessary to compare different protocols of irrigation with and without the associated use of a vacuum pump.

Keywords: Articular disc displacement without reduction, Arthrocentesis, Temporomandibular joint.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A artrocentese é um tratamento eficaz para diminuir ou abolir a dor, aumentar a máxima distância interincisal e eliminar o derrame articular em pacientes com deslocamento do disco sem redução. O objetivo deste estudo foi expor e discutir uma nova proposta técnica de artrocentese da articulação temporomandibular aplicada no tratamento de um caso de deslocamento do disco sem redução.

RELATO DO CASO: Paciente do sexo feminino, 18 anos procurou tratamento devido à dor na articulação temporomandibular e limitação da abertura da boca. A distância interincisal máxima foi de 30,28mm. A ressonância magnética confirmou o diagnóstico de deslocamento do disco sem redução com sinais de derrame articular na articulação temporomandibular direita. A artrocentese foi realizada com o bloqueio anestésico do nervo auriculotemporal, masseterino e temporal profundo posterior. Depois disso, duas agulhas foram inseridas no compartimento superior da articulação temporomandibular. Na segunda agulha foi conectado um cateter transparente e nesse uma bomba de vácuo. Clinicamente, após a artrocentese, a distância interincisal máxima aumentou para 46,25mm e não houve mais dor. Na nova ressonância magnética realizada 180 dias após, não havia mais sinais de derrame articular.

CONCLUSÃO: A artrocentese da articulação temporomandibular foi eficaz no tratamento do paciente com deslocamento do disco sem redução. O aspecto dessa técnica, que é particularmente relevante para a prática clínica, foi a conexão de um cateter transparente a uma bomba de vácuo. Isso permitiu a visão da solução, sua fluidez, além de orientar o fluxo da solução utilizada para lavagem, otimizando a irrigação. No entanto, novos estudos são necessários para comparar diferentes protocolos de irrigação com e sem o uso associado de uma bomba de vácuo.

Descritores: Articulação temporomandibular, Artrocentese, Deslocamento do disco articular sem redução.

INTRODUCTION

The arthrocentesis technique was first described in 1991 by Nitzan, Dolwick and Martinez. It is an effective and minimally invasive method for treatment of several temporoman-
dibular joint (TMJ) disorders. It consists of washing the superior compartment of the TMJ without direct visualization. The washing procedure is done with a biocompatible substance, such as saline, which helps the dilution of the local allogenic substances and frees the joint disc by removing the adhesions formed between the surfaces of the disc and the mandibular fossa due to the hydraulic pressure generated by the irrigation process. The literature has reported some risks with the conventional technique, such as facial nerve paresis, by anesthetic block. Also, there is a risk of extravasation of the liquid used during the irrigation to the surrounding tissue; since there is no guarantee that even using two needles, it is not possible to wash out all the liquid inside. Such risks can be avoided by modifying the technique.

This study aims to expose and discuss a technical proposal of temporomandibular joint arthrocentesis.

CASE REPORT

Female patient, 18-year-old, sought treatment due to joint pain and mouth opening limitation. No relevant medical condition was reported. The patient had a history of clicking sound in her right TMJ for the past 10 years. The click disappeared one year ago. Since then, the patient has been unable to open her mouth completely and complained of localized pain in the right TMJ region. On clinical examination, the maximal interincisal distance was 30.28mm with a jaw deflected to the affected side during the opening. Also, the patient was able to perform a normal lateral movement to the affected side. However, there was a limited, painful lateral excursion to the unaffected side. A magnetic resonance imaging (MRI) was requested and the diagnosis of disc displacement without reduction (DDWOR) with signs of joint effusion in the right TMJ was confirmed. The left TMJ did not show clinical or MRI dysfunction. The patient did not respond well to the conservative treatment provided for three months (splint, anti-inflammatory drugs, soft diet, and individualized physiotherapy). Thus, a TMJ arthrocentesis was performed by an experienced maxillofacial surgeon. Clinically, after the arthrocentesis, the maximal interincisal distance increased to 46.25mm, with no more pain. The patient was followed for 7, 14, 30, 60, 90, 180, and 360 days after the procedure. No complications were reported. The results were maintained in all follow-ups. A new MRI was performed 180 days after the arthrocentesis. There were no more signs of joint effusion in the right TMJ. The left TMJ remained unchanged.

Description of the arthrocentesis technique

In the presented case, the arthrocentesis was performed only once in the right TMJ. A demographic pen was used to draw a straight line from the middle portion of the tragus to the corner side of the eyeball, and two points were marked on this line for the insertion of the needles. The first, the most posterior one, at 10mm from the tragus and 2mm below the corner-tragus line. The second one was inserted 20mm anterior to the tragus and 10mm inferior to the corner-tragus line. After waiting for about 3 minutes for the ink to dry, antisepsis of the whole face was performed with chlorhexidine solution at 2%, with emphasis on the preauricular region and ear. Then, a sterile ball of gauze was placed next to the external acoustic meatus, and the whole face was covered by a sterile fenestrated surgical drape, only exposing the joint. The next step was the auriculotemporal nerve block, followed by the anesthesia of the masseteric and posterior deep temporal nerves with lidocaine chloride at 2% without vasoconstrictor 1:100.000, with a total volume of 3.6mL. The patient was asked to open his mouth to its maximum to allow the jaw head to move down and forward, facilitating the approach to the posterior recess of the upper TMJ compartment. A 40x12mm needle connected to a 5mL syringe was inserted into the first mark, and 4mL of saline solution at 0.9% was administered to distend the joint space. A second needle was introduced into the distended compartment, at the point established before, and connected to a #20 flexible and transparent catheter (60cm) connected to a vacuum pump (Kavo®, Joinville, Santa Catarina, Brazil), which allowed the visualization of the solution. Afterward, an infusion extender, 15C of 120cm (Compojet®, Conceição do Jacuípe, Bahia, Brazil), was connected to a 60mL syringe to allow the joint lysis and lavage. A total of 300mL of physiological solution was used for the TMJ arthrocentesis. No other substance or drug was added to the solution being injected. Once the procedure was completed, the needles were removed, and the patient was asked to perform opening and lateral movements of the mouth in order to break down any possible disc adherences, in attempt to restore an improved mandibular mobility pattern. Local dressing was conducted with sterile gauze and micropore. On the post-procedure protocol for analgesia, paracetamol (750mg) every 6 hours orally was suggested for a maximum of three days if necessary and an ice pack to be applied to the intermittently intervened joint for a period of 48 hours. In addition, the patient was advised to take liquid and pasty foods for 96 hours, not to expose himself to the sun, and to undergo no medical/dental procedure while recovering (Figures 1 and 2).
DISCUSSION

Arthrocentesis is effective to decrease or eliminate pain, increase maximal interincisal distance, and to eliminate joint effusion in patients with DDWOR5-9. A draw of a straight line from the middle portion of the tragus to the corner side of the eyeball and anatomical references are enough to mark the two points of insertion of the needles. The literature showed that ultrasound-guided arthrocentesis was no more successful than the conventional technique and took longer10. The auriculotemporal nerve block, followed by the anesthesia of the masseteric and posterior deep temporal nerves was aimed to avoid the discomfort and/or pain due to the hydraulic pressure that could occur at the beginning of the joint washing procedure, thus obtaining excellent analgesia of the region, avoiding the need for sedation. The literature shows inconclusive advantages of performing arthrocentesis under general anesthesia11. In addition, our proposed anesthetic sequence reduces the chance of facial nerve paresis because injection is given directly into the trigeminal nerve branches and not intraarticularly into the temporomandibular joint. The reduction of the pain, the increase of mouth opening, and the reduction of joint effusion are expected as the irrigation process allows the removal of debris of the joint tissues in degeneration process and helps to eliminate the allogenic substances inside the TMJ (mainly, inflammatory mediators)12,13. Also, the arthrocentesis performed under pressure may help to remove adherences, eliminate the negative pressure in the joint with the distention the joint space, recovering the space of the joint disc and fossa, and changing the viscosity of the synovial liquid that helps the translation of the joint disc and condyle14. One of the advantages of the technique proposed in this paper is the use of a flexible and transparent catheter connected to the second needle and a vacuum pump. This appliance allows the visualization of the solution and the fluidity, guides the flow of solution used for joint washing and optimize irrigation regardless of the volume used. Physically this can be explained by the pressure difference15 inside and outside of the TMJ during the arthrocentesis. Once the irrigation solution is injected into the upper compartment, a pressure difference is created in relation to the external environment. Thus, the pressure inside the upper compartment gets much higher than on the outside. Due to the tendency to restore the pressure balance, the irrigation solution tends to come out of the upper compartment through the second needle. The efficiency of this process is accentuated by the vacuum pump, that also promotes other benefits already mentioned. Also, it can possibly reduce the risk of extravasation of solution used during irrigation, that already has been associated with a negative effect on the success of the procedure16.

CONCLUSION

Arthrocentesis is a simple, less invasive, and highly effective procedure. The aspect of this technique that is particularly relevant for clinical practice is the optimization of irrigation. However, new studies are necessary to compare different protocols of irrigation with and without the associated use of a vacuum pump.

REFERENCES

Interdisciplinary care in the treatment of orofacial pain. Case report
Atendimento interdisciplinar do tratamento da dor orofacial. Relato de caso
Luci Mara França Correia¹, Juliana Wille Silva¹, Henrique Lourenço da Costa Lima¹, Michael Krakauer¹

ABSTRACT

BACKGROUND AND OBJECTIVES: The importance of interdisciplinary action has been increasingly recognized in the area of health due to the global effect that has on the various symptoms of the patient. Interdisciplinarity is possible when professionals allow the exchange of knowledge through clinical meetings and jointly follow-up of the case. The objective of this study was to document the interdisciplinary care of patients with orofacial pain symptoms and comorbidities.

CASE REPORT: Female patient, 48 years old, diagnosed with muscular temporomandibular disorder and oral opening limitation, labyrinthine cervicalgia, tinnitus, sleep disorder, eating disorders and anxiety after evaluation with an odontologist, otorhinolaryngologist, physiotherapist, acupuncturist, psychologist and nutritionist. The 1-year follow-up with monthly visits with the dentist and nutritionist, and biweekly visits with a psychologist, physiotherapist, and acupuncturist showed symptoms control with total remission of the orofacial pain, cervicalgia, labyrinthitis. Tinnitus did not improve in the sense of frequency that remained constant, but according to the patient, there was an improvement in the adaptation to tinnitus in places with excessive noise, thus allowing a better social interaction. Nutrition and psychology made a great contribution to self-esteem and social routine as well as to seek for a better quality of life.

CONCLUSION: The interdisciplinary work promoted a global approach to the patient’s symptoms.

Keywords: Chronic pain, Comorbidity, Interdisciplinary, Orofacial pain.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A importância da ação interdisciplinar tem sido cada vez mais reconhecida na área da saúde, pelo efeito global que exerce sobre os diversos sintomas da paciente. A interdisciplinaridade é possível quando os profissionais permitem a troca do conhecimento através de reuniões clínicas e acompanhamento em conjunto do caso. O objetivo deste estudo foi documentar o atendimento interdisciplinar de paciente que apresentava sintoma da dor orofacial e comorbidades.

RELATO DO CASO: Paciente do sexo feminino, 48 anos, diagnosticada com disfunção temporomandibular muscular e limitação de abertura bucal, cervicalgia labiríntica, zumbido, distúrbio do sono, distúrbios alimentares e ansiedade após avaliação com odontólogo, otorrinolaringologista, fisioterapeuta, acupunturista, psicólogo e nutricionista. O acompanhamento de 1 ano com consultas mensais na área da odontologia e nutrição e consultas quinzenais na área de fisioterapia, acupuntura e psicologia demonstraram controle dos sintomas com remissão total da dor orofacial, cervicalgia, labiríntica. O zumbido não teve melhora no sentido de frequência que permaneceu constante, mas segundo a paciente houve melhora na adaptação ao zumbido em lugares com excesso de barulho, permitindo assim melhor interação social. A nutrição e a psicologia tiveram uma grande contribuição na autoestima e rotina social bem como na busca por melhor qualidade de vida.

CONCLUSÃO: O trabalho interdisciplinar promoveu uma abordagem global dos sintomas da paciente.

Descritores: Comorbidade, Dor crônica, Dor orofacial, Interdisciplinaridade.

INTRODUCTION

According to the American Academy of Orofacial Pain (AAOP), temporomandibular dysfunction (TMD) is defined as a set of clinical signs involving the muscles of mastication, temporomandibular joint (TMJ) and associated structures¹. The most frequent symptoms are muscle fatigue, pain in the face, in the TMJ, headache, and pain in the ears, limitation, and deviation of mandibular movements, and many cases may also present symptoms in the cervical region².

The close relationship between orofacial and cervical pain has been the subject of study by many researchers²⁻⁴. Several studies have shown the convergence of different types of nociceptive afferrors to the caudal subnucleus and can act together as a functional unit to process nociceptive information of craniofacial and cervical tissues, including deep craniofacial tissues, explaining the close relationship between painful symptoms in the facial and cervical region⁴.
The literature indicates that hyperexcitability in the central nociceptive system may favor the rise or maintenance of chronic pain in TMD cases. It is also possible to identify that the increased sensitivity of the mastication and cervical muscles may be related to the symptoms of cervical pain. In addition to the relationship with cervical pain, orofacial pain is closely linked with psycho-emotional aspects, which may act as predisposing factors (which increases the risk of TMD) and/or perpetuating factors (which interfere with disease control). This relationship between psychological factors and TMD is so relevant that the Diagnostic Criteria for Temporomandibular Dysfunction (DC/TMD) addresses 2 axes of assessment, one for physical factors called axis 1, and the one that assesses the intensity and severity of chronic pain and the levels of psychological symptoms with a biopsychosocial approach called axis 2. The reliability of DC/TMD has already been tested and considered satisfactory in adult populations.

When the mind gets sick, the body gets sick, and the influences of this mind-body relationship are very well evaluated by traditional Chinese medicine (TCM). In the Western world, health is often understood as the absence of disease. TCM considers the balance of body, mind, and spirit. Any imbalance of this integral unity causes disease, so the person must maintain a harmonious relationship within itself and everything around. TCM assesses the internal and external pathogenic factors using metaphorical language because of its historical and cultural origin and cannot be mistaken for the pathophysiology of contemporary medicine. Emotions such as fear, panic, anger, worry, joy (excessive excitement), sadness, and melancholy are all capable of generating physiological problems. For example, emotions such as anger and fear affect the liver and kidney, respectively. Knowing the close relationship between these various areas and the possible comorbidity among all symptoms, there is a need for an interdisciplinary approach to the treatment of TMD and all the variables involved. Given the current time and relevance of the topic, the present study aimed to describe an interdisciplinary approach relating the areas of dentistry, otorhinolaryngology, physiotherapy, psychology, acupuncture, and nutrition in the treatment of orofacial pain and other concomitant symptoms such as neck pain, labyrinthitis, tinnitus, anxiety, stress and low self-esteem.

**CASE REPORT**

A 48-year-old female patient sought TMD and Orofacial Pain evaluation with symptoms of facial fatigue, pain during mandibular movement, bilateral tinnitus more intense on the left side, also with cervical pain and labyrinthitis. The patient had a history of treatment for each of these complaints individually, with limited or short-term results. Treatment with labyrinthitis drugs, proposed by the otorhinolaryngology area and used during the last 30 months did not control the symptoms and labyrinthitis was daily with worsening moments throughout the day. The patient underwent clinical evaluation according to the following instrument and protocol:

1. Completion of the clinical record to detail the main complaint, TMD pain characteristics (location, intensity, quality, duration, recovery, and worsening factors), presence of other painful conditions in the cervical region, headaches or other pains, as well as like medical background;
2. Application of AAOP was used for differential diagnosis with other conditions that may resemble TMD;
3. Use of the TMD (DC/TMD) questionnaire to diagnose myalgia with mouth opening limitation. The masseter (superficial and deep belly) and temporal muscles were evaluated as well as the pain referred to the facial region when the sternocleidomastoid, suboccipital and trapezius muscles were palpated;
4. Physiotherapist assessment focusing on manual therapy. The presence of pain on active movements and range of motion (ROM), pain on palpation of cervical muscles and postural alteration (protruding shoulders and head), and mobility restriction of the cervical and thoracic fascia were diagnosed;
5. Psychological evaluation after filling axis 2 of the RDC that showing the negative influence of pain, tinnitus, and labyrinthitis on their daily activities and social relationship, as well as anxiety and concern for their health;
6. Nutritional assessment focusing on issues of tinnitus, pain, overweight, low self-esteem, previous diagnosis of ulcerative colitis, and anal fissure. At the nutritional assessment it was identified obesity 1 (WHO), weighting - 81.5 kg, height - 1.64 m, body mass index - 30.3 kg/m², imbalance in nutritional intake, with exacerbated consumption of simple carbohydrates;
7. A diagnostic evaluation by TCM in patients with labyrinthitis and climacteric. TCM associates these complaints with a kidney deficiency;
8. Completion of the pain diary and verbal numerical scale since the first assessment to monitor the progression or decrease of the pain and other symptoms.

The interdisciplinary team held a meeting before the beginning of the care to share the diagnosis of each area and present the proposed treatment plan. It was agreed as follows: dentistry and nutrition - one visit per month, physiotherapy, acupuncture, and psychology visits - twice a month, and biweekly clinical meetings to monitor the evolution of each area and exchange information, if necessary, with the patient's consent. The patient was asked to complete a pain diary containing information on the frequency and intensity of tinnitus, facial pain, neck pain, and labyrinthitis, as well as stress factors and sleep quality. A TMD therapeutic protocol was initiated with myofascial trigger point inactivation (TPI) of the masseter, temporal and sternocleidomastoid muscles during the first four months, as well as guidance on diet, muscle exercise, and thermotherapy. Concomitant with the dentistry work, physiotherapy sessions were initiated with manual myofascial release therapy and relaxation of the structures involved in the compensation and pain complex.

The treatment performed through manual therapy approached muscle spasm inhibition, connective tissue manipulation, myofascial release, and cervical joint mobilization. The otorhinolaryngologist evaluated the labyrinthitis who diagnosed a chronic hearing loss. The drug to control the labyrinthitis was already being used for one year without satisfactory results. Acupuncture was then introduced to help with this symptom. In
the first sessions, the patient noticed a difference in labyrinthitis and improved sleep quality and anxiety. By the fifth session, the labyrinthitis symptom was no longer constant, and there were reports of days without the complaint.

Psychology sessions took place every 15 days throughout the treatment. There was a worsening of the symptoms at two moments, directly related to stressful situations that emotionally unbalanced the patient, such as stressful situations at work, personal decisions, and self-perception of life. These situations were addressed by therapy, and with the patient’s consent, the other professionals involved were informed at the biweekly clinical meetings, to conduct the case better.

The improvement of the symptoms was gradual and followed at each appointment by the verbal numerical scale and the patient’s report.

The pain diary indicated 100% decrease in labyrinthitis, facial pain, and tension in the face and cervical region after nine months of treatment. Tinnitus did not improve in terms of volume reduction but reduced the patient’s perception of discomfort caused to the patient’s social activities or being in environments with noise or music.

Regarding nutrition, a menu was prescribed with nutritional adjustments to the profile and particularities presented by the patient.

In the eight months of nutritional follow-up, she had 100% improvement in pain, metabolic profile, food choice, and intake. She lost 7.7kg, which improved her self-esteem, motivation, and mood, with more physical and social activities in daily life. There was a volume reduction in tinnitus at only one moment of the nutritional treatment when specific supplementation started. However, it returned to the previous state. On the other hand, auditory perception does not bother her as much as before the interdisciplinary treatment.

**DISCUSSION**

Pain is one of the most common reasons for seeking health professionals, and TMD is one, which has shown a close relationship with several other comorbidities such as cervical pain and headache. All these dysfunctions may become chronic if not managed early on, causing physiopathological phenomena such as central sensitization and decreased the activity of the pain inhibitory system. Current research has shown that the relationship between painful symptoms in these various regions, when it occurs concomitantly, can be explained by the physiological mechanism of neuronal convergence.

In this patient, the influence of emotional factors on the worsening of the condition during the 9-month follow-up was evident. Other authors have also found the psychological factor influencing pain, especially muscle pain. In the Paiva Bertoli et al. study, the relationship between anxiety and TMD was significant, in both muscle and joint TMD, in the reduced disc displacement, about 70% of the sample had moderate anxiety, and about 12% had high anxiety. One possible explanation for the relationship between TMD pain and anxiety may be that anxiety exacerbates the tension of the mastication muscle. The Alkhudhairy et al. study showed, using questionnaires, that habits and emotion were statistically significantly related as “jaw pain or stiffness when waking up, or clenching teeth” and “how often were you upset about something that happened unexpectedly? ” or “have you had pain in your jaw, temple, ear, or in front of your ear” and “how many times have you been upset about something that happened unexpectedly ”. This biopsychosocial evaluation in the treatment of TMD is so important that DC-TMD included it in the axis II of psycho-emotional aspects evaluation. Dworkin et al. showed that severe levels of somatization could potentially mislead the interpretation of the clinical examination of axis I, influencing the diagnosis and control of TMD.

In this report, TMD was controlled after fourth months of treatment, with total remission of symptoms in the fifth month. However, there were two episodes of worsening after stabilization of pain and symptoms of facial tension and limitation of mouth opening, clearly related to emotional stress factors. New TPI sessions were held, and the emotional picture controlled, and symptoms disappeared.

According to TCM, the kidney physiology is also related to willpower or desire to accomplish something. The treatment greatly contributed to helping the patient to change her habits because, at each step, it promoted body self-perception, emotional control, and determined the physical balance.
As shown by Tai\(^9\), healing cannot be isolated by a specific physical method. Instead, any disease must be understood and treated in a holistic and balanced manner, as proposed by TCM\(^13\). Among the factors associated with tinnitus, metabolic changes may impair the functioning of the inner ear. This is because hair cell lesions resulting from peripheral insulin resistance, changes in glucose metabolism, hyperinsulinemia, hyperlipidemic diet, ATP availability, and oxygen levels can modify cochlear homeostasis\(^12\).

Nutritional monitoring, metabolic adjustment, and weight loss have contributed to improve the quality of life and self-esteem, inner ear functioning, helping to control labyrinthitis. Also, the inactivation of the trigger points during muscle TMD sessions, provided the relaxation of the ear and mastication muscles, contributing to the improvement of the tinnitus symptoms.

This is just a case report, with uncontrolled variables, but the interesting thing to highlight in this study is the fact that the patient had previously sought several treatments for several years, from isolated, non-simultaneous areas, which had very little or almost no results, so much so that the pain returned soon. When therapy became interdisciplinary and concomitant among all areas, the control was obtained, and the patient was able to achieve a relevant psycho-emotional balance and important body self-knowledge that keeps her healthy and with a good quality of life.

CONCLUSION

The interdisciplinary work allowed for a global approach to the patient’s symptoms.

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Headache after evaluation with transcranial magnetic stimulation in a healthy participant. Case report

Cefaleia após avaliação com estimulação magnética transcraniana em participante saudável. Relato de caso

Julie Azevedo Araújo Valente1, Maria José Pedreira Ramalho2, Janine Ribeiro Camatti3, Abrahão Fontes Baptista4

ABSTRACT

BACKGROUND AND OBJECTIVES: Adverse effects during noninvasive stimulation of the brain are rare events. The objective of this study is to present a patient’s case with an intense headache with autonomic signs after single-pulse transcranial magnetic stimulation.

CASE REPORT: A 28-year old female patient, volunteered to participate in a study on the evaluation of motor cortical excitability after the injection of lidocaine in the first dorsal interosseous muscle. The resting motor threshold was estimated at four moments: before the procedure, immediately after the procedure, 30 minutes, and one hour after the procedure. At the end of the experiment, 240 pulses were performed. The participant reported mild-intensity headache that rapidly progressed to severe, left hemi-cranial headache, the same region where the transcranial magnetic stimulation pulses were applied. In association with the pain, she had nausea, vomiting, photophobia, conjunctival hyperemia, lacrimation, and ipsilateral eyelid edema, requiring emergency care.

CONCLUSION: It is possible that supraliminal intensities (>100% of resting motor threshold) in single-pulse transcranial magnetic stimulation may predispose to adverse effects. Other factors such as skull anatomy, electrical impedance, age, gender, cognitive and affective status, use of medications, hormone levels, the concentration of neurotransmitters and receptor expression, genetic factors and the circadian cycle may also be involved. There are no well-established safety models to guide assessment protocols with single-pulse transcranial magnetic stimulation, considered a technique with a low incidence of adverse effects and with little demand for safety studies.

Keywords: Case report, Headache, Transcranial magnetic stimulation.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Efeitos adversos durante a estimulação não invasiva do cérebro são eventos considerados raros. O objetivo deste estudo foi apresentar um caso de paciente com cefaleia intensa com sinais autonômicos após estimulação magnética transcraniana de pulso único.

RELATO DO CASO: Paciente do sexo feminino, 28 anos, saudável, voluntariamente se apresentou para participar de pesquisa sobre avaliação de excitabilidade cortical motora após a realização de injeção de lidocaína no músculo primeiro interóseo dorsal. O limiar motor em repouso foi estimado em quatro momentos: antes do procedimento, imediatamente após o procedimento, 30 minutos e uma hora após o procedimento. Foram realizados ao final do experimento 240 pulsos. A participante referiu cefaleia, de leve intensidade, que rapidamente progrediu para cefaleia intensa, hemi-craniana à esquerda, na região onde os pulsos da estimulação magnética transcraniana foram aplicados. Em associação à dor, apresentou náuseas, vômitos, fotofobia, hiperemia conjuntival, lacrimejamento e edema palpebral ipsilateral, com necessidade de atendimento em unidade de emergência.

CONCLUSÃO: É possível que intensidades supraliminares (>100% do limiar motor em repouso) em estimulação magnética transcraniana de pulso único possam predispor a efeitos adversos. Outros fatores como anatomia do crânio, impedância elétrica, idade, sexo, estado cognitivo e afetivo, uso de fármacos, níveis hormonais, concentração de neurotransmissores e expressão de receptores, fatores genéticos e ciclo circadiano também podem ser implicados. Não há modelos de segurança bem estabelecidos para guiar protocolos de avaliação com estimulação magnética transcraniana de pulso único, considerada uma técnica com baixa incidência de efeitos adversos e com baixa demanda de atenção de estudos sobre segurança.

Descritores: Cefaleia, Estimulação magnética transcraniana, Relato de caso.

INTRODUCTION

Transcranial Magnetic Stimulation (TMS) is based on the principle of electromagnetic induction of an electric field on
the skull surface of sufficient magnitude to trigger the depolarization of cortical neurons. Adverse effects during non-invasive brain stimulation are considered rare events, especially during the administration of single- and paired-pulse TMS, techniques used to assess cortical excitability. Studies using single-pulse TMS can assess central motor conduction time and causal chronometry in brain-behavior relations. The use of the paired-pulse allows the assessment of intracortical facilitation and inhibition measures, as well as the study of cortico-cortical interactions. The occurrence of mild and transient headache, hearing impairment, neck pain, and toothache are considered possible adverse effects with these techniques. Seizures, acute hypomania, histotoxicity, cognitive, brain and hormonal changes, such as elevated TSH and lactate levels, have not been described in studies with single- and paired-pulse TMS, although they have been reported during high-frequency repetitive transcranial magnetic stimulation (rTMS) and theta-burst protocols.

This study aimed to present a case of severe headache with autonomic signs after single-pulse TMS in a healthy young woman.

**CASE REPORT**

Right-handed, white, 28-year-old female patient volunteered to participate in research at the functional neurostimulation laboratory of the Federal University of Bahia (UFBA), to assess the motor cortical excitability after injection of lidocaine in the first dorsal interosseous muscle. After applying a safety questionnaire and signing the Free and Informed Consent Form, this participant was included in the study. She denied a history of comorbidities, drug use, recreational drugs, recent caffeine or cigarette consumption, sleep deprivation, implantable brain devices, seizure history, and pregnancy. When asked about the date of her last period, she could not remember the exact date, but said she was in the ovulatory period. This participant had previously volunteered in other studies involving TMS assessment without any complications.

Cortical excitability and organization were assessed with a TMS device (Bistim, Magstim, Reino Unido). After cleaning with alcohol and abrasive solution, the self-adhesive electromyography (EMG) electrodes (Miotec, Brasil) were placed on the muscular belly of the first dorsal interosseous (FDI), abductor pollicis brevis (APB) and abductor digitii minimi (ADM) muscles of the participant's right (dominant) hand, which was comfortably seated in a chair, and kept awake throughout the assessment protocol. A polyester cap previously marked with a 1x1cm grid oriented in the Cartesian plane was placed on the participant's head and served as a reference for hotspot marking. An eight-coil was used on the surface of the left frontoparietal region, corresponding to the primary motor cortex. Monophasic paired- and single- pulses were administered every six seconds, and EMG activity was amplified and converted to digital signal (1401 and 1902, CED, Reino Unido) and monitored in real-time using Signal software (CED, Reino Unido). The average of 5 pulses in points under the described region was used to identify the hotspot, aiming to obtain the best response in motor evoked potential (MEP) size in the FDI muscle. After this step, the resting motor threshold (RMT) was determined, considering the lower intensity of the device to generate a MEP peak-to-peak with an amplitude of 50 µVolts. This threshold was estimated at four moments: before the procedure, immediately after, 30 minutes and one hour after the procedure. In each of these moments, 60 pulses were distributed randomly between 20 pulses at 100% of the RMT, related to MEP; 20 pulses at 80% of the RMT, with 2ms intervals, corresponding to the short-term intracortical inhibition measure, and 20 pulses at 120% of the RMT, with 15ms intervals, relative to the Intracortical Facilitation estimates, totaling at the end of the experiment 240 pulses.

The procedure, performed by an anesthesiologist, was chosen randomly by drawing sealed envelopes. The participant underwent dry needling in the FDI muscle of the dominant hand, and no substance was injected (Table 1).

<table>
<thead>
<tr>
<th>RMT (%)</th>
<th>Baseline</th>
<th>Immediately after needling</th>
<th>30 min after needling</th>
<th>1h after needling</th>
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<tr>
<td>50</td>
<td>59</td>
<td>63</td>
<td>61</td>
<td>58</td>
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<tr>
<td>80% RMT</td>
<td>40</td>
<td>42</td>
<td>41</td>
<td>38</td>
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<tr>
<td>120% RMT</td>
<td>59</td>
<td>63</td>
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RMT = resting motor threshold.

During pulse application, the participant did not report any complaints. However, in the first minute after the end of the last data collection, the participant reported a mild headache that rapidly progressed to severe, left hemiceranial headache. In association with headache, she presented nausea, photophobia, conjunctival hyperemia, tearing, and ipsilateral eyelid edema. She denied similar previous episodes, but reported an irregular history of premenstrual headache (mean of three to four episodes per year), however, without medical follow-up. Two anesthesiologists and two physical therapists were present during the collection and provided care to the participant, who was placed in a horizontal supine position on a stretcher and had vital signs checked within normal limits. Dipyrone was administered orally. The participant was observed for approximately 60 minutes, until she reported headache improvement, and was then released and advised to contact the medical team involved in the research if symptoms returned. A few hours after being released, the participant presented headache return, with the same characteristics as before, but at this moment, accompanied by nausea and vomiting. She was instructed to use naproxen (500mg), cyclobenzaprine (5mg) and ondansetron (4mg) orally, with complete relief of symptoms, as well as outpatient follow-up with a neurologist. Two days after the event, the participant had her menstrual flow. The investigation was performed by cranial nuclear magnetic resonance and electroencephalogram without changes.
DISCUSSION

The use of TMS devices has become increasingly common in both basic research and clinical therapies\(^1\). In the application of repetitive transcranial magnetic stimulation (rTMS), many safety parameters are suggested, such as the total number of pulses, duration, and intervals between pulses, intervals between stimulation sessions, coil type, and stimulation site\(^3\). In the application of single-pulse TMS, the pulse amplitude, in theory, does not cause therapeutic changes. Therefore, there are no well-established safety models to guide assessment protocols with single-pulse TMS, considered a technique with a low incidence of adverse effects and low attention demand from safety studies\(^4\). However, there are studies reporting adverse effects when supraliminal intensities (>100% of the RMT) are used in single-pulse TMS\(^5\). Moreover, more than just technical requirements, other factors can influence the response of TMS, being much more difficult to control, but no less important: skull anatomy, electrical impedance, age, gender, cognitive and affective state, drug use, hormone levels, neurotransmitter concentration and receptor expression, genetic factors and circadian cycle\(^6\).

Headache in single-pulse TMS protocols is considered a rare occurrence and little described in the literature\(^6\). In the last study on the safety and TMS, it was described that the presence of neck pain, toothache, and discomfort under the region where the coil is positioned are possible to occur with single pulses\(^1\). This argument cannot be applied since the participant had already participated in other study protocols, and she was aware of the TMS effects. The occurrence of trigeminal headache, with signs and symptoms very similar to those presented by the participant in this study, was described after the application of rTMS\(^8\) protocol.

In this specific case, the etiology can be established by a therapeutic test performed with the administration of oxygen and immediate relief of symptoms. The diagnosis of the type of headache presented by the participant, whether trigeminal headache or migraine with autonomic signs\(^9\) was impaired in this report since the data collection was performed in an out-of-hospital unit and without the presence of a neurologist. Thus, there was impairment in the assessment of the case, since the differential diagnosis was made retrospectively.

CONCLUSION

Although rare, adverse effects are possible with the use of single-pulse TMS. It is critical that researchers be familiar with the most common occurrences to identify and follow up with each case.

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Dear Editor,

The relationship between sleep and pain was recently revisited by Whibley et al.¹ who aimed to provide additional evidence on the mutual interaction between those functional states of life. But something is missing, so we think. Sleep and pain lay down in common structural and functional matrices. However, neither anatomical pathways or neurochemical substrates may entirely explain the complex interaction which subsides the physiopathology and clinical features of comorbid sleep impairment with acute or chronic pain. Interestingly, while acute pain experience may develop a state of increased arousal from which an individual becomes ready to run away from the real or potential physical injury, chronic pain often involves a state of rest in which the individual tries to become protected from the harmful stimulus. In both cases, the behavior seems to reflect a protective instinct which had probably contributed to make sleep/wake cycle and pain a succeeded evolutionary interactive trait. In the clinical scope, this relationship is highly important as it mutually affects sleep and pain-related disturbances and impacts the prognosis of many disorders co-occurring with any of those conditions.

Both sleep and pain are functions of a well-orchestrated multi-oscillatory mechanism characterizing the Circadian Timing System (CTS), with a central clock and several peripheral oscillators collectively known as peripheral clocks. These complex and self-maintained machinery dictates an internal time for virtually all our physiology². Therefore, it is reasonable to accept an interdependent process between those vital functions, which in turn mutually feed in a circadian fashion favoring a multidimensional clinical outcome.

Although sleep-related circadian regulation is perfectly established, there is a lack of good quality studies on circadian mediation of either pain and sleep-pain interaction, thus leading to a misinterpretation of the true directional dynamics. Insufficient or inadequate sleep is known to contribute to increased pain intensity and a reduction of pain tolerance. CTS plays a fundamental role in sleep propensity, which was early integrated and reappraised in an explanatory model for sleep regulation³. On the other hand, pain either in idiopathic form or associated with a primary condition may negatively impact sleep in all its domains depending on the circadian moment⁴. Some important features of pain are indeed clock-dependent even if is not defined whether those rhythms are derived from daily oscillations within the underlying causes driving the pain or from the rhythmic oscillatory component of the neural processing of pain. Finally, chronotype is also a signature on pain-related oscillatory mechanisms regardless of the social time⁵. Understanding the basics of such temporally guided processes may provide not only a deeper knowledge of the interactive physiological mechanisms between sleep and pain but also an important background to clinical decisions. Furthermore, the multidimensional features of circadian modulatory systems within the distinct mechanisms of pain makes their interconnection a must in any kind of analytic approach of sleep-pain interaction turning the CTS a factor to include in a future review model based on mediation analysis.

Keywords: Circadian rhythm, Circadian rhythm sleep disorders, Pain, Sleep disorders.

Conflict of interests: none – Sponsoring sources: none

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INSTRUCTIONS TO AUTHORS

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1. Structured abstract, with no more than 250 words. For Research articles and Clinical Trials, please include: BACKGROUND AND OBJECTIVES, METHODS, RESULTS and CONCLUSION. For case reports, please include: BACKGROUND AND OBJECTIVES, CASE REPORT and CONCLUSION. For review articles, please include: BACKGROUND AND OBJECTIVES, CONTENTS and CONCLUSION. Please include up to six keywords. We recommend the use of Bireme’s Health Sciences Descriptors – DeCS, available at http://decs.bvs.br/.

2. Abstract: The English version of the abstract shall be forwarded together with the article. Please include up to six keywords.

3. Body of text: Organize the text according to the types of below described articles. In original articles with humans or animal’s ethic aspects shall be informed in addition to the number and the year of the Institution’s Ethics Committee process. Acknowledgements to other collaborators may be mentioned at the end, before the references.

TYPES OF ARTICLES
The submission of experimental or clinical research articles, with humans or animals, implies that authors have obtained approval from the relevant Ethics Committee and that they comply with the Declaration of Helsinki. This type of statement shall be included in the chapter "METHODS".

For all articles including information about patients or clinical pictures, the written and signed consent from each patient or relative shall be obtained to be forwarded to the journal with the submission process. Generic drug names shall be used. When trade names are used in the research, these names shall be included in brackets in the chapter "METHODS".

ORIGINAL ARTICLES
1. Introduction – this section shall briefly describe the scope and previous evidence-based knowledge for the design of the research, based on subject-related references. At the end, the research objective shall be clearly stated. Please include up to six authors.
Methods – shall include study design, sample selection processes, ethic aspects, exclusion and inclusion criteria, clear description of interventions and methods used, in addition to data analysis as well as sample power and applied statistical tests.
Results – shall be objectively described, further explained with figures and tables when needed. Analyses carried out and their results shall be included.
Discussion – this section shall discuss research results at the light of previous knowledge published by scientific duly mentioned sources. This section may be divided in sub-chapters. Please include study limitations and close with the conclusion of the paper. Whenever possible, include clinical implications and information about importance and relevance of the study.
Acknowledgments – acknowledgments to collaborators, among others, may be mentioned in this section, before references.
References – shall be formatted according to Vancouver standards (http://www.icmje.org).

Figures and Tables – shall be sent separately from the text of the article in a format allowing for edition (figures in Excel and tables in Word).
CASE REPORTS
1. Case reports with relevance and originality are invited to be submitted to BrJP. A limit of 1800 words shall be respected. Findings shall be clearly presented and discussed at the light of scientific literature, mentioning references. Please include up to three authors. The body of the text shall contain: INTRODUCTION, CASE REPORT, DISCUSSION, Acknowledgments and References. Figures and tables illustrating the text may be included.

2. REVIEW ARTICLES
Literature reviews on relevant pain subjects, with literature critical review and systematically carried out are welcome. They shall contain no more than 3000 words and be structured as follows: INTRODUCTION, CONTENTS, CONCLUSION, REFERENCES.

3. Letters
Letters or comments to any published article shall be sent to the journal, with no more than 400 words and up to five references.

REFERENCES
BrJP adopts the “Vancouver Standards” (http://www.icmje.org) as style to format references. These shall be presented in the text in numerical sequential order in superscript. Unpublished papers shall not be mentioned and preferably avoid mentioning abstracts presented in scientific events. References older than 5 years shall be mentioned if fundamental for the article. Articles already accepted for publication may be mentioned with information that they are in publication process. Up to six authors may be mentioned and, if there are more, include et al. after the names. Journal title shall be abbreviated.

EXAMPLES OF REFERENCES
Journal articles:

Article with published erratum:

Supplement article:

Book: (when strictly necessary)

Book chapter:

Theses and dissertations: Shall not be accepted.

ILLUSTRATIONS AND TABLES
All illustrations (including figures, tables and pictures), shall be compulsorily mentioned in the text in the preferred place for their inclusion. Please number them in Arabic numbers. All shall have title and captions. Please use pictures and figures in black and white and restrict their number to a maximum of three. The same result shall not be expressed by more than one illustration. Graphic signs, figures of acronyms used in tables or figures shall have their correlation mentioned as footnote. Figures and tables shall be sent separately from the text and in format allowing for edition, according to the following recommendations.

Digital Format
Submission Letter, Manuscript and Figures shall be forwarded in DOC format (Windows Word standard); figures in bars or lines shall be forwarded in Excel (extension XLS). Pictures shall be digitalized with minimum resolution of 300 DPI in JPEG format. File name shall express illustration type and number (Figure 1, Table 2, for example). Copies or reproductions of other publications shall be allowed only after attachment of express authorization of the Editing Company or of the Author of the original article.

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When reporting experiments with human beings, please indicate whether procedures were in compliance with ethical standards of the Committee in charge of the human experiment (institutional or regional), and with the Declaration of Helsinki from 1975, amended in 1983. The number of the Research Ethics Committee approval shall be mentioned.

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BrJP respects World Health Organization and International Committee of Medical Journal Editors – ICMJE policies for the registry of clinical trials, acknowledging the importance of such initiatives for international disclosure of information about clinical research with open access. So, as from 2012, preference shall be given to the publication of articles or studies previously registered before a Platform of Clinical Trials Registry meeting the requirements of the World Health Organization and of the International Committee of Medical Journal Editors. The list of Platforms of Clinical Trials Registry may be found at http://www.who.int/ictrp/en, from the International Clinical Trials Registry Platform (ICTRP). Among them there is the Brazilian Registry of Clinical Trials (ReBEC), which is a virtual platform with free access for the registry of experimental and non-experimental studies carried out with human beings, in process or closed, by Brazilian and foreign researchers, which may be accessed at http://www.ensaiosclinicos.gov.br. The registry number of the study shall be published at the end of the abstract.

Use of Abbreviations:
Title, summary and abstract shall not contain abbreviations. When long expressions are present in the text, they do not have to be repeated after INTRODUCTION. After their first mention in the text, which shall be followed by the initials in brackets, it is recommended that their initials in capital letters replace them.

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