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Durval Campos Kraychete

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Over 30 years working with the Pain Management Clinic, and after almost four years as Editor-in-Chief of a scientific journal that has been gradually improving its technical quality, I wonder how pain, as a physical symptom, changes the course of the subject’s history. Surely the patient suffers. I emphasize that pain and suffering are words that translate distinct meanings and are surrounded by an ocean of meanings. Existential suffering from what a person is, ends up creating physical pain. And physical pain causes suffering. I remember one patient I cared for earlier in my career who had her legs and two fingers amputated and lost her memory, financial status, social position, and body image. Undoubtedly, there was physical pain throughout the amputation process, and the suffering was of the order of my imagination. There is pain when there is empathy. Fortunately, the patient did not evolve with phantom limb pain, either on the amputation stump, which could have had more dramatic consequences. All of this after a gastrointestinal infection, followed by septicemia and systemic vasculitis. The impact of this incident, however, at the peripheral and central neuronal level, is still a major challenge for researchers. After all, any mnemonic record that causes pain, suffering, and changes the natural course of the subject’s history is still hermetically treated in psychotherapy offices, and after, on average eight years comes to the care of a specialized physician. Contemporary ephemerality, the reason for so many absences, including that of love and compassion for others, besides the desperate search for a position of strong social representation, move the patient away from the caregiver and health professional. Perhaps, the consequences over time of the recording in the nervous system of pain and suffering in newborns and premature infants, currently reported in publications as anxiety, abdominal pain, reduction in intelligence coefficient score, among others, alert health professionals about the importance of avoiding pain and suffering at any level. I emphasize that this binomial does not make a person better but worse. The burdens and aggression imposed by the modern world interfere with the course of the subject’s history, depending on individual genetics, environment, social, economic, and psychic history, and are modulated by their ability to cope. So that patient-centered pain education programs have clearly aided treatment adherence and outcome. I conclude this reflection by emphasizing that caring for the body, soul, and spirit is fundamental to the correct flow of a full life: without pain and suffering. Life is to be happy.

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REFERENCES

Clinical evaluation and prevalence of fibromyalgia in hepatitis C patients

Avaliação clínica e prevalência de fibromialgia em pacientes portadores de hepatite C

João Batista Santos Garcia1, Silvia Amália de Melo Moura2, Durval Campos Kraychete3, Anita Perpetua Carvalho Rocha Castro4, Marilia Arrais Garcia5

ABSTRACT

BACKGROUND AND OBJECTIVES: The worldwide distribution and etiology of fibromyalgia are poorly understood. It is believed that different factors are involved, such as hepatitis C virus infection. The aim of this study was to estimate the prevalence of fibromyalgia in hepatitis C virus infected patients, trying to identify the occurrence of liver injury, extrahepatic clinical manifestations, anxiety, depression, and the impact on the quality of life.

METHODS: This is a cross-sectional study of patients (n=118) with hepatitis C virus infection who were compared with a group of clinically stable patients not infected with the hepatitis C virus (n=118). The Anxiety and Depression Questionnaire was applied, and for those diagnosed with fibromyalgia, the Fibromyalgia Impact Questionnaire. Liver biopsies were analyzed according to the METAVIR classification. The Schirmer test was performed to investigate abnormal tear production in the studied patients. Data analysis was performed using the Statistical Package for Social Sciences (SPSS) software, v.10.0.

RESULTS: The prevalence of fibromyalgia in infected patients was 7.6%. In patients infected with fibromyalgia, a significant prevalence of anxiety and depression was observed. Fibromyalgia Impact Questionnaire scores were higher in infected patients with fibromyalgia. When comparing the complementary tests in infected patients with and without fibromyalgia, no significant differences were found for the Schirmer test, viral genotype, and degree of fibrosis and liver inflammation.

CONCLUSION: In females, there was a positive relationship between hepatitis C virus infection, fibromyalgia, and extrahepatic symptoms, which translates into a higher prevalence of anxiety and depression and impaired quality of life.

Keywords: Chronic pain, Fibromyalgia, Hepatitis C.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A fibromialgia tem distribuição mundial e etiologia pouco compreendida. Acredita-se no envolvimento de diferentes fatores, como a infecção pelo vírus da hepatite C. O objetivo deste estudo foi estimar a prevalência de fibromialgia em pacientes infectados pelo vírus da hepatite C, procurando identificar a ocorrência de lesão hepática, manifestações clínicas extra-hepáticas, ansiedade, depressão e o impacto na qualidade de vida.

MÉTODOS: Trata-se de um estudo de corte transversal com pacientes (n=118) portadores de infecção pelo vírus da hepatite C que foram comparados a um grupo composto de pacientes clinicamente estáveis e não infectados pelo vírus da hepatite C (n=118). Foi aplicado o Questionário de Ansiedade e Depressão, e para os que obtivessem o diagnóstico de fibromialgia, o Questionário de Impacto da Fibromialgia. As biópsias hepáticas foram analisadas de acordo com a classificação METAVIR. Foi realizado o teste de Schirmer para a pesquisa de lacrimejamento anormal nos pacientes estudados. A análise dos dados foi realizada através do programa Statistical Package for Social Sciences (SPSS) v.10.0.

RESULTADOS: A prevalência de fibromialgia em pacientes infectados foi de 7,6%. Nos pacientes infectados com fibromialgia observou-se prevalência significativa de ansiedade e depressão. A pontuação do Questionário de Impacto da Fibromialgia foi maior nos pacientes infectados e com fibromialgia. Quando se relacionou os exames complementares em infectados com e sem fibromialgia, não foram constatadas diferenças significativas para o teste de Schirmer, genótipo viral e grau de fibrose e inflamação hepática.

CONCLUSÃO: Nos indivíduos do sexo feminino, observou-se uma relação positiva entre a infecção pelo vírus da hepatite C, fibromialgia e sintomas extra-hepáticos, que se traduzem em maior prevalência de ansiedade e depressão e em comprometimento na qualidade de vida.

Descritores: Dor crônica, Fibromialgia, Hepatite C.

INTRODUCTION

Fibromyalgia (FM) is a chronic disease that affects approximately 0.2-6.6% of the world’s population, with a prevalence of 0.7 to 11.4% in urban areas and from 0.1 to 5.2% in rural areas. In
Brazil, it is also present in 2.5% of the population. FM is more prevalent in young women and has a variable behavior depending on the evaluation period and the diagnostic criterion. FM was defined by the American College of Rheumatology (ACR) in 1990 as a musculoskeletal pain syndrome lasting more than three months in which the patient reports pain at 11 of the 18 possible painful points on both sides of the body, above and below the waist, and pain in the axial skeleton. This concept, however, has changed over time. In 2010, the diagnostic criterion considered widespread pain index (WPI) ≥7; symptom severity scores (SS) ≥5 or WPI between 3-6 and SS ≥9; pain for more than three months and no other disease that explained the pain. Fatigue, non-restful sleep, and cognitive disorders were evaluated as absent, mild, moderate, and severe on a scale from zero to 3. Somatic complaints such as paresthesia, headache, depression, anxiety, irritative bowel syndrome, mouth and/or eye symptoms and Raynaud’s phenomenon, among others, were classified according to the number of symptoms (0 = no symptoms; 1 = few symptoms (10-20); 2 = moderate number of symptoms (20 to 30); 3 = large number of symptoms (30 to 41). In 2011, after reviewing the 2010 criteria, only the somatic symptoms that persisted for six months were considered as headache, pain, or colic in the lower abdomen and depression with a score between zero and 3. Finally, in 2016, the 2011 criteria were further revised, and it was validated that the WPI should be between 4-6 and the SS scale ≥9. Pain is also required in 4 of 5 regions (4 quadrants and axial skeleton), except for the face and abdomen, and there may be another causal relationship morbidity with FM. Despite all the reflection on the diagnostic concept, the different definitions only contributed to the increase of FM diagnosis in males.

FM may be related to genetic predisposition and inadequate activation of the hypothalamic-pituitary-adrenal axis and autonomic nervous system (ANS) in response to stress. It can also occur after infectious and autoimmune diseases, physical and psychic trauma, systemic diseases, and viral infections, such as hepatitis C virus (HCV) infection.

Hepatitis C is a chronic infection caused by a Flaviviridae RNA virus, whose transmission occurs through contact of contaminated biological materials with continuity solutions. It is estimated a prevalence of 1.0% for HCV infection worldwide. HCV causes hepatic inflammation and steatosis, changes that explained the pain. Fatigue, non-restful sleep, and cognitive disorders were evaluated as absent, mild, moderate, and severe on a scale from zero to 3. Somatic complaints such as paresthesia, headache, depression, anxiety, irritative bowel syndrome, mouth and/or eye symptoms and Raynaud’s phenomenon, among others, were classified according to the number of symptoms (0 = no symptoms; 1 = few symptoms (10-20); 2 = moderate number of symptoms (20 to 30); 3 = large number of symptoms (30 to 41). In 2011, after reviewing the 2010 criteria, only the somatic symptoms that persisted for six months were considered as headache, pain, or colic in the lower abdomen and depression with a score between zero and 3. Finally, in 2016, the 2011 criteria were further revised, and it was validated that the WPI should be between 4-6 and the SS scale ≥9. Pain is also required in 4 of 5 regions (4 quadrants and axial skeleton), except for the face and abdomen, and there may be another causal relationship morbidity with FM. Despite all the reflection on the diagnostic concept, the different definitions only contributed to the increase of FM diagnosis in males.

This study aimed to estimate the prevalence of FM in HCV-infected patients from a university service located in northeastern Brazil. Secondary objectives are to identify the occurrence of liver injury, extrahepatic clinical manifestations, psychiatric disorders, as well as the impact on the quality of life of patients infected or not with FM.

MÉTODOS

This was a study of patients with HCV infection who were compared to a group of clinically stable and non-HCV uninfected patients. The calculated sample was 118 with infection and 118 without infection for a power of 80%; α=5%, considering a prevalence of FM in infected individuals around 14% versus an average of 3% found in the population without infection.

To start the evaluation, the patients were asked about their interest in participating in the research by signing a Free and Informed Consent Term (FICT).

The HCV group consisted of patients treated at the Liver Nucleus, linked to the University Hospital of the Federal University of Maranhão (HUUFMA), from January 2009 to January 2010, who had the ELISA (Enzyme-Linked Immunosorbent Assay) positive test and subsequent confirmation of viral RNA in peripheral blood.

Patients in the HCV infection group completed questionnaires, underwent a physical exam and laboratory tests, were over 18 years, had no other liver or infectious disease, neurological, psychiatric, neuromuscular, rheumatological, autoimmune diseases and had not used interferon during the last six months.

The group without infection consisted of randomly selected patients from the medical clinic, with the same mean age, gender ratio, and characteristics already mentioned, with serology for hepatitis C negative, according to the ELISA test.

Participants had medical records reviewed, and epidemiological data such as age, gender, and monthly income were recorded. For those infected, data were recorded regarding risk factors for infection and viral genotype. During the interview, the following symptoms were investigated in both groups: fatigue, Raynaud’s phenomenon, myalgia, arthralgia, subjective complaints of dry eye (sicca), paresthesia, diabetes, hypertension, purpura, and pruritus.

To diagnose dry eye, all patients underwent the Schirmer test, which was performed using a millimeter tape made with an absorptive paper. The tape was left for five minutes in contact with the patient’s lower ocular mucosa at the junction of the middle third with the lateral. The test was read after 10s of its removal from the ocular mucosa. In this study, only values lower than 5mm were considered as a positive criterion for dry eye.

The diagnosis of FM was based on the 1990 ACR criteria, recommended at the time of the study. Generalized pain was evaluated quantitatively via verbal numeric scale (VNS), and qualitatively through characteristics attributed by the patient himself (sting-
The emotional impact caused by the chronic disease was evaluated through the Hospital Anxiety and Depression Scale Questionnaire (HADS) and the Fibromyalgia Impact Questionnaire (FIQ), the latter for those individuals diagnosed with FM. Both questionnaires have already been validated in the national territory, with their respective socio-cultural adaptations.

The HADS consists of 14 questions, of which seven score for the diagnosis of anxiety and seven for the diagnosis of depression. The answers have weights ranging from zero to three points. The cutoff point considered was 9 for anxiety and 9 for depression. The FIQ consists of 10 items that evaluate functional capacity, work absence, work difficulties, pain, fatigue, stiffness, sleep, anxiety, and depression. The total score ranges from 0 to 100, being stratified by degrees of FM involvement, and between 50-70 for a moderate degree.

Liver biopsy results were recorded if the patient had a test performed less than or equal to a year ago, and were analyzed according to the METAVIR classification, which shows degrees of fibrosis and hepatic necroinflammatory activity. The degree of fibrosis was stratified from 0 to 4, where F0 = absence of fibrosis, F1 = portal fibrosis without septa, F2 = few septa, F3 = numerous septa without cirrhosis, F4 = cirrhosis. Necroinflammatory activity was also measured in A0 = absence of inflammatory activity, A1 = mild activity, A2 = moderate activity, A3 = intense activity.

This study was approved by the UFMA Research Ethics Committee, protocol 001911/2008.

**Table 1. Sociodemographic characteristics in HUPD patients with and without hepatitis C virus. São Luís, MA, 2009**

<table>
<thead>
<tr>
<th>Variables</th>
<th>HCV+ n=118</th>
<th>HCV- n=118</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years old)</td>
<td>52.44</td>
<td>52.34</td>
<td>0.9</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>42</td>
<td>35.6</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>76</td>
<td>64.4</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td>0.62</td>
</tr>
<tr>
<td>No income</td>
<td>23</td>
<td>19.5</td>
<td></td>
</tr>
<tr>
<td>Up to 1MW</td>
<td>33</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>1-5 MW</td>
<td>52</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>&gt;5MW</td>
<td>10</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td>0.99</td>
</tr>
<tr>
<td>Married</td>
<td>81</td>
<td>68.7</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>9</td>
<td>7.6</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>17</td>
<td>14.4</td>
<td></td>
</tr>
<tr>
<td>Widower/widow</td>
<td>11</td>
<td>9.3</td>
<td></td>
</tr>
</tbody>
</table>

| n = number of patients; % = percentage; *p<0.05 for statistically significant values; \( \bar{X} \) = average. |

Statistical analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) v.10.0 program. The Chi-square test was used to compare categorical variables (sociodemographic characteristics, symptoms, genotypes, ST biopsies, Student's t for age between the group with and without infection, and those infected with and without FM. A descriptive analysis was performed for the other variables. Variables with p < 0.05 were considered a significant difference.

**RESULTS**

A total of 336 patients (118 with HCV and 118 without HCV) were analyzed, evaluated for their sociodemographic characteristics, which did not differ significantly between the groups (Table 1).

Of the infected patients, 47 (40%) reported not being exposed to risk factors for HCV. Twenty-eight subjects (24%) reported having had blood transfusion, nine (7.5%) had a history of drug use and/or tattoos, 16 (13.5%) had used glass syringes, six (5%) had reported occupational exposure, six (5%) had contacts with infected and six (5%) reported other risk factors.

Of the 118 infected patients, 42 underwent liver biopsy less than or equal to one year ago. In addition, 20 patients already had a diagnosis of liver cirrhosis. Thus, a total of 62 patients with known hepatic fibrosis were classified according to the METAVIR criteria. It was observed that 21 (33.87%) were in F4; one (1.60%) in F3; 11 (17.7%) in F2; 16 (25.8%) in F1; 13 (20.96%) in F0. When analyzing the necroinflammatory degree, it was found that of the 42 known, 18 (42.8%) patients were in stage A0; 20 (47.6%) in A1; one (1.60%) in A2; and one (2.38%) in A3.

Of the 118 infected patients, 74 had viral genotypes distributed as follows: 52 (44.0%) had genotype 1; six (8.3%) genotype 2 and 16 (22.2%) genotype 3.

Regarding the symptoms reported by the patients, complaints of arthralgia, fatigue, myalgia, dizziness, subjective edema, pruritus, and headache were statistically significant, with a higher predominance in the HCV positive group (Table 2).

There was no statistical difference between groups when anxiety was evaluated (p=0.772). On the other hand, there was a higher prevalence of depression in the infected group (p=0.051). There was a significant difference between the groups when the ST was applied, with 23.7% of the infected presenting dry eye (p=0.001). A significant relationship was found between HCV infection and FM. Of those infected, 9 had FM (7.6%), while in the uninfected group, only one patient (0.8%) had FM (p=0.01). The only patient in the FM group without infection was female, married, with a monthly income of less than one minimum wage.

The infected group was then divided into patients with and without FM, and the sociodemographic data were compared (Table 3).

Females were statistically significant in the FM group. The analyses were performed, taking into consideration only the female group. There were no differences in mean age between infected women with and without FM, nor regarding other demographic data.
In evaluating exposure to risk factors in FM-infected individuals, blood transfusion was the most common route (4/9), followed by the unknown route (2/9) and subsequently by occupational exposure, tattooing, and other forms in equal proportions (1/9). Of the patients infected with FM, two had a liver biopsy, and two already had the diagnosis of cirrhosis. Regarding the degree of liver fibrosis, according to the METAVIR criteria, it was observed that one (25%) patient presented with F1, 1 (25%) with F2, and two cirrhotic (50%) with F4. Regarding the inflammatory degree, one patient was A1 and the other A0. When comparing the degrees of fibrosis and necroinflammatory activity between those infected with and without FM, no statistically significant differences were observed.

Regarding the viral genotype of FM-infected patients, of the 118 infected patients, 74 had viral genotype distributed as follows: 52 (70.27%) had genotype 1, 16 (8.3%) genotype 2, and 16 (22.2%) genotype 3. When these patients were compared to those infected without FM, no statistical significance was observed between the groups (p=0.097).

No statistical differences were found for viral genotype (p=0.225) and degree of liver fibrosis (p=0.722) when considering only women infected with and without FM.

Regarding the symptoms reported by the patients, complaints of arthralgia, fatigue, myalgia, non-restorative sleep, dizziness, paresthesia, sicca, constipation, cold sensitivity, subjective edema, purpura, headache, and complaints of Raynaud’s phenomenon were statistically significant with higher prevalence in those infected with FM (Table 4).

When analyzing only women infected with FM, it was observed that the most significant complaints had a similar pattern to the previous group regarding pain complaints, fatigue, paresthesia, dizziness, sleep alteration, and morning stiffness. In the infected group, when comparing those who did not have FM with those who had FM, there were no statistically significant differences regarding ST (p=0.206), although there was a significance regarding the complaint of dry eye by those infected with FM.

In infected patients, there was a significant prevalence of anxiety in 77.7% and depression in 66.7% in the FM group (p<0.001). Similar results were found when considering only women in the FM-infected group compared to the group without, with an association with anxiety and depression in 71.4% (p=0.047) and 57.1% (p=0.005), respectively. For ST, no associations were found (p=0.455).

Regarding pain intensity, the average grade obtained by VNS was 7.5 in FM-infected patients. Regarding the quality of pain in patients with FM, 77.7% of patients complained of stabbing pain; 66.6% stinging pain; 55.5% throbbing pain; 44.4% pain in weight; 22.2% burning pain; 22.2% other types (Figure 1).

### Table 2. Prevalence of symptoms in hepatitis C virus-infected compared to uninfected treated at HUPD in São Luís, MA, 2009

<table>
<thead>
<tr>
<th>Variables</th>
<th>HCV+</th>
<th></th>
<th>HCV-</th>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paresthesia</td>
<td>37(31.4)</td>
<td>27(22.9)</td>
<td>0.143</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sicca</td>
<td>22(18.6)</td>
<td>16(13.6)</td>
<td>0.288</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthralgia</td>
<td>54(45.8)</td>
<td>22(18.6)</td>
<td>&lt;0.001*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myalgia</td>
<td>43(36.4)</td>
<td>29(24.6)</td>
<td>0.048*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purple</td>
<td>7(5.9)</td>
<td>11(5.9)</td>
<td>0.367</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raynaud’s Syndrome</td>
<td>1(0.8)</td>
<td>1(0.8)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pruritus</td>
<td>20(16.9)</td>
<td>7(5.9)</td>
<td>0.008*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>46(39)</td>
<td>27(22.9)</td>
<td>0.015*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective edema</td>
<td>29(24.6)</td>
<td>15(12.7)</td>
<td>0.019*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td>5(4.2)</td>
<td>0</td>
<td>0.024*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constipation</td>
<td>26(22)</td>
<td>28(23.7)</td>
<td>0.594</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonrestorative sleep</td>
<td>22(18.6)</td>
<td>20(16.9)</td>
<td>0.734</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morning stiffness</td>
<td>25</td>
<td>20(16.9)</td>
<td>0.474</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary Urgency</td>
<td>21</td>
<td>12(10.2)</td>
<td>0.183</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>20(16.9)</td>
<td>15(12.7)</td>
<td>0.360</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad memory</td>
<td>40(33.9)</td>
<td>39(33.1)</td>
<td>0.890</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dizziness</td>
<td>40(33.9)</td>
<td>26(22)</td>
<td>0.042*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold sensitivity</td>
<td>19(16.1)</td>
<td>30(25.4)</td>
<td>0.078</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n = number of patients; % = percentage; * p<0.05 for statistically significant values.

### Table 3. Epidemiological profile of hepatitis C virus patients with and without fibromyalgia treated at the HUPD Liver Nucleus in São Luís, MA, 2009

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>HCV+</th>
<th></th>
<th>HCV+</th>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years old)</td>
<td>59.70</td>
<td>57.06</td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>36</td>
<td>33</td>
<td>7</td>
<td>77.8</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>73</td>
<td>67</td>
<td>2</td>
<td>22.2</td>
</tr>
<tr>
<td>Income</td>
<td>No income</td>
<td>21</td>
<td>19.3</td>
<td>2</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>Up to 1MW</td>
<td>30</td>
<td>27.5</td>
<td>3</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>&gt;5MW</td>
<td>48</td>
<td>44</td>
<td>4</td>
<td>44.4</td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
<td>76</td>
<td>69.7</td>
<td>5</td>
<td>55.6</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>7</td>
<td>6.4</td>
<td>2</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>15</td>
<td>13.8</td>
<td>2</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>Widower/Widow</td>
<td>11</td>
<td>10.1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>No activity</td>
<td>45</td>
<td>41.3</td>
<td>2</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>Remunerated</td>
<td>44</td>
<td>40.4</td>
<td>2</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>Retired</td>
<td>8</td>
<td>7.3</td>
<td>3</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>Pensioners and others</td>
<td>12</td>
<td>11</td>
<td>2</td>
<td>22.2</td>
</tr>
</tbody>
</table>

n = number of patients; % = percentage; * p<0.05 for statistically significant values; X = average.
DISCUSSION

Although not having a well-defined etiological factor, FM has an established association with infectious diseases such as chronic Lyme disease, hepatitis C, coxsackievirus, parvovirus, and human immunodeficiency virus.\(^1\)^\(^2\)\(^3\)

This study examined 118 chronically HCV-infected patients, with an average age above 50 years. Of the sample, 35.6% were women. The route of contamination was unknown in 40% of cases, followed by blood transfusion, similar to that described in the literature for developing countries.\(^30\)^\(^31\)

Several studies with a similar design in different parts of the world have found a positive association between HCV infection and FM. Buskila et al.\(^15\) observed a significant prevalence of FM (16%) in the infected group when compared to the group without HCV (3%). Rivera et al.\(^16\), in a study conducted in Spain, found 10% of those infected with FM compared to 1.7% of the group without infection. Kozanoglu et al.\(^19\), in Turkey, observed that 18.9% in the group with hepatitis C had FM, compared to 5.3% without the syndrome. In a similar study, Goulding, O’Connell and Murray\(^17\) found 5% of FM in infected individuals compared to 1.72% of the group without infection. In Brazil, a non-comparative cross-sectional study by Loureiro et al.\(^24\) showed a prevalence of FM in infected individuals of 12%. In this study, a positive association was found between C virus infection and FM, with results of 7.6% of HCV positive

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>HCV+</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthralgia</td>
<td>45</td>
<td>9</td>
</tr>
<tr>
<td>Fatigue</td>
<td>38</td>
<td>8</td>
</tr>
<tr>
<td>Myalgia</td>
<td>36</td>
<td>7</td>
</tr>
<tr>
<td>Nonrestorative sleep</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Dizziness</td>
<td>33</td>
<td>7</td>
</tr>
<tr>
<td>Paresthesia</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>Sicca</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>Constipation</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Morning stiffness</td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td>Cold sensitivity</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Subjective edema</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>Bad memory</td>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>Pruritus</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>Purple</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Urinary urgent</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>Concentration difficult</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>Headache</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Raynaud’s Syndrome</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

n = number of patients; % = percentage; *p<0.05 for statistically significant values.
patients with FM compared to 0.9% of HCV negative group. As can be seen, a lower percentage when compared to the other studies already described. This result could be explained by the different proportions of women who composed each study. The study with FM prevalence of 18.9% had 65% of the sample consisting of women. As for the 16% prevalence of FM in infected patients, 46% of the study population was women. The reflection of female significance in the genesis of the relationship between FM and HCV was observed in this study and reinforced by several authors. In addition to FM, it is known that other extrahepatic symptoms may be observed in patients with hepatitis C. Musculoskeletal pain complaints are common, with a prevalence of 50-81%. In a study by Poynard et al., fatigue was highlighted in 53% of patients, followed by arthralgia (23%), paresthesia (17%), and myalgia (15%). In this study, the most reported symptoms among infected people were arthralgia (45.8%), fatigue (39%) and myalgia (36.4%). In the group of HCV patients with FM, it was observed that pain complaints were significantly more frequent. Dry syndrome, also known as sicca, is characterized by complaints of dry eye and/or mouth that can be objectively observed with specific tests such as Schirmer’s. This syndrome may be part of the Sjögren’s syndrome (SS), which makes up the picture of rheumatologic manifestations associated with the C virus. The diagnosis of SS is given along with specific tests such as Schirmer’s. This syndrome is characterized by complaints of dry eye and/or mouth that can be objectively observed with specific tests such as Schirmer’s. The diagnosis of SS is given along with specific tests such as Schirmer’s. It is believed that dryness complaints, restricted only to the subjectivity of the patient, could contain an association with the psychological characteristics of this population with such significant degrees of anxiety, depression and pain complaints. Several theories have been proposed to explain extrahepatic complaints in patients with C virus infection. Thompson and Barkhuizen suggested that changes in cytokine dynamics could be involved in these extrahepatic manifestations. Other theories for the causes of such manifestations would be the patient’s emotional state at the news of a chronic infection, influence of the viral genotype, or the reduction of liver-produced substances (IGF-1), the lack of which would be responsible for musculoskeletal injuries. Another element to consider is the difference in the design of the studies used for discussion. All studies with a similar design were in agreement to find a relationship between FM and HCV. However, those who researched HCV infection in patients known to have FM had different results. Few studies address the evaluation of the role of anxiety and depression in patients with hepatitis C and FM. Rivera et al. put the emotional factor on a secondary level, since when researching the C virus infection in patients with FM, they observed that this infection is more prevalent in this group than in the control group. This points to the viral role in the genesis of pain syndrome. It is important to note that most patients did not know about the infection and/or that it would have a chronic course. Therefore, they would not have the emotional impact established by this news. A similar conclusion was found in a study conducted in Paraná by Silva et al. Goulding, O’Connell and Murray present a study that evaluates the degree of anxiety and depression in HCV and FM patients, revealing higher anxiety in this group when compared to healthy patients. They also show that the high degree presented by these patients is independent of the presence or absence of circulating viral RNA in the blood and the route of infection. In this study, there was a tendency for a higher prevalence of depression in HCV patients than in those without HCV. There was no significant difference between anxiety levels. When comparing those infected with and without FM, it was observed that 78% of FM had anxiety and 66.7% depression compared to 23 and 13% for anxiety and depression infected without FM. This difference, being statistically significant, supports the emotional influence on the genesis of FM. However, one cannot rule out the role of the infection itself in the generation of FM, since in this group it is not known what the initial event was: pain or depression. Two studies evaluating the quality of life presented by fibromyalgic patients with HCV according to the FIQ showed an average of 52.2 and 85.9 points. These values are considered moderate and severe, respectively. In the study in question, the impact was more intense in patients with virus C, with an average of 59.77 points, a value considered moderate. Unfortunately, it was not possible to make a comparison with the group without infection, as it presented only one fibromyalgia patient with mild impact (43.58 points). When the items were discriminated, the ones with the highest score were related to difficulties in performing tasks and work, pain intensity, fatigue, alteration of well-being, alteration in functional capacity, work absences, anxiety, depression, stiffness and morning fatigue. Given the relevance of pain and fatigue in the worsening of quality of life in positive HCV and, knowing that these are common extrahepatic manifestations, C virus infection is now considered an important factor in FM genesis. Other evidence supporting this theory is that when comparing the group with and without HCV, there are similar
degrees of anxiety and depression, but more prominent pain complaints in the group that has the infection as a differential. Among those infected, pain complaints become more prevalent in those patients with FM, as well as a higher number of anxiety and depression cases. Different neurotransmitters have been related to the genesis of the symptoms presented by patients with HCV and FM. Wallace et al. demonstrated elevated levels of IL-8, IL-1 and IL-6 in patients with FM. Thompson et al. established a connection between cytokine alterations as a consequence of infection and the origin of pain. High levels of alpha tumor necrosis factor have been observed in infected patients, also related to a worse prognosis. In a study by H. Marotte et al., an improvement in pain and a decrease in FM pain points were observed with the use of an alpha tumor necrosis factor antagonist. Other substances also participate in the genesis of FM as substance P and serotonin. Increasing substance P, or reducing serotonin levels and its precursor, tryptophan, are believed to contribute to the development of this disease. This finding corroborates the theory of viral genesis in this pain syndrome. This thinking is the basis of the theory of cytokine release as an etiological factor for FM, which would be directly or indirectly due to HCV infection. Given these studies and the high levels of anxiety and depression found in this population, it is thought that there is an association of different factors in the etiology of FM in patients with HCV. Elements that predispose pain, such as HCV infection and individual characteristics in dealing with the news of being a chronic disease, are believed to contribute to higher pain intensity and suffering in this group of patients. The most prevalent genotype in the HCV population was 1, present in 67.6% of known cases and all patients in the FM and infected group. When analyzing only the group composed of women infected with and without FM, the results were similar. The dissociation between hepatic impairment and the development of pain syndrome was also a concern of the authors of this study, as well as that of Buskila et al. When comparing cirrhotic that had C virus infection as their differential, they initially noticed a significant prevalence of FM in those infected. However, considering that FM is more frequent in females, and that there was an unequal gender distribution between HCV groups with and without cirrhosis, they reviewed the results obtained. In a second moment, they evaluated only females and definitively ruled out the association between cirrhosis and FM. In order to avoid such bias, this study analyzed only the variables of the female population infected with and without FM, and no association was considered between the degree of inflammation, the degree of liver fibrosis, and FM.

**CONCLUSION**

This study demonstrated, in females, a positive relationship between HCV, FM infection and extrahepatic symptoms, which translates into a higher prevalence of anxiety and depression, consequently a compromise in the quality of life of these individuals.

**REFERENCES**

Pain: the impulse in the search for health by means of integrative and complementary practices

Dor: o impulso na busca pela saúde por meio de práticas integrativas e complementares

BACKGROUND AND OBJECTIVES: This study investigated the relations between the playful component and the process of rehabilitation, treatment, and promotion of health in the context of a group that treats the pain, located in Florianópolis (Brazil).

METHODS: The research followed a qualitative approach, a descriptive-exploratory field research. A matrix-guided systematic observation was conducted for two months by the group leader, two volunteers and about 15 participants. A field diary was used to register complementary information. Besides two semi-structured interview guides were used, applied to four members and the person responsible for the group after the two-month observational period. The data were organized and analyzed in three topics: “Characterization of the investigated group and dynamics of the meetings,” “The group as healing potential” and “Lian Gong/Qi Gong as a possibility to look at the pain.”

RESULTS: The participants pointed out that working on Lian Gong/Qi Gong, meditation and auriculotherapy contemplating the playful component the group becomes a place of recognition of each one’s pain subjectivity, by the individual that suffers and by the collective, which has fostered the recovery of specific pain and good sensations to those involved, such as happiness, enthusiasm and pleasure.

CONCLUSION: The creation of the group and people’s engagement has decreased the number of specific requests for physiotherapy sessions and provided greater autonomy to the participants to handle their own pain.

Keywords: Group, Lian Gong/Qi Gong, Pain, Recreational.

JUSTIFICATIVA E OBJETIVOS: Este estudo investigou as relações estabelecidas entre o componente lúdico e o processo de reabilitação, tratamento e promoção da saúde no contexto de um grupo que trata da dor, localizado em Florianópolis (SC).

MÉTODOS: A pesquisa seguiu uma abordagem qualitativa, tendo sido realizada por meio de uma investigação de campo, configurando-se como descritivo-exploratória. Foi realizada observação sistemática, durante dois meses, guiada por uma matriz, envolvendo a responsável pelo grupo, duas voluntárias e cerca de 15 integrantes. Para o registro de informações complementares, utilizou-se um diário de campo. Além disso, foram utilizados dois roteiros de entrevistas semiestruturadas, aplicados com quatro integrantes e com a responsável pelo grupo, ao final do período dos dois meses de observações. Os dados foram organizados e analisados em três tópicos: “Caracterização do grupo investigado e dinâmica dos encontros”, “O grupo como potencial de cura” e “Lian Gong/Qi Gong como uma possibilidade de olhar para a dor”.

RESULTADOS: Os participantes indicaram que ao trabalhar Lian Gong/Qi Gong, meditação e auriculoterapia, contemplando o elemento lúdico, o grupo tornou-se um local de reconhecimento da subjetividade da dor de cada um, pelo indivíduo que sentia e pelo coletivo, gerando melhorias nas dores específicas e trazendo boas sensações aos que estão envolvidos, como alegria, entusiasmo e prazer.

CONCLUSÃO: A criação do grupo e o engajamento das pessoas diminuiu o número de pedidos específicos de sessões de fisioterapia e proporcionou maior autonomia do participante em atender a sua própria dor.

Descriptores: Dor, Grupo, Lian Gong/Qi Gong, Lúdico.

INTRODUCTION

The sensation of pain is fundamental to survival, even though it is described as an unpleasant subjective sensory and emotional experience. It is an important and complex phenomenon that originates from injuries or stimuli, such as heat, cold, pressure, chemical irritants, sudden movements. These stimuli can be modified by the memory, expectation, and emotions experienced by each person. All sensations experienced from pain are part of important physiological, sensory, affective, cognitive, behavioral, and sociocultural domains of human experience. To talk about pain is to talk about life, for one is inherent in the other, sometimes in memory or in the personal experience of those who felt or feel, except for rare exceptions. Pain is generally
not the same as it lasts, with varying intensity, and may change from time to time, from day to day, characteristic that can be linked to the context, the time of day, a gesture, a drug, among many other objective and subjective aspects that are part of the pain experience. Even if they are considered expressions of withdrawal from a condition considered healthy, pain and functional disability are elements reported below expectations and not specifically recorded by the Basic Health Units (BHU) in Brazil. Due to its high prevalence, more attention is needed from professionals working at the BHU to treat it efficiently, since one of the primary care strategy responsibilities in Brazil is to maintain a preventive attitude to the population’s health-disease problems.

In Brazil, it is estimated that chronic pain affects around 30 to 40% of the population, being described as one of the leading causes of sick leave, early retirement, labor compensation, and low productivity, and can be pointed as a public health problem. In the Brazilian reality, especially in the context of the BHUs, the word “pain” is said and heard practically every day in the routine of care. Listening to these types of reports, a physiotherapist, working in a BHU in the south of Florianópolis (SC), founded an open group, aiming to promote autonomy in the treatment of pain (acute and chronic). Pain starts to be viewed according to each person, taking into account the social condition, the cultural context, and their history.

With initiatives such as this, it is, therefore, possible to think of humanized care, which means listening, capturing, and meeting, as thoroughly as possible, people’s health needs, always seeking quality care. Complementing this idea, the Ministry of Health (MOH) advocates that the individuals assisted should not be reduced to purely technical intervention objects. According to the National Health Promotion Policy (PNPS), actions and services in the health area should aim at the equity and quality of life of people to reduce vulnerabilities and health risks arising from social, economic, political, cultural, and environmental determinants.

The structuring and strengthening of attention in Integrative and Complementary Practices (PIC) in SUS occurs through the insertion in all levels of care, with emphasis on primary care, multi-professional development, as well as the establishment of financing mechanisms, elaboration of technical and operational standards for the implementation and articulation with the other policies of MOH.

As a result of initiatives such as these, more humanized relationships developed by the BHUs are being established, in which the playful component presents itself as a fertile path, which can be understood as the anima (soul) that moves the human being, and unproductive pleasure, that is, what drives or feeds playing, partying, and other activities marked by the end in themselves. In this sense, it is believed that health care that takes into account the playful component would be experienced in its entirety, in which professional and user would be immersed at the moment, beyond a set of activities or a list of idealized qualities as spontaneity, fun, joy, creativity, pleasure, dream or immediacy.

From this perspective, this study aimed to investigate the relationships established between the playful component and the process of rehabilitation, treatment, and health promotion in the context of a group that treats pain. This group is located in Florianópolis (SC) and has been developed by residents and health professionals.

**METHODS**

With a qualitative approach, carried out through a field investigation, it is configured as descriptive-exploratory research. The qualitative research was chosen because it did not seek to generalize the findings, but rather to deepen the aspects of the context of the participants in their daily living. The description was used, trying to go deep into the details that characterize the studied phenomenon, with no intention of testing or building theoretical models.

It is important to emphasize that, according to the International Association for the Study of Pain (IASP), the qualitative research enables, with its resources, an individualized contact with patients, giving voice to the experiences of those who live with pain. Thus, qualitative knowledge allows the understanding of the patient as a whole, not just as body parts, thus contributing to the decision-making regarding health care.

The group investigated, entitled the Pain Group, worked in one of nine BHU selected to participate in a broader research, of which this study is part, entitled “The playfulness and rehabilitation in public and private institutions in Florianópolis (SC).” The Pain Group met at the Residents’ Association headquarters in a neighborhood located in the southern region of Florianópolis on Wednesdays, from 9 am to 10 am, being coordinated by a physiotherapist, accompanied by a nutritionist, two health agents, and two physiotherapy residents.

The data collection started by the systematic observation technique, applied during two months, in seven meetings, with a total duration of 10h30 minutes. The systematic observation matrix referred to the activities developed in the group, including: playful activities, forms of appropriation of the playfulness by the responsible (the playfulness as vehicle, object or work method), results and forms of playfulness appropriation by the group members (implicit and explicit expressions). The observations applied as a data collection instrument through the systematic matrix involved the group leader, two volunteers and about 15 members. To record complementary information to this matrix, a field diary was used to verify and obtain an accurate description of the situations/phenomena that met the research objectives, as well as the records of emotions and details that overflowed the matrix.

In addition, two semi-structured interview scripts were used, applied to four members, and the group leader at the end of the observation period. The script for the members comprised of questions that besides the identification data, included the following elements: reasons for participation and permanence in the project; meaning given to the group/project; changes (personal and/or health) from joining; possible changes to the professional, location, activities or methods; and perception of
playful activities in the group/project. In turn, the interview script for the leader included: identification data; professional career; understanding of the term “playfulness”; working time with playful activities; characteristics of the public served by the groups/projects (gender, age, places); choice of contents and how they are developed; expected and achieved results; evaluation mechanisms; and possible differences in working with playful activities inside and outside the institution.

Since the participation in the group was open, there was no attendance control, with participants continually joining and quitting. Thus, after the observations, the members of the group were chosen to participate in the interview with the help of the leader, especially considering their frequencies. Table 1 presents the characteristics of the research participants.

All interviews were conducted in a quiet and reserved place. Before starting the interviews, the participants and the leader signed the Free and Informed Consent Form (FICT) and the Consent Form for Photographs, Videos, and Recordings. An audio recorder was used to record the interviews. The participants’ names have been replaced by fictitious names to preserve their identities.

The data obtained through observations, field diary, and interviews were analyzed by thematic analysis, which consists of organization, preparation, reading, coding, and description of the data, followed by representation and interpretation of the analysis. At the end of this process, the thematic topics were reached: “the group as a healing potential” and “Lian Gong/Qi Gong as a possibility to look at pain”.

This study was approved by the Ethics Committee of the Santa Catarina State University, under number 916.511 of 2014.

RESULTS

During the meetings, it was possible to notice elements that are permanent during the period of the activity, such as lit incense, low music with slow melody, and soft but well-intoned voices of the leader and the trainees that mediated the action. The work of the group investigated was characterized by an initial welcoming moment, in which some dynamics usually occurred; the members get closer and know each other better,Dragging around the room, to look at each other, verbal communication, even briefly.

In a second moment of the meetings, the Lian Gong/Qi Gong guided exercise practice from the Traditional Chinese Medicine (TCM) was performed aimed at developing the use of vital energy. It was divided into four phases: a) Unlocking, responsible for releasing the channels to capture the energy more efficiently, thus strengthening the bone structure and marrow; b) Uptake, in which external energy is captured; c) Circulation, movements are made to favor the circulation of the energy captured through the channels, in order to clean, nourish and strengthen the internal organs; and, finally, d) Storage, when the energy reserve occurs with the intention to use when needed.

While one of the leaders demonstrated the sequence of movements to the group, the other two walked around, observing and, if necessary, giving individual orientation to each of the participants to improve the quality of the movement. Next, the leader conducted a meditation session in which participants imagined hugging a tree. From this image/sensation, they were led to carry an imaginary light that went throughout their body to unlock the energies that were disturbing and producing the pain; and embrace the energies that helped them reduce their pain. Soon after, a sentence from the leader, the trainees or participants, such as “bad thoughts destroy the opportunities and plant the suffering of tomorrow” was read and repeated, “it is wonderful to come home when so many have nowhere to go” (FD 21/10/2015), “none of us is as good as all of us together” (FD 7/11/2015), among others.

In the end, the participants had auriculotherapy, a method also coming from the TCM, using points located in the pinna to treat various body disorders. In this case, the stimulus was made by mustard seeds stuck in the specific ear points of the patients and changed every 15 days. This ended up being the most intimate moment between patients and professionals because when asked what they felt, they ended up having brief consultations, placing the seeds where needed, and sometimes venting about something that bothered them regarding the various aspects of their life.

From the observations and interviews conducted, it was observed that the audience over 50 years was the most frequent, since the time and day of the meetings may have been a barrier for more people to participate. A fact confirmed in the response of the leader in relation to the public served by the project: “Everyone wanted to participate, but due to the schedule, we had more old people. But all who wanted to participate could come.”

Table 1. Identification of participants

<table>
<thead>
<tr>
<th>Participants</th>
<th>Fictitious name</th>
<th>Marital status</th>
<th>Age (years old)</th>
<th>Health problem</th>
<th>Profession</th>
<th>Gender</th>
<th>Group participation time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part. 1</td>
<td>Julieta</td>
<td>Widow</td>
<td>69</td>
<td>Yes</td>
<td>Housewife</td>
<td>F</td>
<td>5 months</td>
</tr>
<tr>
<td>Part. 2</td>
<td>Carlos</td>
<td>Did not inform</td>
<td>61</td>
<td>Yes</td>
<td>Retired</td>
<td>M</td>
<td>4 months</td>
</tr>
<tr>
<td>Part. 3</td>
<td>Clóvis</td>
<td>Did not inform</td>
<td>65</td>
<td>Yes</td>
<td>Retired</td>
<td>M</td>
<td>4 months</td>
</tr>
<tr>
<td>Part. 4</td>
<td>Adelaide</td>
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<td>59</td>
<td>Yes</td>
<td>Housewife</td>
<td>F</td>
<td>1 year</td>
</tr>
<tr>
<td>Leader</td>
<td>Rosa</td>
<td>Married</td>
<td>32</td>
<td></td>
<td>Physical therapist</td>
<td>F</td>
<td>Founder</td>
</tr>
</tbody>
</table>

Source: Own authorship (2019).
The professional responsible for the group informed that the participants adhered to the project both by medical indication and willingness, respecting their interests and needs. Throughout the collection period, the climate variation was intense, but with little change in the group frequency, demonstrating the motivation of the participants to integrate this group.

DISCUSSION

The attendance of participants to the group was something that has drawn our attention and can be justified by the remarkable presence of the playful element during the development of the proposed activities, as noted in the FD, in relation to spontaneity: “[…] observing Juliet and Clovis, they talked how good it was to come to the group, until she said, ‘I do things here that I’ve always felt like doing, but I was ashamed of; now I do it spontaneously,’ and he nodded.”(FD 11/11/2015). This fact meets the response of Rosa, professional responsible for the Pain Group. She stated that playfulness can be any activity characterized by “[…] relaxation, so that people feel comfortable in what they are doing and are happy and not an imposed thing; but, yes, something that makes them feel good” (Rosa).

Rosa believed that activities aimed at pain management, when permeated by the playful element, even favored people’s participation in relating the group to good feelings, happiness, and relaxation. Thus, studies that advocate humanized treatment through welcoming environments that use playful activities as a form of health recovery and pain distraction are, therefore, restated.

Professionals’ conceptions about health and care regarding practices are varied. Some related the PICs to the individualization of care, the professional-patient relationship, self-care, light technologies, and the patients’ biopsychosocial and spiritual context. In turn, the professionals who do not have training in PICs did not describe any relationship with these spiritual context. In turn, the professionals who do not have care, light technologies, and the patients’ biopsychosocial and alization of care, the professional-patient relationship, self-practices are varied. Some related the PICs to the individu-

activities as a form of health recovery and pain distraction. Thus, studies that advocate humanized participation in relating the group to good feelings, happiness, and relaxation. Thus, studies that advocate humanized treatment through welcoming environments that use playful activities as a form of health recovery and pain distraction are, therefore, restated.

Professionals’ conceptions about health and care regarding practices are varied. Some related the PICs to the individualization of care, the professional-patient relationship, self-care, light technologies, and the patients’ biopsychosocial and spiritual context. In turn, the professionals who do not have training in PICs did not describe any relationship with these practices, nor with the therapeutic and natural stimulation training in PICs did not describe any relationship with these spiritual context. In turn, the professionals who do not have care, light technologies, and the patients’ biopsychosocial and alization of care, the professional-patient relationship, self-practices are varied. Some related the PICs to the individu-

In the positive repercussions in the physical spheres, the feeling of belonging to a group was perceived, the creation of an identity as being part of something that transcends individualism, corroborating the evidence of improvement and relief of chronic pain, promoting quality aging, through group practices that enable socialization. Thus, the group’s routine has become a meeting point, creating moments of coexistence for the members, in which they can know the realities of other people who also have similar or different pain and talk about such experiences. In this sense, it was very sensitive to understand the welcome to a new member, as described below: “[…] at the time of auriculotherapy, […] the members were already giving their opinions about what they thought and encouraging a new member of the group to also participate in this activity, saying it was wonderful and stating that she would not regret […]” (FD 11/11/2015).

From these statements, it was noted that the group has become a place for the sharing of various pains, since the forms of reaction to pain are never identical because they are loaded with multiple social and cultural conditions, besides the history of each person. Therefore, it is necessary to consider the particularities of each individual, because even if the pain is installed in only one body fragment, changes in relationships transcend the individual physical body, reaching the totality of the relationship with the world. In this way, it is important for those who suffer, even if the most banal pain, to have their experience recognized by the other, in the other and from the other. Therefore, the Pain Group becomes a place of recognition of the subjectivity of each one’s pain by the collective, corroborating the idea that the group itself is a potential space for healing.

In a study conducted in another context, which aimed to evaluate the presence of chronic pain in elderly practitioners of Chinese gymnastics (Lian Gong/Qi Gong) and sedentary elderly, the result shows that the practice was related to the decrease in the use of medication, the positive perception of their own health, the inclusion of autonomy practices in self-care and the impression of less impairment to perform daily activities. These findings confirm the data found from the interviews and observations of this research, being possible to understand the importance of all the activities that make up the Pain Group, especially the practice of Lian Gong/Qi Gong, as reported by Claudio: “For me, it was a very good thing, I have never exercised at home. Now I come here. When I can’t come, during the week I do some of these exercises, and saying that she liked it a lot, especially the music. […]” (FD 7/11/2015).

This attention to the playful element is shown as one of the reasons for the participants’ engagement in the group, making them think that doing in-group becomes more relevant than doing in the group. That is, the group is as important as the suggested practice itself, as put by a participant: “[…] the environment we form in the group is so good. The day I miss the meeting, I feel something is missing and on Wednesdays that I don’t have it, I’m sorry. For me it was very important, I had never participated in a group and I am loving it” (José Cirio Floreiro).

That day, the group started the activity with a circular dance. They played very calm music, and the steps were simple, but as someone always forgot some movement, everyone ended up laughing, including the person who made a mistake. “[…] In the end, one lady gave her opinion about that meeting,
it helps a lot my health” and by Adelaide: “All exercises are very favorable, important, rewarding, and the seed also helps a lot.” In addition, the observations made it possible to capture moments of explanations of the leader to the participants, demonstrating the importance of the movements stating: “[...] they serve not only for the body but for the circulation of energy” (FD 11/11/2015). Participants highlighted their changes after joining the group, beyond the physical issues, as Adelaide demonstrates: “Improvement, optimism, joy, lots of changes, good things” and Juliete: [...] everything I do has helped me much. Because before, I was very down, because I have my hands like this (showed the hands with some injuries that took them out of body alignment) because I have arthritis. I do biodance, gymnastics on Tuesday and Thursday, and on Wednesdays, we get out of there and come to this therapy. For me, everything I do helps me.

The statements indicated zeal from the participants who, slowly, do the exercise of “[...] plunging into the innermost of the suffering man to try to understand how he deals with biological data to appropriate his behaviors and what meaning it gives him”3, so that he can have autonomy and ability to deal with, improve and resolve his pain and perhaps help others who need.

The number of specific requests for physiotherapy sessions before and after joining the group is unknown. However, the professionals of the Pain Group expect a reduction of the requests and a greater autonomy of the participant to handle their pain with the use of alternative resources worked in the group (Lian Gong/Qi Gong exercises, meditation, and auriculotherapy) which have been accompanied by other good feedback from participants, such as the manifestation of decreased pain, more satisfaction, joy, pleasure, enthusiasm, among others.

CONCLUSION

The Pain Group was considered an important action to improve the lives of the people involved, as it recognizes the potential of humanized actions in therapeutic initiatives that favor the playful element not only concerning physical pain, but also the psychological and social aspects.

REFERENCES

Back pain in adolescents: prevalence and associated factors

Dor nas costas em adolescentes: prevalência e fatores associados

Mirna Namie Okamura1, Wilma Madeira2, Moisés Goldbaum3, Chester Luiz Galvão Cesar1

ABSTRACT

BACKGROUND AND OBJECTIVES: Back pain is one of the most common pain in humans. It impacts the health and quality of life and can be disabling. Diseases detected in adolescence and poorly managed may get worse in adulthood. The objective of this study is to estimate the prevalence, the associated factors and the characteristics of back pain in adolescents living in the city of São Paulo.

METHODS: A cross-sectional population-based study – Health Survey in São Paulo (2015) with 539 adolescents of both genders between 15 and 19 years old was used. The information was collected through home interviews and the participants were selected by probabilistic sampling. Frequencies, Chi-square test, and logistic regression analysis were used in this analysis. The level of significance was 5%.

RESULTS: The estimated prevalence of back pain in adolescents in the city of São Paulo was 22.4%. Back pain in adolescents had the following associated factors: dizziness (OR 3.1), common mental disorder (OR 2.4), insomnia (OR 2.6) and perform household chores (OR 1.8). To relieve the pain, 46.6% of adolescents do nothing, 17.3% use self-medication and 8.9% use prescribed medication.

CONCLUSION: Acknowledging back pain as a public health problem requires strategies that allow us to learn the origins, associated factors and coping strategies that may influence new ways of prioritizing and organizing healthcare. Keywords: Adolescent, Back pain, Cross-sectional studies, Low back pain, Prevalence.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Dor nas costas é uma das dores mais comuns do ser humano. Afeta a saúde e a qualidade de vida, podendo ser incapacitante. Doenças detectadas na adolescência e mal manejadas podem se agravar na vida adulta. O objetivo deste estudo foi estimar a prevalência, fatores associados e características de dor nas costas em adolescentes da cidade de São Paulo.

MÉTODOS: Estudo transversal de base populacional – Inquérito de Saúde da Capital 2015, com 539 adolescentes de ambos os sexos e entre 15 e 19 anos. As informações foram coletadas por meio de entrevistas domiciliares e os participantes foram selecionados a partir de amostragem probabilística. Frequências, teste do Qui-quadrado e análise de regressão logística foram utilizados na análise. O nível de significância adotado foi 5%.

RESULTADOS: A prevalência estimada de dor nas costas em adolescentes da cidade de São Paulo foi de 22.4%. Dor nas costas em adolescentes apresentou fatores associados com: tontura (OR 3.1), transtorno mental comum (OR 2.4), insônia (OR 2.6) e realizar atividades físicas domésticas (OR 1.8). Na busca por alívio da dor, 46,6% dos adolescentes não fazem nada, 17,3% buscam automedicação e 8,9% usam fármaco prescrito.

CONCLUSÃO: Entender a dor nas costas como um problema de saúde pública obriga a pensar em estratégias que permitam compreender origens, fatores associados e estratégias de enfrentamento que podem influenciar novas formas de priorizar e organizar a atenção à saúde. Descritores: Adolescente, Dor lombar, Dor nas costas, Estudos transversais, Prevalência.

INTRODUCTION

Back pain is known as a major cause of disability1 in work and daily activities. Its origin, in part, refers to the use of the human body, which begins in childhood but starts to show its signs of use (or misuse) more intensely in adolescence. There is evidence that earlier intervention in this problem would bring more effective results in adulthood.

There are few studies on back pain, despite being a frequent health problem in the world population. Swain et al.2, in a systematic review of adolescents (9 to 17 years old), estimated the worldwide prevalence of back pain at 37%. In local studies in Brazil, the prevalence found of back pain was in adults in the cities of Campinas-SP, 30.6%3 and Pelotas-RS, 63.1%4, and in adolescents (10 to 17 years old), in Uruguai-RS, 16.1%5.
“Back pain” is a broad term, used colloquially. Its importance is based on its high worldwide prevalence, its impact on people’s quality of life, and its potential for disability to work. Given the breadth of the term, several studies prefer to treat only low back pain. In this study, the term “back pain” will be used, considering it as the grouping of the terms neck pain, upper back pain and low back pain.

This study aimed to estimate the prevalence, associated factors, and characteristics related to back pain in adolescents in the city of São Paulo in 2015.

METHODS

The data from the 2015 Health Survey of São Paulo were analyzed, a population-based cross-sectional study, with data collection conducted between September 2014 and December 2015. The 2015 Health Survey of São Paulo is a study consisting of a sample composed of people aged as of 12 years old, living in permanent private housing units, in the urban area of the city of São Paulo, which is the largest city and makes up the largest and most complex metropolitan region in Brazil. In this study, the stratified probabilistic sampling was used, with a two-stage draw: (1) census sectors; and (2) households.

The prevalence refers to the population of the 2015 Health Survey of São Paulo study, which considered only the population living in urban areas, 9,349,890 inhabitants.

The study domains consisted of: (a) regions and (b) respondents in the 12-19-year-old age group, 60 years old or older, and gender and age range of 20-59 years by gender (male and female). For the purpose of statistical inference, each individual in the sample was associated with a sample weight. The final weight was calculated according to three components: (1) design weight, which takes into account the sampling fractions of the two-stage draw; (2) non-response fit; and (3) post-stratification, which adjusts the distribution of the sample by gender, age group and region of residence, according to the population distribution in the municipality and according to the population estimate.

For this study, 539 (98.4%) respondents were selected, a sample composed of adolescents aged between 15 and 19 years, part of the age group of 12-19 years of the 2015 Health Survey of São Paulo. The 12-14-years-old adolescents were removed from the sample because the questions related to the Self Report Questionnaire (SRQ), an integral part of the 2015 Health Survey of São Paulo. Of the 539 adolescents interviewed, 50.5% were male and 49.5% female, so the proportion was quite approximate. The following dependent variable was considered: 1. back pain.

The following independent variables were considered: 2. Sociodemographic variables: gender, age, race/color, and education; 3. Variables related to health and lifestyle conditions: nutritional status; smoking, alcohol use, and physical activity recommended by the World Health Organization (WHO). Physically active are those who have complied with the WHO recommendation to engage in light or moderate physical activity for at least 150 minutes per week or vigorous activity for at least 75 minutes per week.

4. Variables related to chronic diseases and symptoms: all self-reported were considered and tested.
5. Emotional variables, those who answered ‘yes’ to eight or more questions from the 2015 Health Survey of São Paulo Block E, composed of questions from the Self Report Questionnaire 20 (SRQ20), an instrument with 20 questions for Common Mental Disorder (CMD) and can be used in primary care, validated by Gonçalves, Stein and Kapczinski.
6. Characteristics of back pain: location, frequency, intensity, and attitudes for pain relief.

For the analysis of surveys based on complex designs, the survey module of the STATA14 program was used, which allowed the incorporation of the different weights. The analysis was constructed by a logistic regression model to test the isolated association among the dependent variables (back pain) and each independent one, besides analyzing those that entered the final model.

All participants, or their guardians, signed Free Informed Consent Form (FICF) in which the research objectives and the information that would be requested were explained, ensuring the confidentiality of the information obtained. The research protocol was approved by the Ethics Committee of the Department of Epidemiology, School of Public Health, University of São Paulo - Opinion 1.420.473 (2015).

Statistical analysis

The prevalence between categorical variables was quantified by Pearson’s chi-square test (p); those selected for the model were those with p<0.20. In the final model, after selection tests, only variables with p<0.05 remained in the model. Associations among variables were measured by the Odds Ratio (OR). The adjustment of the regression model was evaluated by the Archer and Lemeshow test.

RESULTS

Of the 554 adolescents (aged 15-19 years) interviewed at the 2015 Health Survey of São Paulo, 539 (98.4%), who responded to all the variables in this study, were identified as the studied population.

Of the 539 adolescents interviewed, 50.5% were male and 49.5% female, so the proportion was quite approximate. The age distribution of this sample showed differences between 17.0 and 22.1%, here also with approximate proportions. All other characterization variables of this population were homogeneous (Table 1).

When studying the population that identified as having problems related to back pain – which in this study includes low back, neck and upper back pain – it was possible to verify significant prevalence differences between females 28.1% (95% CI 22.6 – 34.2) and males 16.8% (95% CI 12.2 – 22.7), meaning that girls have almost twice as much back pain as boys. (Table 2)

It was also possible to verify the existence of significant differences between self-perception of health. Those who have ‘not good’ self-perception health were found to have a prevalence of 36.4% (95% CI 28.6 – 45.0), while 19.0% (95% CI 14.9 – 23.9) had
Back pain in adolescents: prevalence and associated factors


Back pain in adolescents: prevalence and associated factors

What has drawn our attention was precisely 19.0% of adolescents who identified themselves with back pain problems, but with self-perception of ‘good’ health (Table 3).

Regarding the symptoms, diseases and other health problems, adolescents with back pain problems have a higher prevalence of associated factors such as headache 33.3% (95% CI 27.0 – 40.3), anxiety 34.1% (95% CI 21.9 – 49.1), sinusitis 34.7% (95% CI 24.2 – 46.8), insomnia 46.4% (95% CI 36.0 – 57.1), CMD 49.0% (95% CI 38.6 – 59.4) and dizziness 49.9% (95% CI 37.3 – 62.4). It meant that of the total of adolescents interviewed, at least one third reported comorbidities (Table 3).

The estimated prevalence of back pain among adolescents in the city of São Paulo aged 15-19 years old was 22.4% (95% CI 18.4 – 26.9) (Table 4).

The characteristics of back pain for adolescents were related to greater identification with the location of pain in the lower back 42.9% (95% CI 34.5 – 51.8). As for the frequency of pain, it was found that 58.2% reported having back pain at least twice a week (41.0% have pain some days of the week, and 17.2% have every day). Regarding the intensity of the pain felt, 21.8%

Table 1. Demographic profile of adolescents living in São Paulo city in 2015

<table>
<thead>
<tr>
<th>Demographic characterization</th>
<th>% total (95% CI)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>50.5 (46.3 – 54.7)</td>
<td>269</td>
</tr>
<tr>
<td>Female</td>
<td>49.5 (45.3 – 53.7)</td>
<td>270</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>21.2 (18.1 – 24.6)</td>
<td>116</td>
</tr>
<tr>
<td>16</td>
<td>17.0 (13.6 – 21.0)</td>
<td>91</td>
</tr>
<tr>
<td>17</td>
<td>21.0 (17.3 – 25.3)</td>
<td>112</td>
</tr>
<tr>
<td>18</td>
<td>18.7 (15.4 – 22.6)</td>
<td>104</td>
</tr>
<tr>
<td>19</td>
<td>22.1 (18.4 – 26.5)</td>
<td>116</td>
</tr>
<tr>
<td>Race/color</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>44.8 (39.7 – 50.1)</td>
<td>230</td>
</tr>
<tr>
<td>Black</td>
<td>14.2 (11.1 – 18.0)</td>
<td>78</td>
</tr>
<tr>
<td>Brown</td>
<td>37.0 (32.3 – 41.8)</td>
<td>206</td>
</tr>
<tr>
<td>Others</td>
<td>4.0 (2.4 - 6.4)</td>
<td>22</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete elementary school II</td>
<td>33.3 (29.4 – 37.3)</td>
<td>180</td>
</tr>
<tr>
<td>Complete elementary school I</td>
<td>54.1 (49.3 – 58.8)</td>
<td>287</td>
</tr>
<tr>
<td>Incomplete elementary school</td>
<td>12.6 (9.6 – 16.4)</td>
<td>72</td>
</tr>
</tbody>
</table>

CI = Confidence Interval.

Table 2. Adolescents with back pain: prevalence of demographic and lifestyle characterizations of residents in the city of São Paulo, 2015

<table>
<thead>
<tr>
<th>Variables</th>
<th>% Adolescents with back pain (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Characterization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td>0.0028</td>
</tr>
<tr>
<td>Male</td>
<td>16.8 (12.2 – 22.7)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>28.1 (22.6 – 34.2)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td>0.3329</td>
</tr>
<tr>
<td>15</td>
<td>25.3 (18.1 – 34.1)</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>14.1 (8.2 – 23.3)</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>24.0 (17.2 – 32.4)</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>24.2 (16.4 – 34.1)</td>
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</tr>
<tr>
<td>19</td>
<td>22.8 (15.5 – 32.4)</td>
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<tr>
<td>Race/color</td>
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<tr>
<td>White</td>
<td>19.5 (14.3 – 25.9)</td>
<td></td>
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<tr>
<td>Black</td>
<td>28.0 (19.0 – 39.2)</td>
<td></td>
</tr>
<tr>
<td>Brown</td>
<td>24.7 (19.1 – 31.2)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>13.3 (4.6 – 32.7)</td>
<td></td>
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<tr>
<td>Education</td>
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<td>0.5989</td>
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<tr>
<td>Complete elementary school II</td>
<td>22.8 (16.4 – 30.8)</td>
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</tr>
<tr>
<td>Complete elementary school I</td>
<td>21.0 (15.9 – 27.2)</td>
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</tr>
<tr>
<td>Incomplete elementary school I</td>
<td>27.3 (18.4 – 40.3)</td>
<td></td>
</tr>
<tr>
<td>Lifestyle Characterization</td>
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<td>0.7368</td>
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<tr>
<td>Smoking</td>
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</tr>
<tr>
<td>Do not smoke</td>
<td>22.7 (18.6 – 27.2)</td>
<td></td>
</tr>
<tr>
<td>Currently smokes</td>
<td>17.5 (8.0 – 34.3)</td>
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</tr>
<tr>
<td>Alcohol use</td>
<td></td>
<td>0.6195</td>
</tr>
<tr>
<td>Do not drink</td>
<td>26.3 (20.5 – 33.1)</td>
<td></td>
</tr>
<tr>
<td>Currently drinks</td>
<td>33.1 (20.0 – 49.4)</td>
<td></td>
</tr>
</tbody>
</table>

CI = Confidence Interval; P-value = Pearson’s correlation coefficient; * Selected variables for the logistic regression model.
reported having severe or unbearable pain, and 62.3% reported that this pain did not prevent them from performing their daily activities. Attitudes toward seeking back pain relief: drug use was reported by 26.5% (8.9% prescription drug and 17.6% self-medication). Other reported non-pharmacological practices were: 11.2% do rest, 9.6% do physical activities, and 46.6% say they do nothing (Table 4).

From the univariate analysis, the following variables were selected: gender (Table 2), nutritional status and physical activities related to household chore (Table 3), and characterization of health status: sinusitis, anxiety, headache, insomnia, dizziness and CMD (Table 3).

For the logistic regression model, the independent variables associated with back pain were: dizziness (OR 3.1), CMD (OR 2.4), insomnia (OR 2.6) and doing household chore-related physical activities (OR 1.8) (Table 5).

To check the predictive capacity of the logistic regression model, the Archer and Lemeshow test was applied, which indicated a 96.4% chance of an adolescent presenting back pain in the presence of these factors.

**DISCUSSION**

The study by O’Sullivan et al. recognized that back pain – low back, neck, and upper back pain - in adolescents is multifactorial and may be due to biological, psychological, physical, anatomical, lifestyle, and comorbidities.

Swain et al., in a study with data from 28 countries, estimated the worldwide prevalence of back pain in adolescents (9 to 17 years old) at 37%, with the lowest prevalence in Poland (27.7%) and the highest prevalence in the Czech Republic (50.5%). In this study, the estimated prevalence of back pain in adolescents (15 to 19 years) in the city of São Paulo, Brazil, is 22.4% (95% CI 18.4 - 26.9), a result below other countries.

The association between CMD and back pain has been found in different studies. This study also identified a significant association between CMD and back pain in adolescents from the city of São Paulo (OR 2.4, 95% CI 1.4 - 4.4). Viana et al. concluded in their study that individuals with CMD are at higher risk of developing back pain, which may mean that the experience of physical and emotional pain in adolescents may not be independent, emphasizing the importance of detecting such associations.

Dizziness as the primary association with back pain in adolescents from the city of São Paulo has not been presented as an associated factor when studying back pain, although it was found in this study. In a survey, Janssens et al. published on American and Dutch adolescents, in which they identified an association between pubertal delay and back pain, excessive tiredness and dizziness. In this study, the association appears simultaneously, but it is not possible to confirm the direct association.

Insomnia is an inability to sleep properly, therefore a symptom of poor sleep quality. Auvinen et al. and Dey, Jorm, and Mackinnon found an association between poor sleep quality and back pain. In these studies, there is a significant association between back pain and insomnia (OR 2.6 - 95% CI 1.6 - 4.3). It is difficult to identify the origin of this association; if back pain leads to poor sleep quality, or if insomnia contributes to back pain. The health problem related to back pain refers in part to the use and disuse of the human body. The association between back pain in adolescents from the city of São Paulo and the performance of domestic physical activity was identified (OR 1.8 - 95% CI 1.1 - 2.9). However, the classification related to the Physical Activity block of 2015 Health Survey of São Paulo presented only results related to compliance or not with WHO recommendations, which became an important limitation of this study, since

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**Table 4.** Prevalence and distribution of reported back pain characteristics of adolescents living in São Paulo city, 2015

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>% (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back pain</td>
<td>22.4 (18.4 – 26.9)</td>
</tr>
</tbody>
</table>

**Table 5.** Logistic regression analysis for adolescents with back pain living in the city of São Paulo in 2015

<table>
<thead>
<tr>
<th>Variables</th>
<th>Gross OR</th>
<th>Adjusted OR (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dizziness</td>
<td>4.5 (2.5 – 8.1)</td>
<td>3.1 (1.6 – 5.9)</td>
<td>0.001</td>
</tr>
<tr>
<td>Common Metal Disorder</td>
<td>4.3 (2.7 – 7.1)</td>
<td>2.4 (1.4 – 4.4)</td>
<td>0.002</td>
</tr>
<tr>
<td>Insomnia</td>
<td>3.7 (2.3 – 6.1)</td>
<td>2.6 (1.6 – 4.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Physical activity at home</td>
<td>2.1 (1.3 – 3.3)</td>
<td>1.8 (1.1 – 2.9)</td>
<td>0.027</td>
</tr>
</tbody>
</table>

* Fit variables; OR = Odds Ratio; CI = Confidence Interval.
such classification does not have a range that allows recognizing the excess of adolescents in relation to the performance of such physical activities.

As the study refers to adolescents, a contemporary factor of common knowledge related to intense physical activity in the household chores, identified with frequent and inappropriate body postures, is the excessive use of new technologies in this age group. Sjolie demonstrated an association between excessive leisure activity and back pain. Noll et al., in a study with adolescents, identified an association between different postures and body uses (computer use, daily time spent watching television, studying in bed, sitting posture to write and backpacking) with back pain. In this study, it was not possible to identify such associations since classifications related to the intense and/or inappropriate use of technologies are not part of the data available in 2015 Health Survey of São Paulo.

Finally, Hestbaek et al. showed that there was a correlation between low back pain diagnosed in childhood/adolescence and the permanence of the problem in adulthood, and suggest that the focus of prevention, treatment, and research related to back pain problems should be in children and adolescents. The results of this study support this conclusion.

In addition, it has been found that back pain is usually treated with painkillers, but there are other treatments that include physical therapy, physical exercise, and spinal manipulation. Self-medication has been considered a significant public health problem. Pardo et al. relate self-medication as the primary search for relief to face pain-related issues. Arrais et al. estimate the prevalence of self-medication in Brazil at 16.1%. In this study, self-medication used to seek back pain relief was reported by 17.6% of adolescents.

Shipton warns that non-pharmacological treatment to address back pain is important because it improves body function and decreases disability. In this study, approximately a quarter (24.8%) of adolescents in the city of São Paulo who reported having back pain reported using other non-pharmacological mechanisms to relieve it, such as massage (4.0%), activity physical (9.6%), and rest (11.2%).

CONCLUSION

Understanding back pain as a public health problem requires us to think of strategies that allow us to understand origins, associated factors, and coping strategies that may influence new ways of prioritizing and organizing health care in the Unified Health System (SUS) and in complementary health services in the country.

Thus, the four factors (dizziness, common metal disorder, insomnia, and domestic physical activity) associated with back pain should be considered for diagnosis, treatment, and proper clinical management.

Finally, it is important to highlight that diseases detected and managed improperly in adolescence can worsen in adulthood.

REFERENCES

ABSTRACT

BACKGROUND AND OBJECTIVES: Chronic clinical manifestations of the chikungunya virus infection are associated with high rates of disability and worsening of quality of life, representing one of the major challenges for global public health. The objective of this study was to investigate the clinical-psycho-functional presentation of the chikungunya virus-infected individuals with complaints of chronic musculoskeletal pain.

METHODS: Twenty-two individuals with a diagnosis of chikungunya virus infection and a complaint of persistent musculoskeletal pain (≥3 months) participated in the study. The clinical-psycho-functional evaluation was performed through the intensity and affective-emotional aspect of pain, quality of life, kinesophobia, global perception of post-infection pain recovery and emotional functionality. In the end, the pressure pain threshold and the conditioned pain modulation were evaluated.

RESULTS: The clinical presentation of pain revealed long persistence 17.5±7.4 months; predominant in the lower limbs (45.5%); mean intensity (5.5±2.1); mild to moderate affective-emotional changes; moderate kinesophobia (46±6.5) and low overall perception of improvement (1.5±2.5). The Beck Depression Inventory and the visual analog scale for anxiety showed little change. Quality of life presented mild to moderate impairment, and pain modulation showed a slight increase in the pressure pain threshold (6.3%).

CONCLUSION: The chronic phase of the chikungunya virus infection is characterized by persistent moderate-intensity pain, both in sensory and affective levels, with moderate kinesophobia, worsening of quality of life, perception of poor post-infection recovery, and a decrease in the pain descending inhibitory pathways.

Keywords: Chikungunya virus, Chronic pain, Clinical evolution, Signals and symptoms.

RESUMO

JUSTIFICATIVA E OBJETIVOS: As manifestações clínicas crônicas da infecção pelo vírus chikungunya estão associadas a altos índices de incapacidade e piora da qualidade de vida, representando um dos grandes desafios para a saúde pública mundial. O objetivo deste estudo foi investigar a apresentação clínica-psi-co-funcional de indivíduos infectados pelo vírus chikungunya com queixas de dores musculosqueléticas crônicas.

MÉTODOS: Participaram do estudo 22 indivíduos com diagnóstico de infecção pelo vírus chikungunya e queixa de dor musculosquelética persistente (≥3 meses). A avaliação clínica-psi-funcional foi realizada por meio da intensidade e aspecto afetivo-emocional da dor, qualidade de vida, cinesiofobia, percepção global de recuperação da dor pós-infeccção e funcionalidade emocional. Ao final foi avaliado o limiar de dor por pressão e a modulação condicionada da dor.

RESULTADOS: A apresentação clínica da dor revelou longa persistência, 17,5±7,4 meses; predominância nos membros inferiores (45,5%); intensidade média (5,5±2,1); alterações afetivo-emocionais leves a moderadas; moderada cinesiofobia (46±6,5) e baixa percepção global de melhora (1,5±2,5). O Inventário de Depressão de Beck e a escala analógica visual para ansiedade apresentaram pouca alteração. A qualidade de vida apresentou prejuízos leves a moderados, e a modulação da dor revelou pouco aumento do limiar de dor por pressão (6,3%).

CONCLUSÃO: A fase crônica da infecção pelo vírus chikun-
gunya tem como apresentação clínica dor persistente de moderada intensidade, em nível sensorial e afetivo, além de moderada cinesiofobia, piora na qualidade de vida, percepção de pouca recuperação pós-infeccão e diminuição da ativação inibitória descendente da dor.

Descritores: Dor crônica, Evolução clínica, Sinais e sintomas, Vírus chikungunya.

INTRODUCTION

Chikungunya is an arboviral disease of the Togaviridae family transmitted by the bite of the mosquito of the species Aedes, Ae.
Clinical manifestations in patients with musculoskeletal pain post-chikungunya

_Aegypti_ and _Ar. Albopictus_. Since the first outbreak of chikungunya reported in Tanzania in mid-1955, there has been an increase in infection in Asian and African countries. In Brazil, the first indigenous cases were confirmed in Oiapoque (AP) in 2014. Since then, there has been a significant increase in confirmed notifications in all states of the country, either by laboratory or clinical criteria.

The main clinical manifestations in the acute phase are similar to those of dengue: high fever, headache, chills, nausea, vomiting, fatigue, back pain, myalgia, and arthralgia. The acute or febrile phase lasts until the 14th day, but in some cases, there is a persistence of symptoms such as joint pain for up to three months, characterized as the sub-acute phase. When complaints of musculoskeletal pain persist for more than three months, the chronic phase sets in. The mechanisms involved in the chronic characteristic of musculoskeletal pain are not fully understood, but some risk factors have been pointed out: genetic predisposition; pre-existing arthropathy or other comorbidities; tissue damage induced directly by the virus; long-term persistence of chikungunya infection in tissues with inflammation and activation of autoimmune responses. Besides complaints of musculoskeletal pain, the chronic phase is associated with a physical disability and worsening of quality of life.

Although current treatments have some results for symptom relief, clinical manifestations of this chronic characteristic may still be present years after the infection. In this context, the clinical-functional assessment of the disease is extremely important for the planning of effective prevention and treatment strategies. This study aimed to investigate the clinical-psycho-functional presentation of patients infected with the chikungunya virus complaining about chronic musculoskeletal pain.

**METHODS**

This is a cross-sectional, descriptive, and exploratory study, conducted from January 2018 to June 2019. Individuals with a medical diagnosis of chikungunya and complaints of post-infection musculoskeletal pain were recruited through social networks and printed communication in public and private health services in the city of Parnaíba-PI. The sample size calculation considered the number of probable cases reported (n = 825), according to the 52nd Epidemiological Week Bulletin (2017) released by the Piauí State Government, and the population of the city of Parnaíba (n=137,485). Adopting a confidence interval and a precision value of 95% and ±0.07, respectively, the minimum sample size was estimated in 41 subjects.

The inclusion criteria were: 1) confirmed medical diagnosis of chikungunya virus infection; 2) both genders; 3) persistent complaint of musculoskeletal pain (symptoms ≥ 3 months). Participants with pain complaints related to previous diseases, such as inflammatory rheumatic disease, musculoskeletal lesions, neurological diseases, or diabetic neuropathy, were excluded.

After fulfilling the inclusion criteria, participants answered an unstructured questionnaire containing personal data and anthropometric characteristics. Then, the intensity and affective-sensation aspect of pain, quality of life, kinesophobia, the overall perception of pain recovery after infection, and emotional functionality were evaluated. In the end, the pressure pain threshold and the conditioned pain modulation were assessed. Pain intensity was assessed using an 11-point numerical scale (zero-10), with zero being considered no pain and 10 the worst possible pain. The sensory and affective aspect of pain were verified by the McGill questionnaire, short version (SF-MPQ) containing 15 pain sensation descriptors (11 sensory and 4 affective), with each descriptor classified on a 4-point scale, zero = none, 15 = mild, 25 = moderate, and 35 = intense.

The quality of life was assessed using the EQ-5D questionnaire, which covers five health domains: mobility, personal care, everyday activities, pain/malaise, anxiety/depression. This questionnaire also includes a visual analog scale (VAS), where zero indicates the worst imaginable state of health, and 100 indicates the best imaginable state of health.

Kinesophobia was assessed using the Tampa Scale for Kinesophobia. This scale contains 17 items that seek to measure excessive fear or aversion to movement and physical activity. Each item has four answer options: strongly disagree (1 point), partially disagree (2 points), partially agree (3 points), and fully agree (4 points). The sum of the items answered may indicate lower (17 points) or higher kinesophobia (68 points). The overall perception of recovery after the infection was assessed by the numerical global perception scale (GPS). This scale contains 11 points, ranging from -5 to +5, where -5 is the perception of being extremely worse, zero: no modification, and +5 the perception of being fully recovered.

The pain threshold was assessed with the manual pressure algometer (FORCE TEN FDX, USA). The algometer tip, about 1 cm² thick, was applied perpendicular to the skin surface on the dominant arm over the tendon of the extensor carpi radialis brevis muscle, 2 cm distal to the lateral epicondyle. Three measurements were taken, and in each test, participants were instructed to respond “stop” to the first pain sensation caused by the mechanical stimulation of the algometer.

Conditioned pain modulation (CPM) was assessed by the tissue cooling test. Participants remained seated with the dominant forearm over a support, and the contralateral forearm immersed in a bucket of ice and water at 10°C (conditioning stimulus). The pressure pain threshold (PPT) was measured during four intervals: (1) before immersion, (2) after 30 seconds of immersion, (3) after 1 min 30s of immersion, and (4) 1 minute after withdrawing the immersed hand from the cooling system. The CPM was estimated by the difference in the PPT between the baseline condition (pre-immersion) and post-immersion conditions.

Symptoms of anxiety and depression were assessed by the Brazilian version of the Beck Depression Inventory (BDI) and the VAS for anxiety, respectively. The BDI is a self-rated measure of depression that uses a 21-item questionnaire, the intensity of which ranges from zero to 3 (higher scores indicate more depressive symptoms). The VAS for general anxiety is assessed by a 100mm long horizontal line. The far-left end means no anxiety, and the far-right end means the worst possible anxiety.

The study was approved by the Ethics Committee of the Federal University of Piauí (UFPI) under No. 2,883,331/2018. All participants signed the Free Informed Consent Form (FICT).
Statistical analysis
The data were input in the Microsoft Excel software version 2010 for Windows. The descriptive analyses of the investigated variables were performed through means, frequencies (absolute and relative), and standard deviations. All data were analyzed using the IBM SPSS software v.20 for Windows.

RESULTS
Forty-nine individuals were recruited for clinical evaluation. However, 27 individuals were excluded because they no longer complained of pain (n=8); no medical diagnosis (n=9) and 10 subjects refused to participate in the study. Twenty-two individuals (86.4% female) with a medical diagnosis of chikungunya virus infection participated in the study. The mean (±SD) age, weight, height and body mass index (BMI) were 46.4 years (12.0), 63.3kg (17.5), 1.6m (0.1) and 26.1kg/m² (4.4), respectively. The predominant level of education was high school (31.8%) and primary (31.8%), followed by college education (27.3%) and no education (9%). Most participants did not practice physical activity (59.1%), and all denied smoking. The mean period of pain was 17.5 months (7.4), and the areas of major complaints were the lower limbs (45.5%), lower limbs and upper limbs (45.5%), and upper limbs (9.1%). The clinical characteristics, quality of life and conditioned pain modulation are described in tables 1, 2, and 3, respectively.

DISCUSSION
Data analysis showed that infection with the chikungunya virus leads to persistent pain, with temporal characteristics of chronicity and medium to high-intensity magnitudes. The sensory and affective aspects of pain ranged from mild to moderate. Although symptoms of depression and anxiety have not been previously assessed, nor have they included inclusion/exclusion criteria, overall participants did not have clinically relevant changes in symptoms of depression [(10.9±5.9) score of 0-63] and anxiety [(3.1±2.4) score of 0-100]. On the other hand, the depression and anxiety domains, assessed by the EQ-5D quality of life questionnaire, showed that these psychiatric morbidities were present in mild to moderate magnitudes. There are few reports in the literature on psychiatric morbidities associated with chikungunya, which makes it difficult to compare with the current results. A preliminary Indian study found the presence of psychiatric mor-

### Table 1. Participants’ clinical characteristics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain intensity (0-10)</td>
<td>5.5</td>
<td>2.1</td>
</tr>
<tr>
<td>PRI-T (0-45)</td>
<td>17.3</td>
<td>8.4</td>
</tr>
<tr>
<td>PRI-S (0-33)</td>
<td>12.2</td>
<td>5.5</td>
</tr>
<tr>
<td>PRI-A (0-12)</td>
<td>5.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Kinesophobia (17-68)</td>
<td>43.6</td>
<td>6.5</td>
</tr>
<tr>
<td>Overall perception (-5 to +5)</td>
<td>1.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Depression (0-63)</td>
<td>10.9</td>
<td>5.9</td>
</tr>
<tr>
<td>Anxiety (0-100)</td>
<td>3.1</td>
<td>2.4</td>
</tr>
</tbody>
</table>

PRI-T = total pain index, PRI-S = sensory aspect of pain, PRI-A = affective aspect of pain; Kinesophobia = assessed by the Tampa Scale for Kinesophobia. High scores on intensity, pain sensory aspect, and kinesophobia indicate worsening of pain and aversion to movement or physical activity. Overall perception assessed by the overall effect perception scale. Low scores indicate a worsening overall effect.

### Table 2. Participants’ quality of life

<table>
<thead>
<tr>
<th>EQ-5D Domains</th>
<th>Levels</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobidity</td>
<td>1</td>
<td>7(31.8)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5(22.7)</td>
</tr>
<tr>
<td>Anxieatasia (0-100)</td>
<td>3</td>
<td>10(45.5)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>14(63.6)</td>
</tr>
</tbody>
</table>

### Table 3. Conditioned Pain Modulation

<table>
<thead>
<tr>
<th>Pressure pain threshold (Test stimulus)</th>
<th>Pre (kgf)</th>
<th>Post (kgf)</th>
<th>CPM (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>3.2 (0.9)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>30s immersion</td>
<td>-</td>
<td>3.4 (1.0)</td>
<td>6.3</td>
</tr>
<tr>
<td>1.5min immersion</td>
<td>-</td>
<td>3.4 (1.0)</td>
<td>6.3</td>
</tr>
<tr>
<td>1 min post/immersion</td>
<td>-</td>
<td>3.2 (0.9)</td>
<td>0</td>
</tr>
</tbody>
</table>

CPM = conditioned pain modulation kilogram-force values (Kgf) expressed as mean and standard deviation.

### Table 2. Participants’ quality of life – continuation

<table>
<thead>
<tr>
<th>EQ-5D Domains</th>
<th>Levels</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common activities</td>
<td>2</td>
<td>7(31.8)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6(27.3)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1(4.5)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>8(36.4)</td>
</tr>
<tr>
<td>Pain/discomfort</td>
<td>2</td>
<td>10(45.5)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>11(55)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1(4.5)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>8(36.4)</td>
</tr>
<tr>
<td>Anxiety/depression</td>
<td>2</td>
<td>7(31.8)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>7(31.8)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>-</td>
</tr>
</tbody>
</table>

EQ-5D = EuroQol quality of life questionnaire with five dimensions. Level 1 = no problem; Level 2 = mild problem; Level 3 = moderate problem; Level 4 = serious problem; Level 5 = Disable.

### Table 4. Conditioned Pain Modulation

<table>
<thead>
<tr>
<th>Pressure pain threshold (Test stimulus)</th>
<th>Pre (kgf)</th>
<th>Post (kgf)</th>
<th>CPM (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>3.2 (0.9)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>30s immersion</td>
<td>-</td>
<td>3.4 (1.0)</td>
<td>6.3</td>
</tr>
<tr>
<td>1.5min immersion</td>
<td>-</td>
<td>3.4 (1.0)</td>
<td>6.3</td>
</tr>
<tr>
<td>1 min post/immersion</td>
<td>-</td>
<td>3.2 (0.9)</td>
<td>0</td>
</tr>
</tbody>
</table>

CPM = conditioned pain modulation kilogram-force values (Kgf) expressed as mean and standard deviation.
bidity in 20 infected individuals, mainly in the form of episodes of depression (n=5) and anxiety disorders (n=3).22

Despite the differences in the assessment of depression and anxiety symptoms, a moderate level of kinesophobia was observed, indicating that complaints of persistent pain may induce a higher perception of excessive fear or aversion to movement and physical activity. However, as it is a single assessment, it is possible that these changes were already present before the clinical evaluation. In the context of physical rehabilitation, the presence of kinesophobia may indicate a poor prognosis or greater difficulty in adhering to therapy through exercise. In these cases, it is possible that strategies for a reconception of the activation of the pain descending inhibitory pathway. This result suggests that the chronic phase of the chikungunya virus infection negatively interferes with the endogenous capacity for analgesia. The assessment of the dysfunction of the endogenous pain modulatory mechanisms, present in various chronic pain conditions, may provide important information to guide more effective prevention and treatment strategies. For example, failure of CPM during the pre-operative phase is associated with a higher likelihood of chronic post-operative pain.26,29

Concerning treatment, therapeutic strategies that activate pain inhibitory mechanisms similar to CPM, such as exercises or noninvasive neuromodulation techniques, may be important for the treatment of chronic pain. The main limitation of this study refers to the sample size. Although a broad recruitment strategy has been used, the state of Piauí has shown significant reductions in new cases. According to the Bulletin of the 3rd Epidemiological Week – 2019, there was a 95.6% reduction in incidence compared to the same period of 2018. Other limitations may also have influenced the results found: (1) Confounding variables, such as previous symp-oms of depression, anxiety, and kinesophobia; and (2) Method used for the evaluation of CPM.

**CONCLUSION**

The clinical presentation of the chronic phase of the chikungunya virus infection is persistent pain of moderate intensity in sensory and affective levels, moderate kinesophobia, decrease in the quality of life, perception of poor recovery after infection, and decrease in the activation of the pain descending inhibitory pathways.

**REFERENCES**

3. Dash PK, Parida MM, Santhosh SR, Verma SK, Tripathi NK, Ambuj S, et al. East Central South African genotype as the causative agent in reemergence of Chikungun-
8. Brasil, M.d.S., Chikungunya: Manejo Clínico, S.d.V.e.S.S.d.A. Básica, Brasilia, Edi-
tor; 2017. 78p.
15. de Souza FS, Marinho Cda S, Siqueira FB, Malher CG, Costa LO. Psychometric testing confirms that the Brazilian-Portuguese adaptations, the original version of the Fear-Avoidance Beliefs Questionnaire, and the Tampa Scale of Kinesiophobia have similar measurement properties. Spine. 2008;33(9):1028-33.
aire were reproducible, valid, and responsive in patients with musculoskeletal pain. J Clin Epidemiol. 2011;64(8):903-12.
17. EuroQol Group. EQ-5D: a standardised instrument for use a measure of health out-
come EQ-5D translations. 2010 [cited 2019 March, 26]; Available from: www.euro-
qol.org.
23. Polaski AM, Phelps AL, Kostek MC, Szauc KA, Kolber BJ. Exercise-induced hypoal-


ABSTRACT

BACKGROUND AND OBJECTIVES: To describe the knowledge of the nursing team about the evaluation and treatment of pain in newborns hospitalized at the Neonatal Intermediate Care Unit of a university hospital in the state of Minas Gerais, due to the relevance of the issue regarding the quality of the neonatal care.

METHODS: A descriptive and exploratory qualitative research with 13 professionals from a Neonatal Intermediate Care Unit. The data were collected through a semi-structured interview, and the data analysis was guided by the Content Thematic Analysis from January to June 2018.

RESULTS: Four categories were elaborated: pain identification; methods for assessing pain; interventions of the nursing team to relieve pain, and nursing learnings in pain management.

CONCLUSION: The knowledge of this team is based on the individual experience, showing the need for changes in the educational structures to reach better results and nursing practices based on scientific methods for quality assistance.

Keywords: Infant, Knowledge, Neonatal nursing, Newborn, Nursing team, Pain.

INTRODUCTION

The International Association for the Study of Pain (IASP)\(^1\) defines pain as an unpleasant sensory and emotional experience associated with a tissue injury, real or not. Its assessment requires skill, training, and humanized treatment, especially of nursing staff professionals, as they stay longer in contact with the newborn (NB)\(^1\)\(^-\)\(^2\).

Exposure to severe or prolonged pain may increase neonatal morbidity. Infants who experienced pain during the neonatal period respond differently to subsequent painful events. Given these consequences, studies started to be conducted to improve treatment strategies to prevent and treat NB pain and discomfort\(^1\)\(^-\)\(^4\).

The NB expresses pain through crying, facial mimics, body movement, sleep disturbance, and physiological changes. This demonstrates that professionals need to recognize these signals, assess them and treat them correctly. In this process, the use of scales that take these behaviors into consideration may prove to be a viable resource\(^5\). Pain is recognized as a vital variable to be assessed in the clinical practice of NB treatment, and its non-recognition...
is a matter of concern. Scientific productions on the theme demonstrate the importance of knowledge of nursing professionals, in order to avoid the occurrence of iatrogenesis, since NB when hospitalized in neonatal units, are exposed to painful sensation due to the disease itself, which can be potentiated due to physiological stress and invasive procedures, often without pain relief interventions. From this perspective, the assessment and control of pain in NB constitute a significant challenge for health professionals, including those of the nursing staff, who live with the particularities of the neonatal period, seeking ways to prevent and/or mitigate it, respecting the right of the NB not to feel pain. The production of the knowledge developed here may help nurses to identify gaps in the nursing staff’s knowledge about neonatal pain, contributing significantly to the improvement of the quality of care provided to this population group. This study aimed to describe the knowledge of the nursing staff on pain assessment and treatment in NB admitted to a Neonatal Intermediate Care Unit (NICU).

**METHODS**

A descriptive exploratory study with a qualitative approach was conducted in a NICU of a teaching hospital located in the Southern Triangle of the state of Minas Gerais. During the study, the nursing staff was composed of 24 professionals, being eight certified nurses, and 16 nurse practitioners. The inclusion criterion to select the participants was professionals who have been working for more than a year in the study unit, understanding that this environment requires time to know the constituent elements of the work process of the unit. Professionals in sick leave and vacation were excluded. The entire nursing staff was invited to participate in the study after the presentation of the objectives. After verbal acceptance, date, time, and place were scheduled, according to the professional’s preference for the interviews. The information was collected from January to June 2018, through semi-structured interviews in two stages. The first stage contained sociodemographic data, and the second was guided by the following open questions: do you believe the NB feels pain? What situations cause pain in the NB? What methods do you use to assess the NB pain? Do you use scales to identify the NB pain? Have they helped identify pain? What are the signs and symptoms that lead you to interpret that the NB is in pain? What are the interventions (pharmacological and non-pharmacological) that nursing uses to control NB pain? Upon consent, data were collected individually and privately, and the interviews were recorded with the prior consent of the participants, later transcribed, and with an average duration of 15 minutes. In order to maintain anonymity, they were identified with the letter N of “nurse” and NP of “nurse practitioner” and subsequent numbers, according to the order in which data collection was performed, for example, N1, N2, NP1, NP2... The number of participants was defined by the data saturation criterion that allows a more detailed analysis of the relationships established in the research environment and the understanding of meanings and systems.

Data analysis was guided by Thematic Content Analysis, respecting its stages. In the pre-analysis, performed through the fluctuating reading of the printed interviews, the points of interest are highlighted, followed by the exploration of the material in a thorough and exhaustive way, performing the classification and coding of the interviews, with apprehension of the nuclei of meaning, which were grouped, generating the empirical thematic categories responsible for the theme specification. Finally, the interpretation of the obtained results was performed, which were discussed and analyzed with the literature on the theme, to answer the objective proposed in this research.

The development of the study complied with the national and international standards of Ethics in Research involving human beings, complying with Resolution MS/CNS 466/2012, and signing the Free and Informed Consent Form (FICT), in two copies, after approval by the UFTM Research Ethics Committee according to CAAE: 63030416.1.0000.5154 and Opinion No. 1.974.515.

**RESULTS**

Thirteen professionals of the nursing staff were interviewed, all female, four nurses and nine nurse practitioners, aged between 28 and 62 years, with an average of 45 years. The professional experience ranged from five to 40 years, with an average of 17.8 years. Of the participants, one nurse is specialized in neonatology. After analyzing the interview transcripts, the speech categorization was performed, emerging four categories:

**Identification of the newborn pain**

All professionals reported that the NB experiences painful experience in situations of manipulation for procedures such as venipuncture, positioning, intubation, blood glucose test, and heel prick test. Pain has been reported to be associated with the clinical picture, such as diagnosis of hydrocephalus, fever, postoperative situations, thermal variations, and the delivery itself, as follows:

- **Manipulation... procedures, especially those that pierce the skin as venipuncture... blood collection for tests, heel prick test, various invasive procedures such as probing, catheterization, intubation (N4).**
- **Discomfort, any kind of discomfort, whether high or low temperature... noise... the absence of the mother (NP9).**
- **It depends on the picture... that little baby there has hydrocephalus... feels a lot of pain, we believe it is the pressure on her head because she has a lot of fluid (NP5).**

**Methods for assessing newborn pain**

According to the reports, pain is assessed using signs and symptoms presented by the NB, such as crying, facial and body expressions, the degree of agitation, and assessment of the vital signs, such as the presence of tachycardia.
The irritability, the face itself... the restlessness, the kind of desperate crying, is a cry that does not calm down (N1). Every time he starts debating his arms and his little hands, his little legs, we know he’s in pain (N3). It’s a different cry... he gets angry, gives a tachycardia (NP9). In the speech analysis, it was noticed that in the service, validated scales for the measurement of NB pain are not yet used. Some reports point to a graphic scale of pain in the vital signs sheet, but not intended for the target audience.

As we do not have an instrument, we look a lot at the intensity of crying and pain faces (N2).

We are not currently using any pain scale, any scientific method. So today, we assess by perception, right (N4).

Look, we have those little scales with faces, but I don’t take much into account... not that, because actually... I think that you can’t talk about 1 to 10 what is the baby’s pain (NP7).

In the speeches, it was possible to identify that the team knows the physiological changes that the NB presents when feeling pain, but the use of a measurement protocol was not reported. One of the nurses interviewed cited the NB assessment scales used in the institution she had previously worked.

In the other institution where I worked, we worked with child pain protocol... non-pharmacological measures for child pain relief... and we also worked with the NIPS scale and the CHEOPS scale, which is the assessment of the child’s pain, but it has not yet been institutionalized here (N4).

Nursing staff interventions for newborn pain relief

Among the interventions used by the nursing staff are pharmacological and non-pharmacological. It was observed in the reports that the most prescribed drugs by doctors are analgesics and anti-inflammatory drugs. They mentioned dipyrone, acetaminophen, and simethicone as the most used. Sucrose was pointed and associated with suction, despite the routine use, there were differences to which type of method it belongs.

Pharmacological only when there is a medical prescription, right. So, it would be the painkillers that doctors prescribe, acetaminophen, dipyrone, or simethicone (N2).

There is very little time here in the institution we are using sucrose, right. Then the little finger with the sucrose glove (N3). The medications that sometimes the doctor gives are dipyrone, tilenol®, dimethicone®, depending on the case. And according to the case of the child, sometimes even a stronger medication (NP3).

Among the non-pharmacological interventions, the correct positioning of the NB, cuddling, swaddling, and non-nutritive sucking were observed in the speeches.

So, it’s the same thing, the swaddling, sometimes that baby is in pain, is very agitated, you swaddle, non-nutritive sucking, put the gloved finger a few drops of glucose (N1).

The comfort that is to swaddle the newborn makes it more comfortable, minimal handling and non-nutritive suction (N2).

The first method we use is to position it correctly, to cuddle with our own hands, and if it does not improve, what are we doing? Give a pacifier sometimes, here we make a glove pacifier (NP3).

Nursing learning in newborn pain management

In the interviews, the participants pointed out that NB pain management is not a curricular component during vocational training. The speeches show that the handling is performed due to the professional experience gained over time. Insecurity and even despair in dealing with the NB pain were observed due to this previous unfamiliarity.

The other speeches revolve around the experience as mothers and the years of working with NB and children.

It’s with no scales, right? (laughs), as we learn. It seems that the more experience you get in practice, it seems that you are able to assimilate better. At first, it is a bit despairing! Everyone is crying! Everyone is in pain! (N1).

Well, I’m a mother (laughs), after I started working here, it was with the experience from the other professionals (N2).

That’s 25 years of experience; we have to learn from living together, with daily life, with work (NP7).

There was also a report in which a professional believes that there is no way to avoid pain. Pain, for her, is treated after interventions and procedures performed with NB:

No, I didn’t learn it. Actually, we can’t handle the pain. What we do is, after the child has felt all the pain that the procedure brings to him/her, is to cherish him/her (E3).

DISCUSSION

The painful experience was identified by the nursing staff professionals in observing behavioral characteristics such as crying, facial mimic, motor activity in invasive procedures, and the clinical picture of the NB. They considered the need to systematize pain assessment; however, in the unit studied, no strategies are used in this regard.

Pain may be associated with impaired neurological, physical, and behavioral development. A multimodal approach to NB pain management improves prognosis, reduces suffering and stress12,13. The IASP1 indicates as key elements in pain management the quality of care provided, the presence of institutional protocols, continued education for health teams, and standards of registration14.

The assessment and treatment of pain in NB face several barriers, such as its inability to verbalize and the absence of standards of care, which imply empirical and distinct treatment by the professionals15. It is believed that scientific knowledge and clinical practice management are the hurdles to assess and measure pain in the NB, indicating the need for training of multidisciplinary teams and the increase of routines/protocols to assess and control pain in this population12-16.

It is not recommended to assess pain in this life cycle with graphical and numerical scales because it does not include adequate indicators. This study identified the non-systematization of the use of specific scales for pain assessment in the NB. The existence of gaps regarding the knowledge of nursing professionals about pain management and assessment is evidenced14-17. Despite the several scales, they are not applied or used correctly14. A study conducted in a neonatal unit in the Midwest Region observed that most professionals report-
ed knowing some pain assessment scale, and the most known and applied was the Neonatal Infant Pain Scale (NIPS). Prolonged exposures to painful stimuli are known to have long-term consequences on the NB’s brain response, reinforcing the need to assess and treat pain adequately, and the promptness in meeting the NB needs. It is believed that to reduce the NB pain, we should limit the number of invasive procedures, assess the safety and efficacy of drugs, and combine them with non-pharmacological therapies. The drugs mentioned by the participants were dipyrone, paracetamol, and simethicone, the most cited in the literature. It was observed that its use is the first choice when not using an assessment instrument. The non-pharmacological methods indicated were non-nutritive sucking, the use of sucrose, the positioning of the NB, swaddling, the cuddling and minimum manipulation. The kangaroo-mother care method, the little package, and cuddling, much used in pain relief, are considered soft technologies to care for the babies. Other measures such as NB massage and bath therapy may be employed to promote relaxation, improve sleep quality and minimize the effects of painful stimuli, and can be applied by the nursing staff. Many nurses are unaware of such techniques, so these themes should be included in the education of nurses in neonatal units. The stimulation of the mother’s voice before and during painful procedures, such as heel-stick puncture, has a positive effect on the vital signs of NB, being a practice to be considered for this type of procedure. Regarding the divergence in considering sucrose a pharmacological method, the literature refers to it as non-pharmacological interventions. Sucrose or 25% glucose administration is recommended two to three minutes before minor painful procedures, such as a heel-stick puncture or venous puncture, in the anterior portion of the tongue, with a limit of 10 doses per day. It can be used in combination with non-nutritive suction, which increases the release of endogenous endorphins. Providing comfort to the NB through stimulation of the mother’s voice before and during painful procedures, assess the safety and efficacy of drugs, and combine them with non-pharmacological therapies. The drugs mentioned by the participants were dipyrone, paracetamol, and simethicone, the most cited in the literature. It was observed that its use is the first choice when not using an assessment instrument.

CONCLUSION

The study made it possible to identify that the staff knowledge is based on the personal experiences acquired with the time of service at the NICU. The reports show the absence of institutional protocols for pain assessment with scales and identify the need to incorporate pain assessment into the curriculum plans of health professionals to improve the quality of care provided.

REFERENCES

Knowledge of the nursing team about the newborn’s pain


The impact of chronic pain on the quality of life and on the functional capacity of cancer patients and their caregivers

O impacto da dor crônica na qualidade de vida e na capacidade funcional de pacientes oncológicos e de seus cuidadores

Juliana Martins Izzo¹, Ana Marcia Rodrigues Cunha², Claudia Bernardi Cesarino³, Marielza Regina Ismael Martins⁴

ABSTRACT

BACKGROUND AND OBJECTIVES: Pain for cancer patients might represent a worsening prognosis, decreased autonomy, well-being and quality of life, affecting all spheres of life of cancer patients and their repercussions on caregivers. Therefore, this study aimed to evaluate the impact of chronic pain on the quality of life and functional capacity of cancer patients and their caregivers.

METHODS: Eleven caregivers and 15 cancer patients from a Pain Clinic were evaluated. To assess the functional capacity of the patients, we used the physical and instrumental activities of daily living scale and, for quality of life, we used the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30), which indicated impairment in social and emotional functions and prevalence of symptoms fatigue and insomnia.

RESULTS: The average of the instrumental activities of daily living scores indicated a semi-dependence of the patients. There was a female predominance in patients (60%) and caregivers (72.2%). The average pain by the visual analog scale was 6.8. The Zarit Caregiver Overload Scale indicated that 36.3% of caregivers had moderate to severe overload and a positive correlation between functional capacity and overload (p=0.003).

CONCLUSION: The presence of chronic pain impacts, negatively and significantly, the quality of life and functional capacity of cancer patients extending this impact to the caregiver.

Keywords: Cancer pain, Caregivers, Quality of life.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor para o paciente oncológico pode representar agravamento do prognóstico, diminuição da autonomia, bem-estar e qualidade de vida, afetando todas as esferas da vida do paciente com câncer e sua repercussão no cuidador. Assim, este estudo objetivou avaliar o impacto da dor crônica na qualidade de vida e na capacidade funcional de pacientes oncológicos e de seus cuidadores.

MÉTODOS: Foram avaliados 11 cuidadores e 15 pacientes oncológicos de uma Clínica da Dor. Para avaliar a capacidade funcional dos pacientes foi utilizada a escala de atividades físicas e instrumentais da vida diária e, para a qualidade de vida, foi utilizado o European Organization for Research and Treatment of Cancer Quality of Life Questionnaire, que indicou prejuízo nas funções social e emocional e prevalência dos sintomas fadiga e insônia.

RESULTADOS: A média dos escores das atividades básicas e instrumentais da vida diária indicaram semi-dependência dos pacientes. Houve predominância feminina em pacientes (60%) e cuidadores (72.2%). A média de dor pela escala analógica visual foi 6.8. A Escala de Sobrecarga do Cuidador de Zarit, indicou que 36.3% dos cuidadores apresentaram de moderada a grave sobrecarga e correlação positiva entre capacidade funcional e sobrecarga (p=0.003).

CONCLUSÃO: A presença de dor crônica impacta de forma negativa e significante a qualidade de vida e a capacidade funcional dos pacientes com câncer, estendendo esse impacto para a figura do cuidador.

Descritores: Cuidadores, Dor do câncer, Qualidade de vida.

INTRODUCTION

The World Health Organization (WHO) considers neoplasia-associated pain a worldwide medical emergency¹. In oncology, it is one of the most frequent complaints and one of the most feared phenomena among patients with cancer. This becomes even more relevant as these patients face adverse emotional impact and discomfort at all stages of the disease, from diagnostic tests to conventional therapeutic procedures².
The multidimensional nature of oncologic pain is identified as Total Pain. This conceptualization takes into account not only the dimension of physical suffering but also the emotional, social, and spiritual consequences of exposure to the experience of pain. The concept of Total Pain includes the assessment of physical aspects (injury and disease progression, and reaction to treatment), psychological aspects (depression, mood swings, apathy), social aspects (impaired social relationships, isolation and discouragement), and spiritual aspects (change in the relationship of individuals with their beliefs, principles and values, doubts about faith and the meaning of life, feelings of helplessness and hopelessness). About 50% of people with cancer experience pain during treatment, 10-15% of them with relevant intensity at an early stage. With the onset of metastasis, the prevalence of pain increases by 25% to 30% and, in the advanced stages of the disease, from 60 to 90%. Pain is the most common symptom of cancer in advanced stages.

For the oncologic patient, pain may represent worsening prognosis or near death, decreased autonomy, decreased well-being, and quality of life, the threat of increased physical suffering, and a challenge to dignity. It can also harm cognitive functions, daily physical and social activities, the appetite, and sleep, which is interrupted by pain in 58% of the patients. The experience of chronic pain impacts not only patients but also people around them, like family members, friends, caregivers, and the team that treats them. This experience has repercussions in the social, emotional, and spiritual aspects of life, such as restrictions on work and leisure activities, greater financial burden, psychological distress in the face of the discomfort of a loved one, and metaphysical questions, among others.

Despite the high incidence in cancer patients, especially in patients on advanced stages of the disease, one of the biggest challenges is the fact that pain is still misdiagnosed. This is due to many factors, such as the lack of qualification for efficient handling by health professionals, who often underestimate or neglect patient pain, the use of ineffective assessment strategies, and patients’ difficulty or reluctance in expressing their pain. Also, the lack of adherence is associated with the patient’s concern about being hooked on analgesic drugs and the fear of their adverse effects.

Thus, the present work is justified by the importance of elucidating the impacts of prolonged pain in all aspects of life of cancer patients and the impact on the caregiver, considering that the clarification of these impacts can be decisive for efficiency and patient’s acceptance of the therapeutic procedures, as well as to promote physical and emotional well-being for the patient and those around him/her, including their caregivers.

**METHODS**

It is a cross-sectional, descriptive exploratory study, conducted at the Pain Clinic of the São José do Rio Preto Base Hospital. This study included patients diagnosed with chronic oncologic pain and their caregivers. The inclusion criteria of the patients were the presence of chronic pain lasting at least 6 months, and intensity greater than or equal to 3 (screened by the visual analog scale - VAS), and agree to participate in the study by signing the Free and Informed Consent Term (FICT). Patients with limiting sensorial or cognitive deficits were excluded (screened by the Mini-Mental exam), or when refused to participate. For the caregivers, the inclusion criteria were taking care of a patient with chronic oncologic pain for at least 6 months, and accepting the caregiver FICT. Those who have refused to participate were excluded.

The following instruments have been used: a clinical and sociodemographic interview with patient and caregiver, as well as the physical and instrumental activities of the daily life scale (OARS) to evaluate the functional capacity of both. The Quality of Life Questionnaire European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ-C30) was used to assess patients’ quality of life, and the caregiver’s burden was assessed with the Zarit Caregiver Burden Interview (ZBI). The sample consisted of 15 patients and 11 caregivers, which was estimated by the sample calculation of 5% (error=0.05) and with a reliability level of 95% (α=0.05 which provided z0.05/2=1.96), considering the true proportion as 50% (p=0.50). The sample size was calculated based on the total number of patients undergoing clinical follow-up at the Pain Clinic of a teaching hospital, with a total of 20 patients/month with oncologic pain.

This study was approved by the FAMERP Human Research Ethics Committee, under protocol CAAE 86689518.8.0000.5415. The participation in the study was voluntary and made effective by signing the FICT. Participants were informed about their rights, according to Resolution 466/2012 of the National Health Council.

**Statistical analysis**

The Statistical Package for Social Science (SPSS) application was used. To achieve the proposed objectives, two statistical techniques were applied. The correlation analysis was performed using the Student test, and the analysis of the EORTC QLQ-C30 instrument was performed according to the instructions provided by the group responsible for the standardization of the instrument in Brazil.

**RESULTS**

Fifteen patients with chronic oncologic pain who were undergoing treatment at the Pain Clinic of the São José do Rio Preto Base Hospital were evaluated. Table 1 describes the sociodemographic and clinical characteristics of these patients.

About functional capacity for basic daily life activities, obtained by the “OARS” scale, the average scores can be observed in table 2. Regarding instrumental activities, 60% (n=9) of the participants reported being unable to clean and housekeeping, while 20% (n=3) claimed to need some help, and 20% (n=3) performed the task without help. In instrumental activities of daily living (IADL), there was a statistically significant difference (p=0.048), while in physical activities of daily living (PADL), this did not occur (p=0.052). When asked about activities as of shopping, 25% (n=4) had considered themselves incapable of performing, 60% (n=9) need some help, and 15% (n=2) do it without help (Figure 1).
Note that the three symptoms with the highest scores were: fatigue (49.5), insomnia (37.4), and loss of appetite (30.6). By stratifying the group by gender, in table 3, it was observed that female patients had better averages in overall health and role performance scales, while male patients presented better averages in cognitive function (Tables 3 and 4).

Caregivers also had their sociodemographic and clinical characteristics analyzed, as well as their overload and functional capacity for the basic activities of daily living (Tables 5 and 6).

In the correlation between age, IADL, PADL, and caregiver burden, in this data crossover, there was a positive correlation between them; that is, the older the person, the higher the perception of burden, the lower the IADL index (p=0.003). There was no correlation between gender, PADL, and education (p=0.75), because in these cases, there was no significant difference (p-value<0.05) of overload among categories.

### Table 1. Socioeconomic and clinical characterization of the study patients (n=15)

<table>
<thead>
<tr>
<th>Variables</th>
<th>% and n</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>60 (n=9)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>40 (n=6)</td>
<td></td>
</tr>
<tr>
<td>Average age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>64.6±8.8</td>
<td>60.7±9.5</td>
</tr>
<tr>
<td>Male</td>
<td>54.8±7.7</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>20 (n=3)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>53.4 (n=8)</td>
<td></td>
</tr>
<tr>
<td>Widower</td>
<td>13.3 (n=2)</td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>13.3 (n=2)</td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incomplete primary education</td>
<td>60 (n=9)</td>
<td></td>
</tr>
<tr>
<td>Complete primary education</td>
<td>13.3 (n=2)</td>
<td></td>
</tr>
<tr>
<td>Incomplete high school education</td>
<td>6.7 (n=1)</td>
<td></td>
</tr>
<tr>
<td>Complete high school education</td>
<td>13.3 (n=2)</td>
<td></td>
</tr>
<tr>
<td>Incomplete College</td>
<td>6.7 (n=1)</td>
<td></td>
</tr>
<tr>
<td>Household income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 2 MW</td>
<td>73.3 (n=11)</td>
<td></td>
</tr>
<tr>
<td>3 to 4 MW</td>
<td>6.7 (n=1)</td>
<td></td>
</tr>
<tr>
<td>Not reported</td>
<td>20 (n=3)</td>
<td></td>
</tr>
<tr>
<td>Drinker</td>
<td>6.7 (n=1)</td>
<td></td>
</tr>
<tr>
<td>Smoker</td>
<td>6.7 (n=1)</td>
<td></td>
</tr>
<tr>
<td>How many times have you sought the Emergency Service in the last 6 months</td>
<td>2.2±1.08</td>
<td>times</td>
</tr>
<tr>
<td>Average medical visits over the past 12 months</td>
<td>3.4±0.9</td>
<td>times</td>
</tr>
<tr>
<td>Visual analog scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>7.1±1.9</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>6.8±1.7</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6.8±1.9</td>
<td></td>
</tr>
<tr>
<td>Has caregiver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>66.6 (n=11)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>33.4 (n=4)</td>
<td></td>
</tr>
<tr>
<td>Employment situation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>60 (n=9)</td>
<td></td>
</tr>
<tr>
<td>Inactive (retired)</td>
<td>40 (n=6)</td>
<td></td>
</tr>
</tbody>
</table>

MW = Minimum wage.

### Table 2. Average scores of the physical and instrumental daily activity OARS of patients and caregivers

<table>
<thead>
<tr>
<th>Domains</th>
<th>Groups</th>
<th>n</th>
<th>Mean±SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumental activity of daily life</td>
<td>Patient</td>
<td>11</td>
<td>9.54±3.44</td>
<td>0.048*</td>
</tr>
<tr>
<td></td>
<td>Caregiver</td>
<td>7</td>
<td>13.4±1.5</td>
<td></td>
</tr>
<tr>
<td>Physical activity of daily life</td>
<td>Patient</td>
<td>11</td>
<td>12.45±1.86</td>
<td>0.052</td>
</tr>
<tr>
<td></td>
<td>Caregiver</td>
<td>7</td>
<td>14±0.0</td>
<td></td>
</tr>
</tbody>
</table>

*p Statistically significant value – p>0.05. Student’s t-test.

### Figure 1. Average scores related to instrumental activities of daily living and physical activities of daily living

### Table 3. Average and standard deviation (±) of the EORTC QLQ30 quality-of-life instrument scale scores of patients served at the Pain Clinic (n=15)

<table>
<thead>
<tr>
<th>Functional Scales</th>
<th>Level</th>
<th>Average ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical function</td>
<td></td>
<td>54.0±21.4</td>
</tr>
<tr>
<td>Role performance</td>
<td></td>
<td>56.8±32.5</td>
</tr>
<tr>
<td>Emotional function</td>
<td></td>
<td>53.7±15.5</td>
</tr>
<tr>
<td>Cognitive function</td>
<td></td>
<td>72.4±23.9</td>
</tr>
<tr>
<td>Social function</td>
<td></td>
<td>52.6±14.4</td>
</tr>
<tr>
<td>Symptom scales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td>49.5±19.8</td>
</tr>
<tr>
<td>Nausea/Vomiting</td>
<td></td>
<td>19.1±12.4</td>
</tr>
<tr>
<td>Pain</td>
<td></td>
<td>27.5±25.4</td>
</tr>
<tr>
<td>Dyspnea</td>
<td></td>
<td>10±21.4</td>
</tr>
<tr>
<td>Insomnia</td>
<td></td>
<td>37.4±22.5</td>
</tr>
<tr>
<td>Loss of appetite, Constipation</td>
<td></td>
<td>30.6±13.9</td>
</tr>
<tr>
<td>Diarrhea</td>
<td></td>
<td>12.5±23.8</td>
</tr>
<tr>
<td>Financial difficulties</td>
<td></td>
<td>25.5±21.4</td>
</tr>
<tr>
<td>Quality of life overall health</td>
<td></td>
<td>58.4±22.0</td>
</tr>
</tbody>
</table>

### Table 4. Association between average quality of life scores and gender of patients (n=15)

<table>
<thead>
<tr>
<th>Scale items</th>
<th>Average ± SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of life overall health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>62.4±12.2</td>
<td>0.034*</td>
</tr>
<tr>
<td>Male</td>
<td>51.7±9.8</td>
<td></td>
</tr>
<tr>
<td>Role performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>59.1±11.2</td>
<td>0.042*</td>
</tr>
<tr>
<td>Male</td>
<td>49.8±10.5</td>
<td></td>
</tr>
<tr>
<td>Cognitive function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>62.8±9.9</td>
<td>0.038*</td>
</tr>
<tr>
<td>Male</td>
<td>79.5±11.2</td>
<td></td>
</tr>
</tbody>
</table>

* Chi-square test - p<0.05: a statistically significant difference.
that is, 77% of cancers are diagnosed in individuals over 55 years. This higher average age is justified because aging is linked to the increased incidence of cancer due to various age-related physiological changes.

Education data (60% of patients had incomplete primary education) and income (72.2% of patients receive up to 2 minimum wages) are consistent with studies that indicate greater use of services of the Unified Health System (SUS) by the population with the lowest level of education and lower income. The higher probability of using SUS by individuals with lower education and lower per capita family income indicates that the public system assists groups with a more precarious social insertion, fulfilling expectations regarding the performance of this public policy. Moreover, the low level of education present in this sample, also evident in other researches involving oncologic patients, reveals a scenario of concern, as studies indicate that low education is related to late diagnoses and worse care standards to overall health, including resulting in higher mortality.

Regarding the VAS results, the average was 6.8, indicating moderate to severe pain for patients. It is important to note that most patients undergoing treatment at the Pain Clinic routinely use one or more prescribed pain control drugs. Therefore, it is noteworthy that, despite the pharmacological treatment, the pain remained with significant intensity as a factor that aggravates the quality of life of these patients. Studies report that the non-control of pain may occur due to factors such as the potency of the analgesics used is lower than the pain intensity (negative pain control index), proposed analgesic schemes not compatible, or compatible with restrictions with the WHO analgesic scale pattern, or the incorrect use of drugs by patients, who use them only in situations of pain aggravation.

Among the patients, 66.6% indicated that they have a person who acts as their caregiver. The importance of the caregiver in the health care of oncologic patients is essential. The caregiver provides direct care, such as drug administration, hygiene and food, and indirect care, accompanying the patient in all stages of the disease.

Regarding functional capacity, the results obtained concerning IADL (such as using the telephone, taking transportation to travel, shopping, preparing meals, cleaning, taking drugs, and dealing with the finances) were 8.2 for women and 7.5 for men, on a scale from zero to 14. According to the proposed classification, these numbers indicate an intermediate level of independence for IADL, a result supported by research that shows altered functional capacity in oncologic patients due to semi-dependence for activities of daily living, justified by abnormal performances in autonomy and independence.

Still regarding functional capacity, the results obtained in relation to PADL (such as eating without help, dressing/taking off clothes, personal hygiene, walking/getting out of bed, taking a bath and getting to the toilet in time when needed) were 13.5 for women and 9.4 for men, on a scale from zero to 14. Based on these numbers, women...
were considered to have a high degree of functional independence, while men had a significantly lower degree of independence.

No studies were found to support these findings and justify this less sensitive difference in IADL. However, contrary to the findings, some studies indicate that older women are usually more dependent on IADL than men, with a lower quality of life and a greater chance of incapacity.

Regarding the quality of life, analyzed by the EORTC QLQ-C30 questionnaire, the social function was the most affected (52.6), followed by emotional (53.7), physical (54.0), performance of roles (56.8), and finally cognitive (72.4). These results were partially corroborated by the 2008 EORTC QLC-C30 Global Benchmark Manual, in that cognitive function remains the least affected and emotional as the second most affected. Regarding symptoms, the three symptoms with the highest scores were: fatigue (49.5), insomnia (37.4), and loss of appetite (30.6). Again, these results were partially corroborated by the Benchmark Values Manual, which indicates the most frequent symptoms, in decreasing order, fatigue, insomnia, and pain.

Oncologic patients report fatigue as the most common symptom in all stages of the disease. However, there is still no consensus on its definition, only on its multicausal nature. It is a very debilitating symptom that significantly limits daily activities and reduces working capacity. However, unlike other symptoms, especially pain, there are no known effective interventions for fatigue control and management, further increasing its disabling potential.

When analyzed by gender, there was a statistically significant difference in QoL. Overall Health scores (an average of 62.4 for women and 51.7 for men), role performance (59.1 for women and 49.8 for men), and cognitive function (62.8 for women and 79.5 for men).

A research focused on gender differences in cancer coping revealed significant results for understanding these differences observed in the present study. Men, faced with a diagnosis of cancer, assume a self-controlling attitude, suppressing emotional manifestations to fulfill their social problem-solving role. Perhaps this attitude is decisive for maintaining a higher score of the cognitive function of men compared to women. On the other hand, women adopt a more emotionally positive coping strategy, seeking social support and physical help to make the burden of the disease more bearable.

Regarding the caregivers interviewed in this research, there was female prevalence (72.2% are women, versus 27.8% men). The average age was 48 years (42 years for women, and 64.3 years for men). The prevalent marital status was married (72.2% of respondents). Gender, age, and marital status data are corroborated by existing literature, which shows that adult and married women, usually wives, daughters, or sisters of the patient, make up the predominant profile of caregivers.

This gender cut, specifically, matches with what studies attest to the social and cultural construction of which women have historically been the caregivers of their children, parents, and family. 72.2% of the caregivers had an income of up to 2 minimum wages, and 63.7% had an active work situation. These numbers indicate that the role of the caregiver may interfere with the individual's personal and family financial situation, contributing to an overload scenario. In Siegel et al. study, 48% of caregivers had some sort of financial support, and 25% used their savings or borrowed money; Additionally, among the 79% of caregivers who were working, the main burden reported was financial.

Many caregivers need to abandon all or part of their work since they need, time after time, to accompany the patient to appointments or treatment sessions, or to give the patient full attention and care. In this sense, it is once more the women who end up prioritizing total dedication to caring, thus harming not only their professional activities but also their social life and leisure, resulting in a stressful overload of uninterrupted and daily care.

Regarding the ZBI scale, results were mild overload for 63.7% of respondents, moderate for 18.15%, and severe for 18.15%. There was a positive correlation between age, IADL, and overload: the older the caregiver, the higher the perception of overload and the lower the IADL index. The Zarit Scale assesses, above all, the caregivers' subjective overload, that is, their perception of the situation. Thus, lower scores are common and present in other studies. The explanation for this, as studies in psychology show, may be coping strategies related to controlling emotional reactions.

CONCLUSION

The set of results showed that the presence of chronic pain negatively and significantly impacts the quality of life and functional capacity of cancer patients. This impact is more significant in IADL, resulting in the semi-dependence of these patients, especially men.

It was also possible to conclude that this impact also extends to the figure of the caregiver. Older caregivers with relative functional disability showed a higher perception of overload.

REFERENCES

33. Coppetti LC, Girardon-Pellini NMO, Andalhe R, Gutiérrez MGR, Dapper SN, Siqueira FD. Caring ability of family caregivers of patients on cancer treatment: associa-
ABSTRACT

BACKGROUND AND OBJECTIVES: Walking is described as one of the abilities most affected by chronic low back pain. This study aimed to determine if chronic nonspecific low back pain and walking speed affect the spatiotemporal parameters (stride length, swing time, contact time, stride time, stride frequency and walking ratio) and the coefficients of variation of stride length and contact time.

METHODS: Ten participants with chronic nonspecific low back pain (low back pain - LG) and ten healthy participants in the control group (CG) walked on the treadmill at preferred self-selected speed, slower and faster than the preferred speed. Spatiotemporal parameters and coefficients of variation were determined by kinematic analysis. Main effects (group and speed) and their interactions were tested using generalized estimating equations method.

RESULTS: Our results showed that there were no significant differences between groups or significant interaction between group and speed factors. There was a speed effect. Stride frequency and length increased while contact and stride time decreased as the speed increased. The walking ratio (stride length/stride frequency) was relatively consistent across speeds (-1.6 m/stride\(^1\)) without statistical differences. The coefficients of variation were below 5%.

CONCLUSION: The chronic nonspecific low back pain did not affect the gait spatiotemporal profile, at least for those patients classified as chronic nonspecific low back pain according to the signs and symptoms criteria. Although the preferred speed has affected the spatiotemporal parameters, both groups patients were able to adjust their kinematic parameters to each task demand.

Keywords: Gait, Biomechanical phenomena, Locomotion, Spine.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A caminhada é descrita como uma das habilidades mais afetadas pela dor lombar crônica. Este estudo objetivou determinar se a dor lombar crônica não específica e a velocidade de caminhada afetam os parâmetros espaço-temporais (comprimento da passada, tempo de balanço, tempo de contato, tempo da passada, frequência da passada e razão de caminhada) e os coeficientes de variação do comprimento da passada e do tempo de contato.

MÉTODOS: Dez participantes com dor lombar crônica não específica (grupo dor lombar GL) e 10 participantes saudáveis (grupo controle - GC) caminharam na esteira na velocidade preferida autosselecionada, e em velocidades mais lenta e mais rápida que a velocidade preferida. Parâmetros espaço-temporais e coeficientes de variação foram determinados por cinemática. Os efeitos principais (grupo e velocidade) e as suas interações foram testadas pelo método de equações de Estimativas Generalizadas.

RESULTADOS: Não houve diferenças entre os grupos ou integração entre os fatores (grupo e velocidade). Houve efeito da velocidade. A frequência e o comprimento de passada aumentaram, enquanto o tempo de contato e de passada diminuíram à medida que a velocidade aumentou. A razão de caminhada (comprimento da passada/frequência da passada) foi relativamente consistente entre as velocidades (-1,6 m-passada\(^{-1}\)) sem diferenças estatísticas. Os coeficientes de variação ficaram abaixo dos 5%.

CONCLUSÃO: A dor lombar crônica não específica não afetou os parâmetros espaço-temporais da caminhada, pelo menos para os pacientes classificados com dor lombar crônica não específica pelos critérios de sinais e sintomas. Embora a velocidade preferida tenha afetado os parâmetros espaço-temporais, os pacientes de ambos os grupos foram hábeis para ajustar seus parâmetros cinemáticos às demandas da tarefa.

Descritores: Coluna vertebral, Fenômenos biomecânicos, Locomoção, Marcha.
INTRODUCTION

Low back pain (LBP) is a syndrome-based condition with high prevalence in the world population. The global prevalence of LBP was reported as ranging from 5 to 65%\(^1\). In Brazil, the prevalence of chronic low back pain (CLBP) is 3.9 to 25.4%, and the prevalence in individuals aged between 20 and 59 years is around 19.6%\(^2\). Although the specific causes of LBP can be identified, the specific diagnosis is not possible in most cases, and a nonspecific cause is frequently accepted as the diagnosis\(^3\).

The recognition of the LBP etiology remains a challenge since there is still a poor correlation between anatomopathological and clinical presentation\(^4\). Nevertheless, CLBP is usually associated with functional and psychosocial impairment\(^5,6\). A study that identified the main activities performed with difficulty in patients with CLBP pointed out more than 60 types of activities. However, the most prevalent, around 56%, was a decrease in walking tolerance\(^7\).

Walking is an activity of both clinical and functional relevance due to its impact on independence and quality of life, and is often an integral part of rehabilitation programs, including those directed to patients with CLBP. However, the repercussion of LBP on the walking parameters still needs further understanding, given the etiological complexity of this syndrome and the wide range of factors that can contribute to the loss of movement\(^8\).

Spatiotemporal parameters of gait, such as speed, stride length, stride frequency, contact, and balance time, are not unvarying. They interact in a coordinated manner to allow the displacement to be adequate to the task demands and environment and to ensure that it is performed effectively. Therefore, individuals tend to determine these spatiotemporal parameters freely, although dynamic and mechanical factors have a remarkable influence on this choice\(^9\).

Some neurological diseases cause disturbance of gait spatiotemporal synchronism\(^10,11\). In the major part of neurological impairments, the relation between the disease and motor disorders, although complex, is more apparent because the anatomopathological disease basis involves the recognized damage to the structures responsible for the generation and conduction of nerve stimuli\(^12\). Often, this framework does not apply to CLBP and walking tolerance\(^7\). The hypothesis of this study was that participants with CLBP are less able to adjust the spatiotemporal parameters as a result of speed variation, but especially in the preferred self-selected speeds because these patients tend to choose speed rates slower than healthy people, and as it has recently been demonstrated, at lower speeds the inter-strides variation is critical\(^16,17\). Based on this, it is expected that participants with CLBP have their dynamical stability impaired (assessed by inter-stride variation) at all speeds tested.

METHODS

After the sample calculation, which was determined for the variable “speed” (WinPepi version 11.18; power = 80%; significance level 5%; SD control group = 0.16; SD low back pain group = 0.21; difference to be detected = 0.3; at least n = 8 for each group), volunteers of both genders and aged over 25 years, with and without CLBP were recruited. The CG consisted of participants without systemic or musculoskeletal disorders in the lower limbs and spine, either chronic or acute, reported during the last year.

The chronic low back pain group (LG) consisted of volunteers with CLBP, from a local Rehabilitation Center, and with no musculoskeletal injuries in other joints on lower limbs and/or systemic illnesses which impairs the ability to walk. They were recruited intentionally and not probabilistically. The inclusion criteria for the LG followed the recommendations of original or review articles that focused on the diagnosis and treatment of LBP, according to the signs and symptoms indicated in the amnesia and physical examination\(^3,18\). Thus, volunteers should report LBP persisting for more than three months, without radiation to the lower limbs but with physical and clinical characteristics compatible with Category 1 pain (nonspecific low back pain) according to the guidelines for evaluation and treatment that are proposed by the American College of Physicians and the American Pain Society\(^18\).

Volunteers, from both groups, were excluded if they did systematically and routinely engage in physical exercise, two or more times per week for at least 30 minutes; did show obvious differences in length of the lower limbs, postural misalignments and body mass indexes greater than 30.0kg.m\(^{-2}\). For data processing, videos with bad technical quality were excluded from the analysis.

Measures

The experimental design of this study involved the following steps: 1) screening; 2) preferred self-selected speed determination; 3) spatiotemporal assessment; 4) data analysis.

After the explanation about the procedures and objectives of the research, the volunteers underwent clinical screening to identify possible exclusion factors and collection of history and anthropometric data.

To determine the preferred self-selected speed (PS), the participant underwent a familiarization period, for five minutes, on the treadmill (Embrex 563-R3, Brusque, Brazil) and then the PS was determined. The PS was determined as follows: a) the volunteer was asked to choose the most comfortable speed, similar to the
one used daily, that could be maintained over a long path; b) the treadmill speed was increased progressively up to a standard of 7 km.h⁻¹ (or until before the volunteer felt insecure in walking) and then reduced in the same pattern so that the volunteer could choose his PS in each set; c) the PS of each patient was determined by calculating the mean of the PSs from two sets of recording⁹⁹. A high-speed digital video camera (Casio High Speed – HS Exilim EX-FH25, Norderstedt, Germany) recorded the spatiotemporal parameters. Data acquisition occurred at a frequency of 240Hz. The camera was placed perpendicular to the treadmill with a focus on the lower limbs, especially on legs and feet. The test battery was divided into three sections according to WS intensity as follows: PS, and slower and faster than the PS. Only three intensities were proposed to avoid overloading on the LG. In the first section, the participants walked at their PS. The order of the next two sections was randomly selected so that in one case, the volunteers walked 0.5 km.h⁻¹ slower than the PS, and the other the volunteers walked 0.5 km.h⁻¹ faster than the PS. In each section, the participants walked for five minutes. The images were captured in the last 30s of each section to minimize variability between steps²⁰. During the treadmill walking tests, minute by minute, the participants were asked to grade the pain experienced at that exact moment using the visual analogue scale (zero to 10, where zero represented absence of pain, and 10 the worst possible pain) making a total of six samples: from moment zero immediately before start walking until the moment five at the end of the last walking minute. The valid pain scores of each section for statistical analysis was the arithmetic average of all measures of that section.

**Data processing**

For kinematic analysis, the ‘Kinovea’ software (V0.8.15; Kinovea open source project, www.kinovea.org) was used to determine the spatiotemporal parameters by visually identifying the total of frames, computing frame by frame, corresponding to the touching of the heel on the ground (landing) and the moment when a foot lost contact with the ground (toe-off) for 16 strides analyzed in that last 30s time. Each stride cycle comprised the interval between two consecutive take-offs of the same foot²¹,²². The spatiotemporal parameters analyzed, and their respective measurement units and definitions are presented in table 1²¹,²². We also calculated the CoV of contact time and stride length, obtained by the ratio between standard deviation and the average values arising from each step transformed into percentage values⁶. The CoV is expressed in percentage values (CoV%).

The present study was previously approved by the Research Review Board of the Universidade Estadual do Oeste do Paraná (Report 1433/2011), in accordance with resolution 466/12, and it was classified as observational, ex-post-facto, exploratory-descriptive, transversal study. All volunteers received clarification regarding the study aims and procedures before inclusion, and all provided formal consent to participate.

**Statistical analysis**

Regarding variable stride length, we considered only normalized values by lower limb length for statistical treatment. We tested the data normality by the Shapiro-Wilk test. For all statistical tests, we adopted α=0.05. We compared the participants’ characteristics using the Mann-Whitney test (intergroup comparison). We verified if there was any difference in pain scores for LG between the speeds using the Friedman test. The verification of LBP effect (main group effect), walking speed effect (main effect of speed) and their interactions were made using the Generalized Estimating Equation (GEE) method. In post-tests, we applied the Bonferroni test.

**RESULTS**

In total, 20 volunteers were recruited, being five men and five women in each group. Statistical differences in age, PS, anthropometric characteristics were not observed between the groups, but we found differences in pain scores (Table 2). The pain scores were not different between the speeds for LG (p=0.8302). The descriptive statistic for the spatiotemporal variables is presented in figure 1. No main group effect was found as well as interactions between group and speed, but we found the effect of speed. It can be observed that stride frequency and stride length increased as the speed was higher. The contact time and stride time decreased as the speed was higher. We did not find effect of speed on the walking ratio. The CoVs were below 5%.

**Table 1. List of the spatiotemporal parameters analyzed in the present study, their units and definitions**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Units</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>m.s⁻¹</td>
<td>Distance traveled per unit time</td>
</tr>
<tr>
<td>Stride time</td>
<td>s</td>
<td>Number of frames of each cycle multiplied by the period</td>
</tr>
<tr>
<td>Stride length (normalized by the Lₜ)</td>
<td>m</td>
<td>Speed multiplied by (ST / Lₜ)</td>
</tr>
<tr>
<td>Stride frequency</td>
<td>Stride.s⁻¹</td>
<td>Speed /SL</td>
</tr>
<tr>
<td>Swing time</td>
<td>s</td>
<td>Number of frames in that the foot is not in contact with the ground during a stride multiplied by the period</td>
</tr>
<tr>
<td>Contact time</td>
<td>s</td>
<td>Number of frames in that the same foot is in contact with the ground during a stride multiplied by the period</td>
</tr>
<tr>
<td>Walking ratio</td>
<td>m.stride⁻¹.s</td>
<td>A speed-independent walking standard index. It is the ratio of SL per SF</td>
</tr>
</tbody>
</table>

Period = reciprocal of the sampling rate (1.240⁻¹).
Table 2. Presentation of descriptive statistics (median, 25%, and 75% percentile) and intergroup comparison between the variables of sample characterization

<table>
<thead>
<tr>
<th>Variables</th>
<th>CG</th>
<th>Descriptive statistics</th>
<th>LG</th>
<th>Intergroup comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>25% percentile</td>
<td>75% percentile</td>
<td>p= .1984</td>
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<tr>
<td>Age (year)</td>
<td>37</td>
<td>32</td>
<td>44</td>
<td>p=.3215</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>33</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>LII (m)</td>
<td>0.88</td>
<td>0.86</td>
<td>0.93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.87</td>
<td>0.76</td>
<td>0.91</td>
<td></td>
</tr>
<tr>
<td>Stature (m)</td>
<td>1.76</td>
<td>1.63</td>
<td>1.79</td>
<td>p=.0634</td>
</tr>
<tr>
<td></td>
<td>1.69</td>
<td>1.56</td>
<td>1.75</td>
<td></td>
</tr>
<tr>
<td>Body mass (kg)</td>
<td>70.5</td>
<td>65.4</td>
<td>86.1</td>
<td>p=.6305</td>
</tr>
<tr>
<td></td>
<td>70.4</td>
<td>56.6</td>
<td>85.0</td>
<td></td>
</tr>
<tr>
<td>PS (m s⁻¹)</td>
<td>0.98</td>
<td>0.84</td>
<td>1.20</td>
<td></td>
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<tr>
<td></td>
<td>0.91</td>
<td>0.84</td>
<td>1.09</td>
<td></td>
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<tr>
<td>Pain at slower speed (by VAS)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>p=.0014</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>0.3</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Pain at PS (by VAS)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>p=.0014</td>
</tr>
<tr>
<td></td>
<td>0.9</td>
<td>0</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>Pain at faster speed (by VAS)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>p=.0014</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>0.6</td>
<td>2.1</td>
<td></td>
</tr>
</tbody>
</table>

LG = low back pain; CG = control group; LII = length of lower limb, walking speed 0.5 km/h slower than the preferred self-selected speed (slower); PS = preferred self-selected speed; speed 0.5 km/h faster than the preferred self-selected speed (faster); VAS = visual analog scale; significance level=0.05.

Figure 1. Descriptive statistics (mean and 95% confidence interval) and inferential comparisons of the spatiotemporal variables by assessing the effect of speed.
DISCUSSION

We aimed to determine if CLBP and WS affect the spatiotemporal parameters. The results of this study indicated that CLBP did not have a significant effect on the spatiotemporal parameters. However, the WS did affect them.

The effect of speed on the spatiotemporal parameters has been reported before, as speed is accompanied by changes in the kinematic parameters\(^\text{23}\). Likewise, it is emphasized that the walking speed is the product of stride length and frequency, but at the same time, these parameters are also determined by the speed, and this is a consequence of the complex interaction between mechanical parameters, task demand, and motor control\(^\text{24}\). It means that changes in the spatiotemporal parameters observed in this study, by the influence of the speed, are supported by the scientific and technical literature.

As the relation choice between stride length and stride frequency tends to be spontaneous at a self-selected speed, and even at different speeds\(^\text{23}\), the walking ratio is considered as an index of the walking pattern which is independent of speed. Thus, a constant walking ratio at different speeds reveals a normal walking pattern\(^\text{26}\). As the walking ratio of the present study in both groups showed no statistical differences between the three intensities in speed and no significant group effect, we concluded that all the studied participants were skilled enough to adapt their kinematic parameters to each task demand.

Besides, the low values and the lack of statistical difference in the CoV index reinforce our findings, indicating stable gait characteristics. Variability of both stride time and length are closely related to the control of the rhythmic stepping mechanism associated with safe gait\(^\text{27}\). Variability, represented by CoV, provides additional information about the behavior of the gait concerning average values of the kinematic variables and tends to be low in walks considered stable, being advocated percentage values for normal coefficient variation lower than 3% among young adults. Also, variability tends to be higher at lower speeds and, on the contrary, lower at higher speeds. The smaller the variability the greater the gait dynamic stability\(^\text{16,28}\). In the present study, both groups were able to adjust their spatiotemporal parameters, and the LG reported low pain scores at all speeds without difference between them. We believe to be this the cause of the lack of statistical difference for PS between groups.

Our initial hypothesis was that participants with CLBP are less able to adjust the spatiotemporal parameters due to speed variation. This hypothesis was based on the findings of other authors\(^\text{29}\). In the medical literature, some investigators have highlighted the impairment in the walking pattern in people with CLBP as a synchronous movement between trunk and pelvis leading to “en bloc” style of walking, alteration of proprioceptive postural control, tendency to adopt ankle strategy for walking and slower speed gait than people without CLBP. In general, it is accepted that those adaptations might happen as a protective reaction to avoid pain\(^\text{30,31}\). However, our data indicate the opposite, and they do not support the theory that patients with CLBP avoid moving due to the pain.

Despite some mechanical reasons to believe that the gait in CLBP patients could be changed, it is possible that the spatiotemporal features may not reflect the kinetics impaired. It is possible to speculate that one should consider other relevant features involved in the etiology of LBP syndrome for that spatiotemporal changes to be present.

Henchoz et al.\(^\text{31}\) did not observe differences in the spatiotemporal, mechanical, and metabolic variables in people with and without LBP, even with the self-selected speed for the lumbar group being slower than the control group. One of the arguments suggested to explain these outcomes was that peripheral musculoskeletal disorders, unlike central musculoskeletal disorders, may not be sufficiently large to cause a less efficient walking pattern.

One study suggested that CLBP patients seem to be more effective at slow speeds than fast speeds (speed effect), although there was no difference in free-pain participants\(^\text{32}\). The authors speculated that the repercussion of neurophysiological adjustments due to painful stimuli could explain the motor behavior in people with CLBP and consequently the metabolic parameters.

Indeed, the LBP is a syndrome-based condition, and the contribution of psychosocial and neuropsychological factors on the performance of motor tasks is still poorly understood and confusing in the context of CLBP. The contemporary classification system for this syndrome is yet not sensitive enough to include all etiological aspects. Probably, the physical classification systems for LBP do not consider relevant dimensions as pain characteristics, psychophysical, psychological, social, lifestyle, movement or comorbidities in an integrated manner to provide a diagnosis that allows recognizing single features in each case\(^\text{33}\). Corroborating other papers, the researchers observed that patients with CLBP, although they had a lower level of strength on dorsal and lower limb muscles or in psychosocial variables, they did not show differences in the six-minute walk tests performance in comparison to healthy people\(^\text{3,6}\). It is important to highlight that the speeds evaluated were self-selected.

We suggest future papers to include other etiological dimensions in the analysis to compose groups functionally more homogeneous. The major limitation of this study is that we did not have a fixed speed aiming to compare both groups under similar mechanical conditions.

In general, one cause of concern about CLBP rehabilitation relates to the improvement of walking ability; mainly because these patients tend to walk slower. According to two systematic reviews, walking is a recommended strategy to be used in the management of CLBP to reduce pain and disability\(^\text{34}\), although there is low-quality evidence to bespeak that walking is a strategy, in comparison with other non-pharmacological, and more effective, approaches\(^\text{35}\).

Our results make us think if the strategies used in rehabilitation, aiming to correct the spatiotemporal parameter of gait for CLBP patients are necessary. The present findings show that the spatiotemporal profile of gait in this syndrome-based condition does not change across slow, middle, and high walking speeds. The gait variability is an indirect marker of dynamical stability and, though previous evidence shows a greater step width in people with LBP, these changes are not enough to impair the global stability parameters assessed here.
CONCLUSION

We conclude that CLBP does not affect the spatiotemporal parameters, at least for those patients classified as CLBP according to the signs and symptoms criteria. Although the WS has affected the spatiotemporal parameters, both LG and CG patients were able to adjust their kinematic parameters to each task demand sustaining a low variability of gait.

ACKNOWLEDGEMENTS

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REFERENCES

Acupuncture in the treatment of temporomandibular muscle dysfunction

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ABSTRACT

BACKGROUND AND OBJECTIVES: Temporomandibular dysfunction consists of frequent non-dental pain in the orofacial region of multifactorial origin and interdisciplinary treatment, among them, acupuncture. The treatment of temporomandibular dysfunction acts both in muscle relaxation and pain control, trying to achieve the physical, mental, and emotional balance of the patient, thus reducing anxiety and improving the quality of life. The objective of this study was to evaluate acupuncture as a treatment for temporomandibular dysfunction.

METHODS: A total of 34 volunteers screened and selected at the Federal University of Mato Grosso do Sul, diagnosed with muscle dysfunction according to the Research Diagnostic Criteria. They were randomly divided into two equal groups: group 1 treated with occlusal plaque, massage, thermotherapy and self-care guidelines; and group 2 treated with six acupuncture sessions lasting 30 minutes each. The pain was evaluated by the visual analog scale, and an algometer to assess the muscular tension of the temporal and masseter muscles. The limitation of mouth opening was measured with the use of calipers. The Mann-Whitney test was used for the non-normal distribution (visual analog scale and tension threshold) between the two groups (G1 and G2), and the Friedman test to compare the assessment periods (beginning of the treatment, after six weeks and 4 months) with a significance level of 5%.

RESULTS: There was no difference in mouth opening, visual analog scale scores, or muscle tension threshold in relation to the type of treatment used. Both groups improved after six weeks of treatment. There was no statistical difference in the values obtained after six weeks and after four months.

CONCLUSION: The statistical results showed that acupuncture increased the muscle tension threshold, improved the mouth opening and reduced pain, being as effective as the most commonly used conventional therapies.

Keywords: Acupuncture, Orofacial pain, Temporomandibular dysfunction.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A disfunção temporomandibular consiste em dores não dentárias frequentes na região orofacial, de origem multifatorial e de tratamento interdisciplinar. Entre esses tratamentos está a acupuntura. O tratamento da disfunção temporomandibular atua tanto no relaxamento muscular quanto no controle da dor, sistematicamente buscando o equilíbrio físico, mental e emocional do paciente, diminuindo a ansiedade e melhorando a qualidade de vida. Este trabalho teve como objetivo avaliar a acupuntura como tratamento da disfunção temporomandibular.

MÉTODOS: Participaram do estudo 34 voluntários triados e selecionados na universidade de Mato Grosso do Sul, diagnosticados com disfunção muscular pelo Research Diagnostic Criteria, e foram divididos aleatoriamente em dois grupos iguais. O grupo 1 foi tratado com placa oclusal, massagem, termoterapia e orientações de autocuidado. O grupo 2 foi tratado com 6 sessões de acupuntura com duração de 30 minutos cada. A dor foi avaliada pela escala analógica visual e com auxílio de um algômetro para avaliar a tensão muscular dos músculos temporal e masseter. A limitação de abertura bucal foi medida com o uso do paquímetro. Para a distribuição não normal (escala analógica visual e limiar de tensão), entre os dois grupos (G1 e G2), foi utilizado o teste Mann-Whitney, e para a comparação entre os períodos de avaliação (início do tratamento, após seis semanas e 4 meses) foi utilizado o teste de Friedman, ao nível de significância de 5%.

RESULTADOS: Não houve diferença das medidas de abertura de boca, dos escores de escala analógica visual e de limiar de tensão muscular segundo o tipo de tratamento utilizado. No entanto, em ambos os grupos houve melhora nos parâmetros avaliados após seis semanas de tratamento. Não houve diferença estatística dos valores obtidos após seis semanas e ao final do tratamento, após quatro meses.

CONCLUSÃO: Os resultados estatísticos mostraram que a acupuntura aumentou o limiar de tensão muscular, melhorou a abertura de boca e diminuiu a dor. Concluiu-se que a acupuntura foi tão eficiente quanto as terapias convencionais mais utilizadas.
INTRODUCTION

Temporomandibular dysfunction (TMD) is a set of clinical signs and symptoms involving the masticatory muscles, the temporomandibular joint (TMJ) and associated structures. Currently, TMD is basically divided into two groups, which are joint and muscle dysfunction. Symptoms most frequently reported by patients are muscle fatigue, facial pain, headache, TMJ pain, and chewing muscle pain. Ear pain, mandibular movement limitation, tinnitus may be present in some cases, especially in joint dysfunction.

It is important to know some of the factors that can contribute to the development and maintenance of TMD, such as teeth clenching, bruxism (grinding or clenching), biting foreign objects such as pens or nails, chewing gum, head posture or presenting factors related to stress, depression, and anxiety or traumatic events, malocclusions and occlusal maladjustments, such as missing teeth.

Because TMD have a multifactorial etiology, they require an interdisciplinary therapeutic approach through a team of several specialties, or at least close collaboration. The use of interocclusal splints is the most used treatment in dentistry, as they cause local muscle relaxation and relief of muscle pain. Others act presumably more centrally, including acupuncture.

The use of occlusal splints comprises a treatment modality with a high success rate in reducing muscle TMD symptoms, but it is only effective when used correctly. However, there are still patients who do not respond to treatment with splints, so it is necessary to institute other treatment modalities. The use of acupuncture in the treatment of TMD can be considered as a holistic science and therapy that preaches mental, emotional balance through the harmony of the patient’s physical, mental, and psychosocial environment.

Based on the literature, this study aimed to compare the effects of acupuncture on occlusal splint in the treatment of patients with muscle TMD.

METHODS

Thirty-four individuals were screened in the TMD extension project of the School of Dentistry (FAODO) of the University of Mato Grosso do Sul, who presented a clinical picture of muscle TMJ pain and dysfunction. After being evaluated by the Research Diagnostic Criteria (RDC/TMD) exam and signing the Free and Informed Consent Term (FICT), the patients participated in the random selection of the research groups.

The sample size was determined with the SPSS software version 24.0 (SPSS, Inc., Chicago, IL, EUA) by the t-test calculation, accepting a sample mean of pain score decrease in the visual analog scale (VAS) after treatment of TMD of 5.29±0.43, population mean of 5.0, significance level of 5% and power of 80%, resulting in a minimum sample of 17 participants for each group.

The inclusion criteria were being diagnosed with muscle TMD and being over 18 years old. The exclusion criteria were the previous treatment of TMD, have fibromyalgia, pregnant women; individuals using neuromuscular drugs; cancer patients.

The patients were randomized by simple draw into two groups: G1: n=17, who underwent massage treatment, thermotherapy, counseling, and occlusal device. The patients were instructed to use the myorelaxant splint at night (Figure 1).
Participants received counseling and self-care guidance. The occlusal splints were of 2mm thick acetate from Bio.art brand, and all were reinforced with a mean 2mm thick acrylic layer to improve their strength and smoothness. No semi-adjustable articulator was used to make the splints. A single skilled and experienced RDC/TMD professional installed and adjusted the splints, carefully checking the highest number of contact points, and the protrusion and laterality of jaw movements. After the splints were installed, patients were instructed to use only at night and return for follow-up and possible adjustments every 15 days. Patients were reevaluated after six weeks and four months of treatment. G2 (n=17) underwent acupuncture sessions once a week for 30 minutes. There were six acupuncture sessions. The treatment was performed with 0.25x15mm disposable needles (acupuncture needles) of DongBang Xu li Ltda brand, at points called acupoints. The skin was previously cleansed with 70% ethyl alcohol by a specialized professional. In each session, the patients remained for 30 minutes lying down and relaxed. The selected points followed the TCM diagnostic protocol. The selected points were:

a) for local pain, stomach meridian E7 (Xianguan); a local meridian point of the stomach that improves ear and TMJ functions, relieves muscle spasm of the masseter, decreases jaw motor imbalance and decreases pain.

b) systemic points: VG20 (Baihui) - governing vessel channel (Figure 2). A systemic point indicated to calm the mind, reduce stress, improve sleep, calm thoughts, soothe the spirit, relax muscles. TA5 (Waiguan) - triple heater channel (Figure 3). Systemic point for the treatment of pain and irritability, treatment of otitis, tinnitus, reduces headache, treatment of neck and shoulder muscle pain. IG4 (Hegu) - large intestine channel (Figure 4). A systemic point that strengthens the immune system, anti-inflammatory point of the upper limbs, analgesia, calms the mind, promotes labor (contraindicated in pregnant women), regulates the stomach and intestine channels, regulates the uterus, treats tinnitus and deafness, treats the flu, sinusitis, rhinitis, anxiety, and neck muscle pain. E36 (Zusanli) - stomach channel (Figure 5). Systemic point regulates the immune system, regulates the intestines, increases energy. According to Chinese belief, this point is the point of vitality, strength, and long life, rebalances the mind, decreases fever, treats depressive disorders. F3 (Taichong) - liver channel (Figure 6). A systemic point that regulates menstruation, treats menstrual cramps, calms the mind, treats headaches, treats irritability, treats insomnia, reduces worry, rebalances the mind.

The points are applied bilaterally, except for the central point VG20, totaling 11 points for pain, anxiety, and stress, following the TCM criteria. Patients were reevaluated after six weeks and four months of treatment.

Both groups were evaluated and treated by the same professional, dental surgeon and acupuncture specialist by the Instituto Brasileiro de Técnicas Médicas (IBRATE) and volunteer of SERDOF-DTM (Serviço de Dor Orofacial e Disfunção Temporomandibular) at UFMS.

After the reevaluations, the results were statistically analyzed.
The visual analog scale (VAS) and the pressure algometer were used to evaluate the pain perception of the volunteers. The VAS assists in the measurement of pain intensity in the patient to check his/her evolution during treatment and each service, in a practical way. To use the VAS, the researcher must ask the volunteer what his/her degree of pain is, zero means no pain, and 10 the maximum tolerable pain level. The study patients were instructed to mark their pain grade on the day of each evaluation.

The pressure algometer is a device designed to quantify and document sensitivity levels by measuring the pressure threshold and pain sensitivity, measuring tolerance, to check the temporal muscle pain threshold (anterior and middle bundles), and the masseter (medium and inferior fibers).

The patients’ mouth opening limitation was evaluated using the caliper before treatment, after 6 weeks of treatment and 4 months after treatment. It is a very accurate tool that measures the distance between two symmetrically opposite sides of an object. In the case of the mouth opening, the reference was the distance between the upper and lower incisors.

The research was approved by the Ethics Committee of the Federal University of Mato Grosso do Sul (CEP/UFMS) CAAE number: 89598418.6.0000.0021.

Statistical analysis
Data were tabulated in a Microsoft Excel 2010 spreadsheet (Microsoft Corporation, Redmond/Washington/Estados Unidos) and analyzed by the Statistical Package for Social Science Version 18.0 (SPSS Inc., Chicago/Illinois/Estados Unidos). Initially, descriptive statistics of the collected data were performed using measures of central tendency and dispersion.

In order to verify the association of quantitative variables between G1 and G2, the t-test was used for normal distribution (mouth opening) for independent samples; and for comparison between the evaluation periods (baseline of treatment, after six weeks and 4 months, two by two), the t-test for paired samples was used. For the non-normal distribution (VAS and tension threshold), the Mann-Whitney test was used in the two groups, and for the comparison between the evaluation periods (baseline of treatment, after six weeks and 4 months), the Friedman test was used at a significance level of 5%.

RESULTS
Table 1 shows the mean and standard deviation of mouth opening measurements at baseline, after 6 weeks and after 4 months of treatment in G1 and G2. G1 was treated with massage, thermotherapy, counseling, and occlusal splint, and G2 underwent acupuncture. There was no difference in mouth opening measures according to the type of treatment used. However, in both groups (acupuncture and occlusal splint), there was an increase in mouth opening measures after 6 weeks of treatment. There was no difference in mouth opening values after 6 weeks and at the end of treatment after 4 months (Table 1).

Table 2 shows the mean and standard deviation of the VAS scores at baseline, after six weeks of treatment, and at the end, after 4 months of treatment, in both groups. There was no difference in the VAS scores according to the type of treatment used. However, in both groups (acupuncture and occlusal splint), scores decreased after six weeks of treatment. There was no difference in the VAS scores after six weeks and at the end of treatment after four months (Table 2).

Table 3 shows the mean and standard deviation of the masseter and temporal muscle tension threshold scores at baseline, after six weeks, and at the end of treatment in G1 and G2. There was no difference in tension threshold scores between G1 (acupuncture) and G2 (occlusal splint), except for the left temporal muscle (Tb), in which the value obtained in G1 (4.7±1.2) was higher compared to G2 (3.8±1.6) at evaluation after six weeks of treatment. However, after four months, there was no difference in values.

In the evaluation of the studied period of G1 and G2 separately, there was an increase in tension threshold scores for the evaluated muscles, masseter, and temporal, after six weeks of treatment. However, the values were similar to those obtained after four months (Table 3).
Table 1. Mean and standard deviation of mouth opening measurements at baseline, after 6 weeks and after 4 months of treatment by type of intervention

<table>
<thead>
<tr>
<th></th>
<th>G1 (n=17)</th>
<th>G2 (n=17)</th>
<th>(1) p-value</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
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<tr>
<td>Painless mouth opening</td>
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<td></td>
<td></td>
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<tr>
<td>Baseline</td>
<td>a 36.6</td>
<td>7.8</td>
<td>a 35.5</td>
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<tr>
<td>After 6 weeks</td>
<td>b 42.2</td>
<td>6.5</td>
<td>b 44.1</td>
</tr>
<tr>
<td>After 4 months</td>
<td>b 41.4</td>
<td>7.2</td>
<td>b 42.9</td>
</tr>
<tr>
<td>p(2)</td>
<td>0.007; 0.046; 0.623</td>
<td>0.001; 0.001; 0.408</td>
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</tr>
<tr>
<td>Maximum mouth opening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>a 45.9</td>
<td>8.0</td>
<td>a 44.1</td>
</tr>
<tr>
<td>After 6 weeks</td>
<td>b 50.4</td>
<td>6.6</td>
<td>b 51.2</td>
</tr>
<tr>
<td>After 4 months</td>
<td>b 49.8</td>
<td>6.6</td>
<td>b 50.6</td>
</tr>
</tbody>
</table>

(1) t-test for independent samples (acupuncture versus occlusal splint); (2) t-test for paired samples. Different letters indicate statistically significant difference. Equal letters indicate statistically not significant difference.

Table 2. Mean and standard deviation of visual analog scale scores at baseline and after 6 weeks of treatment by type of intervention

<table>
<thead>
<tr>
<th></th>
<th>G1 (n=17)</th>
<th>G2 (n=17)</th>
<th>(1)p-value</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Baseline</td>
<td>a 6.2</td>
<td>2.6</td>
<td>a 5.9</td>
</tr>
<tr>
<td>After 6 weeks</td>
<td>b 2.6</td>
<td>2.0</td>
<td>b 1.9</td>
</tr>
<tr>
<td>After 4 months</td>
<td>b 1.2</td>
<td>1.1</td>
<td>b 1.5</td>
</tr>
<tr>
<td>p(2)</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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</tbody>
</table>

(1) Mann-Whitney test for independent samples (acupuncture versus occlusal splint); (2) Friedman test for paired samples (baseline versus after 6 weeks of treatment; baseline versus after 4 months of treatment; 6 weeks of treatment versus after 4 months of treatment).

Table 3. Mean and standard deviation of tension threshold scores at baseline, after 6 weeks and after 4 months of treatment according to the type of intervention and muscle evaluated

<table>
<thead>
<tr>
<th></th>
<th>G1 (n=17)</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
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<tr>
<td>Left masseter muscle (Md)</td>
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<td></td>
<td></td>
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<tr>
<td>Baseline</td>
<td>a 1.5</td>
<td>0.7</td>
<td>a 1.8</td>
</tr>
<tr>
<td>After 6 weeks</td>
<td>b 3.0</td>
<td>0.9</td>
<td>b 3.0</td>
</tr>
<tr>
<td>After 4 months</td>
<td>b 3.0</td>
<td>1.1</td>
<td>b 3.5</td>
</tr>
<tr>
<td>p(2)</td>
<td>&lt;0.001</td>
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Right temporal muscle (Ta)

<table>
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<th>G2 (n=17)</th>
<th>(1)p-value</th>
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<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Baseline</td>
<td>a 3.1</td>
<td>1.0</td>
<td>a 3.3</td>
</tr>
<tr>
<td>After 6 weeks</td>
<td>b 5.7</td>
<td>1.4</td>
<td>b 5.0</td>
</tr>
<tr>
<td>After 4 months</td>
<td>a 4.7</td>
<td>1.6</td>
<td>b 5.7</td>
</tr>
<tr>
<td>p(2)</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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Right temporal muscle (Tb)

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<tr>
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<tr>
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<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Baseline</td>
<td>a 2.6</td>
<td>1.1</td>
<td>a 2.8</td>
</tr>
<tr>
<td>After 6 weeks</td>
<td>b 4.6</td>
<td>1.2</td>
<td>b 4.3</td>
</tr>
<tr>
<td>After 4 months</td>
<td>b 3.9</td>
<td>1.6</td>
<td>b 4.6</td>
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<tr>
<td>p(2)</td>
<td>&lt;0.001</td>
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Left temporal muscle (Ta)

<table>
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<tr>
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<td>SD</td>
<td>Mean</td>
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<tr>
<td>Baseline</td>
<td>a 2.8</td>
<td>1.1</td>
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<tr>
<td>After 6 weeks</td>
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<td>b 4.5</td>
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<tr>
<td>After 4 months</td>
<td>a 4.9</td>
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<td>p(2)</td>
<td>&lt;0.001</td>
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Left temporal muscle (Tb)

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<td>Baseline</td>
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</tr>
<tr>
<td>After 6 weeks</td>
<td>b 4.7</td>
<td>1.2</td>
<td>b 3.8</td>
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<td>After 4 months</td>
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<td>p(2)</td>
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(1) Mann Whitney test for independent samples (acupuncture versus occlusal splint); (2) Friedman test for paired samples (baseline versus after 6 weeks of treatment; baseline versus after 4 months of treatment; 6 weeks of treatment versus after 4 months of treatment); different letters indicate statistically significant difference (p value in bold); equal letters indicate statistically non-significant difference (p value without bold).
DISCUSSION

Pain caused by TMD is musculoskeletal pain that affects deep tissue and, in chronic cases, generates a biopsychosocial process that interferes with patients’ normal daily activities. Chronic pain should be diagnosed and treated correctly, as TMD pain can significantly compromise the person’s quality of life.

In a randomized clinical study, 40 patients diagnosed with muscle TMD by RDC/TMD were treated. The patients were divided into two groups. One group received placebo treatment, and the other, acupuncture. Patients were evaluated by theVAS to measure pain before and after treatment. The following acupuncture points were selected: E6, E7, ID18 (local points); VB20, VG20, B10 and IG4 (distance points). Patients were treated for four weeks, with sessions lasting 30 minutes each. The patients were reevaluated after 30 days. There was a significant difference between the groups (p=0.2261), and each patient’s pain intensity was identified. At the end of treatment using the VAS. At the initial consultation, an anamnesis was performed according to the TCM standards, and the patient’s pain intensity was identified. At the end of treatment of six sessions of 20 minutes each, the patients were reevaluated and after 12 months as well. The means for VAS0, VAS1, and VAS2 were respectively 5.9; 1.65; 2.45. There was a statistical difference between VAS0 and VAS1 of p<0.01 and between VAS2 (p<0.01), but there was no difference between VAS1 and VAS (p>0.05). The authors pointed out that the acupuncture treatment reduced pain after six weeks of treatment and remained for a mean of 12 months.

Twenty TMD patients were treated with occlusal splint alone. In a case report of a 32-year-old female patient diagnosed with muscular TMD and evaluated by VAS for pain, an anamnesis was performed according to the TCM standards, and the patient’s pain intensity was identified. At the end of treatment of six sessions of 20 minutes each, the patients were reevaluated and after 12 months as well. The means for VAS0, VAS1, and VAS2 were respectively 5.9; 1.65; 2.45. There was a statistical difference between VAS0 and VAS1 of p<0.01 and between VAS2 (p<0.01), but there was no difference between VAS1 and VAS (p>0.05). The authors pointed out that the acupuncture treatment reduced pain after six weeks of treatment and remained for a mean of 12 months.

A descriptive study of 31 TMD patients used the VAS before and after treatment to evaluate pain intensity. The patients underwent three acupuncture sessions, 20 minutes each per week. They underwent anamnesis and diagnosis of the TCM, and the selected points were heart channel C7, pericardial channel PC6, small intestine channel ID3, gallbladder channel VB20, and triple heater channel TA23. The pain ceased (VAS=0) in 67.7% of the cases. There was a reduction in pain intensity with VAS1 of the 1st session (6.10±2.64) than VASf of the 3rd session (1.16±1.98). The authors concluded that a minimum of 3 acupuncture sessions is sufficient to reduce pain intensity, regardless of its degree.

In a clinical trial, ten patients with TMD, diagnosed by RDC/TDM, and using the VAS were treated. Patients were randomly divided into two groups, the first group consisting of five patients treated only with physical therapy (massage) for three weeks and the second, also consisting of five patients treated with occlusal splint alone. The study showed that patients who received treatment with physical therapy alone did not reset their pain after treatment; but there was an average decrease of 92.5% in pain. In patients who received treatment with the occlusal splint, there was a 92% improvement in the first week, and reset pain until the end of treatment. This showed that the occlusal splint is as efficient as physical therapy treatments.

Acupuncture works to reduce the sensation of pain, and this therapy has been shown effective with conventional TMD treatment techniques. In one study, 20 TMD patients were treated. One group underwent acupuncture associated with occlusal splint, and one group used only the occlusal splint. The acupuncture group was treated with five sessions of 50 minutes each and occlusal splint for night use. The splint group was instructed to use the device only at night. The limitation of mandibular movements before and after treatment was also evaluated. The degree of pain was verified by the VAS. After the first week of treatment, pain and mandibular movements improved in the acupuncture group. After five weeks of treatment, the patients were reevaluated, and there was a significant reduction in the TMD symptoms, but there were no statistical differences between the two groups (p>0.05). However, in the acupuncture group, pain decreased faster. Just like these results, the UFMS study showed very similar results.

After a systematic literature review, it was observed that there is no standard protocol for acupuncture for the treatment of TMD, that the choice of acupoints varies according to the degree of patient involvement. Excellent results were obtained using as local points the stomach channel, such as E8; E7, E6; triple heater channel points such as TA21, TA17 and gallbladder channel points such as VB2. These points were used to control local pain. The most frequently applied distance points for the control of anxiety, muscle relaxation, stress reduction, and sleep improvement were the large intestine meridian IG4, stomach E36, triple heater TA5, liver F3, gallbladder VB34, and governing vessel VG20. Based on the literature, Souza e Silva found evidence of the use of small intestine ID18, stomach E6, E7, governing vessel VG20, gallbladder VB20, bladder B10 points. Other points may also be employed, such as bladder B60 and gallbladder VB3. The authors also emphasize that acupuncture is an excellent treatment method complementary to other therapies, or as a technique of choice for patients with intolerance to occlusal splints.

In a case report of a 32-year-old female patient diagnosed with muscular TMD and evaluated by VAS for pain, an anamnesis of the TCM showed the patient’s tongue, pulse, and skin color characteristics. When evaluating 20 patients who underwent six 30-minute acupuncture sessions, it was observed after six weeks that the pain threshold and muscle tension evaluated by electromyography was statistically better than at baseline and that these improvements remained for 12 months. Similar results were observed in this study, which presented lower VAS index in pain, decreased muscle tension, and improvement in mouth.
openning at 6 weeks and 4 months after treatment in patients undergoing acupuncture with the same number of sessions and treatment time. This action of acupuncture was also found in a study that observed 40 patients treated with acupuncture and after 4 sessions presented decreased pain and lower muscle tension, which was also observed in this study, in which patients were evaluated at 6 weeks and 4 months. It was found that both acupuncture and occlusal splint associated with massage and thermotherapy provided muscle relaxation, improved jaw movements at mouth opening and decreased pain level of patients. These results were similar to the study as patients presented improvement in mouth opening, reduced pain and muscle tension in both acupuncture and splint groups.

In a randomized clinical study of 40 TMD patients diagnosed by RDC/TMD, pain was evaluated by theVAS, and the chewing muscles were evaluated by electromyography before and after treatment. The patients were randomly divided into two groups. The first was treated with acupuncture, underwent anamnesis and diagnosis according to the TCM. The patients were treated with four acupuncture sessions lasting 20 minutes each. The selected points were: large intestine meridian IG4 and IG11, small intestine meridian ID19, liver meridian F2, bladder meridian B2, conception vessel meridian VC23, triple heater meridian TA23, gallbladder meridian VB21, and VB34. The splint group was treated with a myorelaxant splint, counseling, and self-care guidance. The splints were conventionally made of acrylic and installed and adjusted by a single professional. Patients were instructed to use the splint at night and to return within four weeks. The patients were reevaluated after 30 days of treatment. The electromyography of the masticatory muscles was lower in 40% in the acupuncture group and 50% in the splint group. Pain decreased in both groups, but there were no statistical differences between the two. However, in the acupuncture group, pain reduction was faster, and the absence of pain lasted longer. Half of the patients in the acupuncture group had improved mandibular limitations. The authors concluded that acupuncture was as efficient as occlusal splint.

CONCLUSION

Based on the results of this study, it was concluded that both acupuncture and occlusal splint associated with massage and thermotherapy were effective in treating patients with muscle TMD for six weeks and remained for a period after four months of treatment.

REFERENCES


Auriculotherapy: neurophysiology, points to choose, indications and results on musculoskeletal pain conditions: a systematic review of reviews

ABSTRACT

BACKGROUND AND OBJECTIVES: Auriculotherapy is widely used to relieve painful conditions, therefore, allowing systematic reviews on the subject. However, they did not propose a unified bank of points of possible choice, their possible combinations or described the location of such points, thus making it the objective of this study.

CONTENTS: The systematic review of revisions methodology (Overview) was chosen to achieve the proposed goal. The quality of such material was ascertained by the tool Assessment of Multiple Systematic Reviews, and the databases consulted were PEDro database, Pubmed, Scielo, and LILACS. The keywords and boolean index applied were: auriculotherapy AND pain; ear acupuncture AND pain, ear acupressure AND pain; auricular therapy and pain; auricular medicine AND pain. A total of 242 studies were found, but only six were systematic reviews in humans involving pain and auriculotherapy alone (without association with another technique). The methodological quality of the studies was high (8-10/11 Assessment of Multiple Systematic Reviews). There is variability in the neurophysiological explanation of action, many possible disorders that can be approached with auriculotherapy (acute, chronic, trauma, pre- and postoperative pain among others). Auriculotherapy showed to be promising in the remission of the pain, adjacent to the conventional treatment, low risk, cost, and easy administration.

CONCLUSION: There are several ways of justifying its neurophysiological effects, and the most used points were ShenMen, the corresponding somatotopic region and the cavum conchae region (vagal stimulation). Auriculotherapy meets the needs of an immense possibility of painful musculoskeletal conditions, with favorable and promising results.

Keywords: Auriculotherapy, Modalities of physiotherapy, Pain, Physiotherapy, Rehabilitation, Traditional Chinese Medicine.

INTRODUCTION

Since 1978, the World Health Organization (WHO) recommends the insertion of complementary and alternative medicine
Auriculotherapy: neurophysiology, points to choose, indications and results on musculoskeletal pain conditions: a systematic review of reviews

To achieve the proposed objective, a systematic review of reviews that addressed AT and pain was chosen (Overview). In order to achieve the proposed objective, a systematic review of reviews that addressed AT and pain was chosen (Overview). PEDro, Pubmed, Scielo and LILACS databases were accessed in February 2019. The keywords and Boolean indexes were used as follows: Auriculotherapy AND pain; ear acupuncture AND pain; ear acupressure AND pain; auricular therapy AND pain; auricular medicine AND pain. These words should be present in the title or abstract for the articles to be selected. If in doubt, the studies were fully verified. Filters were applied seeking only

(CAM) or integrative and complementary practices (ICP) in public health systems (e.g., Unified Health System, SUS). In Brazil, ICPS increased following the approval by the Ministry of Health (MS) in 2006 to include non-pharmacological and more natural therapies, such as Tai Chi, Qigong (Lian Gong), Yoga, Mat Pilates, workplace exercises, therapeutic exercises, manipulative resources, acupuncture, and meditation. In 2017 there was an increase in ICPS used, and auriculotherapy (AT) was included. Since AT can be applied at several levels of health care, such as basic, specialized, and hospital, the proposal is to prevent health problems, to promote recovery, health, and the non-abandonment of the conventional medicine treatment. Given the effectiveness and low cost of AT, the Federal University of Santa Catarina, in partnership with the MS, promoted throughout Brazil the “Training in Auriculotherapy for Primary Care Health Professionals,” enabling and promoting the integration of this resource to ICPs.

AT, ear acupuncture and ear acupressure are synonymous with centuries-old therapy via stimulation of the pinna to relieve pathological conditions in the body. AT has two main lines of reasoning that explain its principles, the French school (Paul Nogier) and the Chinese school (Traditional Chinese Medicine - TCM). In 1957, in France, AT was driven by the cartography proposed by Paul Nogier, scheming an inverted fetus in the ear as a somatotopic map representing reflex parts of body stimulation. Theorizing that symptoms and diseases are projected in specific regions in the ear, as it is one of the few anatomical structures formed by endoderm, mesoderm, and ectoderm (three embryonic layers), which may hypothetically represent all parts of the body. This triggered the study of its neurophysiological basis of action and its recognition by WHO in 1987, which identifies it as an acupuncture microsystem capable of intervening in the body as a whole. The standardization of an international nomenclature took place in 1990, with updates of such information occurring to the present day, merging the two principles (French and Chinese). In addition to Paul Nogier’s view, for more than 2000 years, AT has been dated in Asian culture and explained by the regulation of “vital energy” (Qi), which circulates through the meridians and collateral channels. When there is an imbalance of a person’s Qi, he/she becomes vulnerable to disease, and AT would be able to harmonize such flow by minimizing symptoms (TCM concepts). AT treatment may be isolated or in combination with another intervention (e.g., kinesiotherapy), temporary, aiming at discharge, or referral to exercise groups.

Pain, in its various forms of manifestation, is a common cause of medical consultations and other health professionals (e.g., physiotherapists), and chronic pain is prevalent in the Brazilian population equal to or greater than worldwide (10.1-55.5%), representing one of the biggest challenges for public health. It impacts the functionality, quality of life, productivity, generates economic damage (personal, family, business and government), as well as the indiscriminate use of drugs and thus their possible adverse effects. Therefore, complementary therapies are part of the list of pain control options, as they have lower risk, lower cost, and are less invasive than the usual approach.

The concepts described serve as a starting point for AT studies. However, by focusing on the care of painful conditions, the analysis of its relationship with pain modulation should be understood. Neurophysiologically, stimuli at the nerve endings of the pinna are transmitted via the spinal and cranial nerves (peripheral nervous system, PNS) to the central nervous system (CNS), releasing neurotransmitters that regulate the control mechanisms of endogenous pain. When activated, the descending neural pathway releases endogenous opioids (endorphins) in the posterior horn of spinal cord (PHSC), making it difficult for the CNS to spread and perceive the pain stimulus (pain descending inhibitory pathways, extra segmental or supraspinatus mechanism). Another mechanism of nociceptive modulation is the so-called Gate Control Theory (segmental or spinal mechanism), which transmits non-painful stimuli via myelinated afferent fibers (Aβ), as opposed to harmful stimuli from poorly myelinated (Aδ) or unmyelinated (C) fibers balancing painful sensation in PHSC. Both routes are the most attributed to AT, aiming to justify their effects in pain conditions. Inflammation control would be linked to points in the anatomical region of the cavum conchae (e.g., lung 1 and 2), which stimulates the vagus nerve by releasing acetylcholine, a neurotransmitter that inhibits the release of tumor necrosis factor-alpha (TNF-α), proinflammatory cytokine by macrophages, thereby minimizing inflammation (cholinergic reflex).

AT points can be stimulated in a variety of ways such as seeds (mustard or rapeseed), acupuncture needles (facial or systemic), magnetic pellets, semi-permanent needles, electrophototherapy (laser or transcutaneous electrical nerve stimulation (TENS) and transcutaneous electrical nerve stimulation (TENS)), or seeds. The seeds should be stimulated three to four times a day, for a minute or until the site becomes sensitive, with weekly changes upon reassessment of the case. However, there are reports of staying with the same application for up to one month, and the total treatment time ranges from 2-10 weeks.

A systematic review with meta-analysis concluded that AT might be effective in relieving acute and chronic pain, reducing its intensity within the first 48 hours of treatment initiation, and being a safe resource. Another study describes pain remission time ranging immediately up to 6 months. Although there are systematic reviews addressing AT and pain, they did not propose a unified database of possible site choice, their possible combinations, or describe the location of such sites, thus becoming the goal of this study. In addition to mentioning the main sites indicated for painful cases, the aim was to identify their locations, facilitating the clinical practice.

CONTENTS

In order to achieve the proposed objective, a systematic review of reviews that addressed AT and pain was chosen (Overview). The keywords and Boolean indexes were used as follows: Auriculotherapy AND pain; ear acupuncture AND pain; ear acupressure AND pain; auricular therapy AND pain; auricular medicine AND pain. These words should be present in the title or abstract for the articles to be selected. If in doubt, the studies were fully verified. Filters were applied seeking only
systematic reviews that were in humans, without restriction on the date of publication. Two evaluators made the selection and assessment by the Assessment of Multiple Systematic Reviews (AMSTAR) tool, discussing the score in case of divergence. Although revisions on the theme are not an unpublished subject, the report of the points or which were the most used are not always described, making clinical practice and methodological reproduction difficult. Therefore, books were also consulted to provide the best description of the use of points, as well as their location. Table 1 shows the results of the selection in the databases, and table 2 shows the studies with the application of the AMSTAR tool in order of the highest score. Figure 1 shows the subdivision of the pinna necessary to understand and facilitate the interpretation of the description of the sites in table 3. It is noteworthy that there are normal anatomical variations from person to person, so at first, the identification of the structures, as well as the search for specific sites, require practical training.

Table 1 shows the main points for the relief of painful conditions according to the unification of several studies, and figure 2 shows where they are anatomically. This does not mean that all should be applied in a single session but rather selected according to the combinations already described and added to the painful area to be treated (Figure 3).

For example, ShenMen, Kidney, Sympathetic (auriculocybernetics) + lumbar (affected region - AR). However, a systematic re-

Table 1. Search and selection of studies in the databases

<table>
<thead>
<tr>
<th>Databases</th>
<th>Found</th>
<th>Repeated</th>
<th>Deleted</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEDro</td>
<td>20</td>
<td>2</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Pubmed</td>
<td>112</td>
<td>11</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>Scielo</td>
<td>33</td>
<td>0</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>LILACS</td>
<td>77</td>
<td>0</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>242</td>
<td>13</td>
<td>223</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 2. Characteristics of systematic reviews and selected meta-analyses

<table>
<thead>
<tr>
<th>Authors</th>
<th>Objectives</th>
<th>Most used AT points</th>
<th>Results (p)</th>
<th>Mean differences in pain</th>
<th>AMSTAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yang et al.7</td>
<td>Effect of ear acupressure on chronic low back pain</td>
<td>ShenMen, sub cortex, AR (lumbosacral, spine, lumbar, sciatic nerve, hip, popliteal fossa), liver, kidney, sympathetic, bladder, spleen, Ashi points</td>
<td>p&lt;0.001</td>
<td>- 1.13</td>
<td>11/11</td>
</tr>
<tr>
<td>Zhao et al.20</td>
<td>Assess the effectiveness of AT in chronic pain</td>
<td>ShenMen, sympathetic, sub cortex, thalamus, liver, kidney, heart, bladder, spleen, lung, analgesia, AR and Ashi points</td>
<td>p&lt;0.05</td>
<td>- 3.76</td>
<td>10/11</td>
</tr>
<tr>
<td>Yeh et al.10</td>
<td>AT effectiveness in pain management compared to the placebo group</td>
<td>ShenMen, sub cortex, lung, thalamus, sympathetic, liver, kidney, analgesia, endocrine and AR.</td>
<td>p&lt;0.05</td>
<td>1.59</td>
<td>10/11</td>
</tr>
<tr>
<td>Asher et al.14</td>
<td>AT in pain management</td>
<td>ShenMen, thalamus, lung, heart, zero point and AR.</td>
<td>p&lt;0.05</td>
<td>1.56</td>
<td>10/11</td>
</tr>
<tr>
<td>Murakami, Fox and Dijkers11</td>
<td>Immediate pain relief (48h)</td>
<td>ShenMen, thalamus, lung and AR.</td>
<td>p&lt;0.05</td>
<td>- 1.08</td>
<td>9/11</td>
</tr>
<tr>
<td>Usichenko, Lehmann and Ernst21</td>
<td>Assess the effectiveness of AT in postoperative pain control</td>
<td>Not described</td>
<td>Not described</td>
<td>Not described</td>
<td>8/11</td>
</tr>
</tbody>
</table>

AR = affected region, somatotopic correspondence of reflexively compromised body area; AT = auriculotherapy; Ashi point = most uncomfortable site; AMSTAR = Assessment of Multiple Systematic Reviews.
Table 3. Main points to be combined with analgesic purposes

<table>
<thead>
<tr>
<th>Points</th>
<th>Location</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>ShenMen</td>
<td>Apex of the angle formed by the upper and lower branch of the anthelix</td>
<td>Anxiety, mental disorders, emotional stabilization, pain conditions and anti-inflammatory activity</td>
</tr>
<tr>
<td>Sympathetic</td>
<td>At the intersection of the lower branch of the anthelix and the helix, in the inner region</td>
<td>Pain in general, nausea, vomiting, hyperhidrosis of the hands and feet. Vegetative stabilization of the viscera</td>
</tr>
<tr>
<td>Kidney</td>
<td>In a fossa located below the beginning of the inferior branch of the triangular fossa, in the superior region of the cymba conchae</td>
<td>Urogenital tract disorders, joint problems, menstrual complaints, amenorrhea, premenstrual tension, migraine and for the treatment of chemical dependence. General and chronic bone diseases</td>
</tr>
<tr>
<td>Liver</td>
<td>In the lower region of the cymba conchae, above the beginning of the helix root, near the anthelix</td>
<td>Contributes to disorders of muscles and tendons in cases of pain, stiffness and injuries</td>
</tr>
<tr>
<td>Spleen</td>
<td>Located at the top of the cavum conchae, near the anthelix and lower than the helix root</td>
<td>Treatment of painful and weak muscles</td>
</tr>
<tr>
<td>Bladder</td>
<td>Below the lower branch of the anthelix</td>
<td>Urogenital tract disorders: infection, dysuria, polyuria, incontinence, urethral stone and acute nephritis. Idiopathic edema</td>
</tr>
<tr>
<td>Analgesic or analgesia</td>
<td>Vertically between kidney point and helix root</td>
<td>Analgesia</td>
</tr>
<tr>
<td>Ear apex</td>
<td>At the apex of the ear, on the helix</td>
<td>Hypertension, allergies, analgesia and emotional harmonization</td>
</tr>
<tr>
<td>Zero-point</td>
<td>In the ascending branch of the helix or root</td>
<td>Spasmolytic, analgesic and relaxing action</td>
</tr>
<tr>
<td>Muscle relaxation</td>
<td>Medially to the spleen point towards the root of the helix</td>
<td>Muscle relaxant, muscle tension or spasm and insomnia</td>
</tr>
</tbody>
</table>
view demonstrated the possibility of choosing 15 different points only for the treatment of low back pain, with ShenMen and subcortex being the most frequent. This demonstrates considerable variability among the studies analyzed, as it is suggested to select about 4-6 treatment points. Therefore, it is impracticable to propose associations for each painful case in this format; a book would be needed to address this objective since more than 200 AT points were identified. In any case, some previously used combinations serve as the basis, such as the described auriculocybernetics itself or the following combinations: ShenMen, thalamus, lung + affected region, somatotopic correspondence of reflexively compromised body area (AR); ShenMen + AR; thalamus, analgesic + AR; ShenMen, subcortex + AR.

There have been many reported conditions where AT can help to relieve the pain. Some of these indications are as follows: 1) cancer-associated pain, knee arthroscopy, femur fracture, hip arthroplasty; in dysmenorrhea, postoperative pain, hip fracture, low back pain, bone marrow aspiration, acute and chronic pain; 2) spinal pain, lumbar sciatic pain, cramps, stiff neck, fibromyalgia, rheumatic pain, phantom pain, amputation stump pain, herpes zoster, pain after fractures in general, trigeminal neuralgia, toothache, headache, migraine and tension headache; 3) chronic low back pain, muscle spasm, whiplash injuries, traumatic pain, inflammation after joint sprains, osteoarthritis, pelvic and abdominal pain, shoulder impingement syndrome, adhesive capsulitis, bursitis, lateral epicondyritis, carpal tunnel syndrome and joint pain.

Usichenko, Lehmann and Ernst did not state which AT points were applied in the clinical trials analyzed and their results in statistical terms, which hinders the interpretation and reproducibility of new research. This study was conducted over a decade ago, and others with the same methodological design came later, being more careful. Murakami, Fox and Dijkers highlighted the fact that AT has results as good as their comparative groups, has temporary adverse effects and is less degrading than medications (pain in the site, which can make it difficult to sleep, skin irritation, slight bleeding, dizziness, and nausea) and the application is quick and accessible. However, they expected a more significant reduction in pain. Asher et al. came to a more positive conclusion than previous authors, stating superior pain minimization results when AT was compared with a control group or placebo compared to the same comparison made with systemic acupuncture. Contradicting another systematic review, which shows that AT was not superior to the placebo group and that its effects begin to diminish three months after the end of its application, they nevertheless described it as promising and capable of reducing pain. Jiang et al. found a positive and lasting effect of AT on pain and that adverse effects are insufficient for patients to abandon treatment. In order to resolve these doubts, studies such as Moura et al., with 110 participants, treatment group, placebo, and control, should be encouraged, as they allow reliable conclusions to be based.

The justification for the effects of AT seems to be linked not only to the penetration of the needle into the pinna but to the choice of ideal sites. This is an extensive discussion, but four possible explanations are elucidated: (1) AT acts by a mechanism other than systemic acupuncture; (2) action similar to acupuncture, which would activate meridians, regularization of organ function, Qi and Blood, with consequent normalization of painful pathways (TCM); (3) hypersensitive reflex neuronal pathways that connect the auricular microsystem to the corresponding somatotopic region in the brain, which through the spinal cord reaches the corresponding painful area; (4) AT does not depend on specific points, but rather on the stimulated region. The fourth explanation comes from the stimuli in the cavum conchae region, innervated by the vagus nerve, to be able to induce parasympathetic stimulation. Therefore, analgesia would be caused by the application site and not by the selection of points. That is, AT can function via the central pain control mechanism. However, if the analgesia provided is by specific points or stimulated region, it remains under discussion. What is known is that auricular stimulation is a scientifically validated method, even by functional non-invasive magnetic resonance imaging of brain neuromodulation. The possibility of acting by central descending pain inhibitory mechanism was reinforced by the fact that the effects of AT are blocked by the use of the opioid antagonist naloxone. AT would still be able to increase pain tolerance. Therefore, there is variability in the explanation that indicates the action of AT in pain, but it shows the interest of the scientific community in this microsystem, making it the most studied.

Yeh et al. also reported significant pain relief with AT compared to the control or placebo group, noting that the quality of the studies was moderate to high. One of the difficulties with

### Table 3. Main points to be combined with analgesic purposes – continuation

<table>
<thead>
<tr>
<th>Points</th>
<th>Location</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung 1 and 2</td>
<td>In the conchae cavity surrounding the heart zone</td>
<td>Respiratory tract and skin disorders such as colds, laryngitis, cough, asthma, bronchitis, dermatitis, urticaria and acne (vagus nerve stimulation)</td>
</tr>
<tr>
<td>Heart</td>
<td>Cavum conchae cavity center</td>
<td>Hypertension, anxiety, depression, insomnia, palpitations, tachycardia and dyspnea, angina and bradycardia (vagus nerve stimulation)</td>
</tr>
<tr>
<td>Adrenal</td>
<td>In the prominence of the tragus</td>
<td>Articular disorders, circulatory, inflammatory processes, rheumatism, arthrosis, bursitis, allergic processes. Stimulates adrenocortical hormones and adrenaline</td>
</tr>
<tr>
<td>Subcortex</td>
<td>Lower region of the inner part of antitragus</td>
<td>Pain, anxiety and depression</td>
</tr>
<tr>
<td>Thalamus</td>
<td>Above the subcortex point in the inner face and apex of the antitragus</td>
<td>Low back pain and neck pain</td>
</tr>
<tr>
<td>Endocrine</td>
<td>At the inner base of the intertragal notch.</td>
<td>Endocrine disorders, hypo, and hyperthyroidism, diabetes, gynecological and rheumatoid disorders.</td>
</tr>
</tbody>
</table>
AT effectiveness reported by these authors would be the limited number of placebo group studies, only 32% of studies involving AT and pain. The patient expectation about the treatment, the relationship with the therapist, and the placebo effect itself may affect the results obtained with AT, but they are present in any other treatment modality. The ShenMen point and the reflex points corresponding to the affected region are the most commonly used in practice, according to the authors mentioned, information that corroborates the findings in table 2. In short, the need for blind, randomized, sample-based clinical trials to define the number of participants should be encouraged when investigating the effectiveness of any treatment method, as well as the review of reviews. The possibility of using this study design, review of reviews, on a specific theme (AT and pain), demonstrates the interest of the scientific community in the topic. So far, the conclusions are cautious, but the systematic reviews that have been included have shown high methodological quality (8-10/11 - AMSTAR) and agree on the following aspects: AT is an adjunct technique to be used to manage pain; to reduce the use of analgesic drugs, minimizing tolerance and adverse effects. It is a treatment with low risk, low cost, and easy administration. 7,10,11,14,20,21.

CONCLUSION
AT has favorable results regarding its effects on pain (although its mechanisms of action continue to be studied), showing to be promising as adjunctive therapy to conventional treatment. The ShenMen point, reflex points corresponding to the site in the affected body, and cavum conchae stimulation (e.g., lung point), seems to be the most favorable combination for better pain relief results.

REFERENCES
Methods of diagnosis and treatment of complex regional pain syndrome: an integrative literature review

Métodos de diagnóstico e tratamento da síndrome da dor regional complexa: uma revisão integrativa da literatura

Sheila Bortagaray1, Thais Fadel Gonçalves Meulman2, Henrique Rossoni Junior3, Tiago Perinetto4

ABSTRACT

BACKGROUND AND OBJECTIVES: The complex regional pain syndrome is characterized by severe pain that affects one extremity of the body, in addition to edema, increased sensitivity to cold and touch, sweating, discoloration and decreased ability to move. This study aimed to identify and analyze the methods of diagnosis and treatment of complex regional pain syndrome.

CONTENTS: This is an integrative review of literature conducted in April 2018, which used the electronic database and an academic search engine to select the studies. We sought to complement the survey with manual search of the citations of the primary studies identified. As a search strategy, the authors used the descriptors: “complex regional pain syndrome”, “pain”, “chronic pain”, “diagnosis” and “treatment” in Portuguese and English. A total of 416 references were identified, 11 of which were selected for the present study. Most articles were published in 2016, in English. In general, the articles present the pathophysiology, methods of diagnosis and treatment of complex regional pain syndrome, and it is possible to identify and analyze the consonance and divergence found in the scientific literature.

CONCLUSION: The basis for the diagnosis of regional complex pain syndrome remains clinical, and there is no “gold standard” to conduct the diagnosis as there are no accurate imaging indicators or serum markers. The psychological evaluation and the treatment of the disorders, when present, can ensure a better patient’s compliance with the treatment instituted.

Keywords: Chronic pain, Complex regional pain syndrome, Diagnosis, Pain, Therapeutics.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A síndrome da dor regional complexa é caracterizada por dor intensa que acomete uma extremidade do corpo, além de edema, aumento da sensibilidade ao frio e ao toque, sudorese, alteração de coloração e diminuição da capacidade de movimento. O objetivo deste estudo foi identificar e analisar os métodos de diagnóstico e tratamento da síndrome da dor regional complexa.


CONCLUSÃO: A base do diagnóstico da síndrome da dor regional complexa permaneceu clínica e não se tem um “padrão ouro” para conduzir o diagnóstico, pois não há indicadores de imagem ou marcadores séricos precisos. A avaliação psicológica e o tratamento de seus distúrbios, quando presentes, garantem melhor adesão do paciente ao tratamento instituído.

Descritores: Diagnóstico, Dor, Dor crônica, Síndrome da dor regional complexa, Terapêutica.

INTRODUCTION

Complex regional pain syndrome (CRPS), as it is currently called, is an entity that causes great distress, not only for the patient due to the disabling pain but also for health professionals. They are limited in their approach since the pathophysiology of CRPS is not fully understood, and it is difficult to obtain positive treatment results. Until the last century, CRPS was also called causalgia. In 1877, causalgia was first described as a chronic painful entity with no neurological cause, accompanied by hitherto unnamed vasomotor changes. Many terminologies have been
used to designate it, such as minor causalgia, posttraumatic vasomotor disorder, Sudeck atrophy, and shoulder-hand syndrome. Then, it was suggested that all painful diseases associated with vasomotor phenomena, usually preceded by trauma, should be called “reflex sympathetic dystrophy”, in which the following characteristics should be present: pain, vasomotor changes of the skin, loss of function of the limb and trophic changes in various stages.

However, the controversy over the diagnosis continued to raise doubts. In 1993, the International Association for the Study of Pain developed a consensus defining the criteria for the diagnosis of this disease. The term “complex regional pain syndrome” or “CRPS” was used to designate the painful regional condition associated with sensory changes resulting from a noxious event. After a trauma, pain is the main symptom and may be associated with abnormal skin coloration, changes in limb temperature, abnormal sudomotor activity, or edema.

By consensus, two types of CRPS were defined: type I, formerly called “reflex sympathetic dystrophy”, follows disease or injury that did not directly affect the nerves in the affected limb; and type II, previously called “causalgia”. Type II CRPS differs from type I in that there is a real nerve injury, where the pain is not limited to the injured nerve innervation territory. Approximately 90% of people with CRPS suffer from type I.

Patients with CRPS develop severe pain associated with edema, vasomotor instability, joint stiffness, skin lesions, and acute bone atrophy. They often add to the picture of allodynia and hyperalgesia, changes in blood flow and regional sweating; dyscrasia phenomena; changes in the active movement pattern of the affected segments, including the accentuation of physiological tremor; trophic changes of the integument, muscleatrophy and subcutaneous cellular tissue and functional disability of the affected segment.

This condition, most often described following acute trauma, surgery, or immobilization of a limb, particularly after evident peripheral nerve injury (causalgia), is also recognized in association with clinical conditions such as diabetic neuropathy, multiple sclerosis, stroke and acute myocardial infarction (sympathetic reflex dystrophy) and is a major cause of disability. Its association with repetitive strain injuries (RSI) and work-related musculoskeletal disorders (WRMSD) is more recent and still little explored.

It is noteworthy that CRPS may migrate to another part of the body, such as the opposite foot or arm, and emotional stress often aggravates this pain. In some people, the signs and symptoms of CRPS disappear, while in others, they may continue for months to years.

However, the diagnosis and treatment of CRPS are complex, and probably, for this reason, there are not many studies on these conditions, showing a gap in the scientific literature. Considering the importance of knowing the diagnostic methods and treatment types of this clinical condition, this study aimed to identify and analyze the diagnosis and treatment methods of CRPS.

CONTENTS

This is an integrative review study of the scientific literature developed according to the proposition of two American authors. Therefore, this research was conducted in order to obtain answers to the following question: How does the scientific literature conceptualize and approach the diagnosis methods and type of treatment of CRPS in the national and international scenario? Quantitative or qualitative studies and clinical cases or case reports that analyzed or proposed a theory and/or methodology for the diagnosis and treatment of CRPS were included. Primary studies using an integrative literature review as a methodology to support the diagnosis and treatment of CRPS were excluded; however, these studies were used to support the results. No limits were set on the date of publication or the language of the primary studies.

The search strategy used electronic databases such as LILACS, Science Direct, SCOPUS, Web of Sciences, Pubmed, which includes Medline, Scientific Electronic Library Online (Scielo) digital library, and the academic search engine (Google Scholar). Thus, in addition to databases of indexed scientific publications, gray literature was explored, which prints unpublished literature as technical documents. It was sought to complement the survey with a manual search in the citations of the identified primary studies. It was chosen to use the advanced form with the following keywords in their English or Portuguese versions to verify the title, abstract or subject, depending on the database: “complex regional pain syndrome”, “pain”, “chronic pain”, “diagnosis” and “treatment”. The Boolean operators adopted in the strategies were “and” and “or”. The search was conducted in April 2018.

After identification, the primary studies were selected according to the guiding question and the previously defined inclusion criteria. All studies identified through the search strategy were initially assessed by analyzing the titles and abstracts. In cases where the titles and abstracts were not sufficient to define the initial selection, the full publication was read. Therefore, items that did not correspond to scientific research or were duplicated in the different groups of keywords searched and in the different databases, as well as theses, dissertations, and monographs, were removed from the sample.

Figure 1 shows the flowchart of article selection.

After exhaustive reading of the selected material and critical analysis of the data, the captured information was made available in a structured framework to understand and discuss the results according to the diagnosis and treatment proposed in the scientific literature.

During the search in the electronic databases, portal, digital libraries, and the academic searcher, 416 references were identified. Six references were identified by hand searching the citations of primary studies. After the initial exclusion of duplicate references, monographs, dissertations, theses, titles and abstracts that did not apply to the theme, 92 articles were analyzed for eligibility. However, 81 were excluded after reading and registering the full article because it did not address the diagnosis and treatment of CRPS, or because it was a literature review.

So, 11 articles were selected for this study. As gray literature, it used the guidelines proposed by the Brazilian Society for
the Study of Pain\textsuperscript{19}. For better visualization of the results, table 1 was elaborated.

Regarding the analysis in the year of publication, it was noted that the studies were published as of 2004, and most of them (7-63.6\%) were published in 2016. The three oldest articles published in the years 2004, 2005, and 2011 are in the Portuguese language and published in Brazilian journals. The remaining articles published from 2015 on are all international, published in English or Spanish. The predominant language of the articles was English, with seven references (63.6\%).

According to the type of study, it was observed that almost half of the articles are case reports (5-45.5\%) and two (18.2\%) are case series. Four (36.3\%) quantitative studies with descriptive design, case-control, retrospective, and prospective cohort studies were found.

In general, the articles present the pathophysiology of the disease, the diagnostic methods, and the treatment methods of CRPS. The main results and conclusions of the articles selected for the study are discussed below, in two thematic categories, emphasizing the divergences and consonances found in the scientific literature: 1) diagnosis of complex regional pain syndrome; and 2) treatment of CRPS.

**DIAGNOSIS OF COMPLEX REGIONAL PAIN SYNDROME**

In this study, it was observed in all articles selected for the study, and in other literature reviews\textsuperscript{1,5} used to support the discussion, that pain is the dominant symptom of CRPS, and trauma is the main etiology of the syndrome. Trauma involves sprains, fractures, dislocations, lacerations, bruises, and strains, as well as prolonged immobilization, tight cast, and surgical trauma\textsuperscript{8,15}. Fractures are the most common incitement events for CRPS, affecting the upper limbs twice as often as the lower limbs. This disease has been classified in different ways. Currently, it is divided into three stages: acute, which occurs in the first days

| Table 1. Selected studies. Maringá-PR, April 2018 |
| Authors | Objectives | Types of studies |
| Lauretti, Veloso and Mattos\textsuperscript{6} | Report two cases of CRPS in which the application of botulinum toxin A as an adjuvant drug contributed to the functional motor recovery of the affected limb. | Case report |
| Azambuja et al.\textsuperscript{7} | Clinically identify and characterize, in a series of RSI and WRMSD cases, patients with FMS and CRPS. | Case series |
| Artioli et al.\textsuperscript{8} | Describe the results obtained with the physical therapy treatment alone in one patient. | Case report |
| Vas and Pai\textsuperscript{11} | Describe the observational results of ultrasound data of muscles and limbs affected with neuropathic pain in 7 patients and to compare with affected muscles with type 1 CRPS in 7 patients. | Case report |
| Bullen, Lang and Tran\textsuperscript{12} | Prospectively determine the incidence of CRPS after foot and ankle fractures. | Prospective independent cohort study |
| Salazar\textsuperscript{13} | Assess the effectiveness of sympathetic stellate ganglion block in the treatment of upper extremity type I CRPS. | Descriptive study |
| Hayashi et al.\textsuperscript{14} | Report the case of a young woman with type I CRPS who underwent rehabilitation facilitated by continuous epidural block. | Case report |
| Christophe et al.\textsuperscript{15} | Describe a comprehensive and quantitative case report showing that: (1) not all patients with chronic CRPS exhibit decreased spatial attention to the affected side, and (2) patients may actually have a substantial, broad, and reliable tendency toward attention on the painful side, similar to spatial neglect on the healthy side. | Case report |
| Alkosha and Elkiran\textsuperscript{16} | Determine predictive factors of long-term sympathectomy outcome in patients with type II upper limb CRPS. | Retrospective cohort |
| Albayrak et al.\textsuperscript{17} | Present 2 cases that suffered from type I CRPS after stroke and were successfully treated with the application of pulsed radiofrequency to the dorsal root ganglia. | Case series |
| Kim, Cho and Lee\textsuperscript{18} | Investigate the effects of frequent long-term ketamine treatment on cognitive function in patients with CRPS. | Case-control |

\textsuperscript{RSI} = repetitive strain injury; \textsuperscript{WRMSD} = work-related musculoskeletal disorders; \textsuperscript{FMS} = fibromyalgia syndrome; \textsuperscript{CRPS} = complex regional pain syndrome.

after injury up to three months; dystrophic, three to six months after its onset; atrophic, from six months to approximately one year from the causal event. Prevention and early diagnosis are believed to be important to slow the development of the disease. However, signs and symptoms are ignored, causing delays in the final diagnosis and early initiation of treatment.

Bullen, Lang e Tran presented the diagnostic criteria codified by the International Association for the Study of Pain, which were updated in Budapest in 2007 and have since been statistically validated in CRPS populations. For these authors, the clinical diagnosis should be based on the following criteria:

1. Continuous pains that are disproportionate to any instigating event;
2. Reporting at least one symptom in three of the following four categories:
   - Sensory: reports of hyperesthesia and/or allodynia;
   - Vasomotor: reports of temperature asymmetry and/or changes in skin color and/or skin color asymmetry;
   - Sudomotor/edema: reports of edema and/or sweating and/or sweating asymmetry;
   - Motor/trophic: reports of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin).
3. Must display at least one sign at the time of assessment in two or more of the following categories:
   - Sensory: evidence of hyperalgesia (sting) and/or allodynia (feeling of light touch and/or temperature and/or deep somatic pressure and/or joint movement);
   - Vasomotor: evidence of temperature asymmetry (>1°C) and/or changes in skin color and/or asymmetry;
   - Sudomotor/edema: evidence of changes in edema and/or sweating and/or sweating asymmetry;
   - Motor/trophic: evidence of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin).
4. There is no other diagnosis that better explains the signs and symptoms.

According to the authors, the criteria updated in Budapest have been shown to improve the specificity and sensitivity of CRPS diagnosis and are the only standardized, internationally recognized, and validated criteria for CRPS diagnosis. Azambuja et al. agree with the other authors and emphasize that the diagnosis is eminently clinical, and its primary manifestation is regional pain. There are currently no “objective” examinations with sufficient sensitivity and specificity to be routinely used, thus proposing the following criteria for positive diagnosis of CRPS:

1. Excruciating diffuse regional pain;
2. At least two of the following signs and symptoms:
   - Difference in skin color relative to the other limb;
   - Edema;
   - Temperature difference in the skin relative to the other limb;
   - Limb on active range of motion.
3. Additionally: occurrence or exacerbation of the signs/symptoms described.

Despite these criteria, the diagnosis of CRPS presents several controversies. It should be remembered the difficulties in establishing the diagnosis, as there are no precise image indicators or serum markers, which is one of the most important elements to consider. The clinical classification is based on a better understanding of the pathophysiology of this entity, which dependent factors coexist, such as changes of the peripheral and central nervous systems, the endocrine system, and psychological, environmental, and situational factors. However, the expertise of an expert must be of excellence to make the correct diagnosis. But the criterion of higher weight is given by the absence of another diagnosis that better explains the symptoms and signs.

In a literature review, the authors found that, although the diagnosis of CRPS is clinical, other tests may be requested to confirm or exclude it. A simple radiological test can identify decreased bone calcification, although this change is not specific for CRPS, as bone demineralization may be caused by limb disuse. Electro-neuromyography indicates nerve injury in cases of type II CRPS, but it is not useful in the evolutionary control of the disease. Other laboratory imaging tests may be performed: thermography determines the temperature difference between the affected and normal limbs, and plethysmography highlights the differences in perfusion between the limbs. Therapeutic tests are useful to aid in diagnosis by response to a particular substance.

For Vas and Pai, muscle ultrasonography (MUS) is an important research modality used to identify structural lesions of the myofascial system. The authors conducted case studies where MUS in patients with type I CRPS showed loss of muscle architecture and volume in the forearm muscles, particularly in the hand extensors. The striking feature of the findings was intramuscular proliferation of fibrous tapes, giving an appearance of hyperchogenicity compared to the normal limb, indicating loss of myoarchitecture. These changes were seen in muscles that caused difficulty in initiating and sustaining movement (usually flexor digitorum profundus and superficialis of the fingers, but also in other flexor muscles, such as the flexor carpi radialis, the palmaris longus, and the pronator teres). Muscle edema was visualized in a patient with muscle atrophy. However, the marked loss of myoarchitecture in CRPS could explain the severity of motor symptoms in this condition.

Furthermore, it has been found in the literature that several drugs are used to diagnose CRPS, such as guanethidine, phenolamine, and lidocaine, by various techniques such as simple venous infusions and regional blocks. These tests are used to prove whether the sympathetic nervous system is involved in pain genesis and CRPS signs and symptoms, thus helping to make the diagnosis as well as guiding appropriate and effective therapy.

It is noteworthy that no examination was considered a “gold standard” for diagnosis, although several clinical, radiographic, and electrodiagnostic tests have been described. However, from the analysis of these articles, the basis of the diagnosis of this syndrome remains clinical. Early identification and treatment are essential in preventing the progression of CRPS and appear more effective when instituted early in the disease. Broader prospective studies using validated criteria are needed to guide the clinical management of CRPS and would contribute to consensus on a gold standard for CRPS diagnosis.
TREATMENT OF COMPLEX REGIONAL PAIN SYNDROME

Because it is a complex disease, difficult to diagnose, with numerous therapeutic proposals and their varied responses, there is no standard protocol for the treatment of CRPS. In many cases, it is necessary to make associations of techniques for a good result. In this sense, it is believed that patient follow-up should be multidisciplinary and multiprofessional due to the various components involved in the disease. Thus, psychological assessment and treatment of its disorders, when present, ensure better adherence to the treatment instituted. In general, the studied literature indicates that the initial treatment is based on analgesia and intensive and careful physical therapy to avoid pain exacerbation. In the second line of treatment is the use of centrally acting analgesics, tricyclic antidepressants, gabapentin, opioids, and topical capsaicin are associated. In refractory cases, surgery may be used, but its use is very restricted\textsuperscript{20}. The main CRPS treatment methods identified in this study will be detailed below:

Stellate ganglion block
The stellate ganglion is a group of nerves in the neck region. A descriptive study\textsuperscript{13} with 229 patients with type I CRPS in the upper limbs performed stellate ganglion block according to the Nolte-modified Herget technique\textsuperscript{31}. For this, it used 1% lidocaine for the skin papule and 0.25% bupivacaine twice a week. Once the treatment was performed, the patients remained at least 1h in the post-anesthetic recovery room. All patients were trained to perform physical therapy at home. At the end of treatment, high efficacy in symptom relief was found, although 17.9% of patients returned without finding definitive relief for their disease. In this sense, the author\textsuperscript{13} proposes that a 50% decrease in pain through stellate ganglion block should be considered as a satisfactory treatment.

Botulinum toxin A
The reports in the literature on the use of botulinum toxin as an adjunct in functional rehabilitation are initial but encouraging. Lauretti, Veloso and Mattos\textsuperscript{6} used botulinum toxin in two patients with type I CRPS simultaneously during the third stellate ganglion block. A total of 75 IU of botulinum toxin was equitably administered by muscle to the flexor muscles of the affected phalanges and wrist joint of each patient. One week after botulinum toxin A application, patients presented phalanx and wrist relaxation, reported ease of performing passive physical therapy, and pain was rated 2 according to the visual analog scale (VAS) for pain in passive manipulation. After eight months of assessment, the patients presented 70 and 80% of motor and functional recovery of the affected limb. The patients remained under passive physical therapy for the entire period initially, and later active and were able to integrate again in their routine work.

Ketamine
CRPS often does not respond to traditional pharmaceutical treatment and is, therefore, a challenge for healthcare professionals. Ketamine, a non-barbiturate anesthetic drug, has recently been introduced as a new therapeutic intervention for pain relief, demonstrating marked reduction in pain and improved cognitive function after short-term treatment in patients with CRPS. The advantages of using ketamine include a rapid onset of action, brief cardiorespiratory depressant effects, and a benign effect on muscle tone and protective airway reflexes. However, given the characteristics of CRPS involving chronic pain, prolonged use may be detrimental. Authors\textsuperscript{18} have shown that repetitive ketamine use provides analgesic effects on CRPS, but its frequent or repetitive use for extended periods may impair the cognitive function. This impairment may occur because ketamine is a non-competitive antagonist of the glutamate N-methyl-D-aspartate receptor, and its repeated use has been associated with reduced function of the prefrontal dopaminergic system, which plays an essential role in cognitive function. Given these factors, frequent long-term ketamine treatment may impair cognitive function in CRPS patients by altering dopaminergic function in the prefrontal cortex.

Epidural anesthesia
It is used to promote rehabilitation in CRPS patients who cannot support physical programs due to severe pain. Authors\textsuperscript{14} reported the case of a 15-year-old girl diagnosed with type I CRPS who underwent a rehabilitation program facilitating epidural block with 0.15% ropivacaine. His rehabilitation program included physical therapy and cognitive behavioral therapy. The intensity of the exercise was gradually increased without exacerbation of its symptoms. Finally, she recovered completely after continuous epidural block for 21 days and rehabilitation for 80 days. However, the authors concluded that there was a combination of continuous epidural block and intensive rehabilitation and that this association improved the patient’s symptoms.

Physiotherapy treatment
Physiotherapy, previously used in later phases, has its space and importance increased today\textsuperscript{14}. Authors\textsuperscript{8} state that when physiotherapy is mentioned, it is associated with another form of treatment. Therefore, they analyzed the results obtained with the only physiotherapy in a patient with type I CRPS in the acute stage. The patient underwent eight weeks of treatment, with approximately 40 minutes each session, totaling 13 physiotherapy sessions, with her reassessment in the last session. To assess the effects of physiotherapy on CRPS, it was requested not to give any other form of pharmacological treatment or any other kind, just follow-up on CRPS I conditions. Of the analyzed items, those that showed significant improvement were: (1) staining of the skin, (2) decreased edema; (3) improved neuromuscular control. Despite being the rehabilitation of only one individual, the results obtained in this study suggest that physiotherapy alone can contribute to the improvement of this syndrome.
Sympathectomy
One of the most effective and popular treatment modalities for type II CRPS is sympathectomy. However, two types of pain associated with type II CRPS should be considered before sympathectomy: symptomatically maintained and independent pain, depending on whether or not the pain responds to the preoperative stellate ganglion block. Although sympathectomy is regarded as the treatment of choice for patients with the first type of pain, it is considered ineffective in the latter. In a study, developed with 53 patients, mean age 47±7 years old and 60% women, included according to the Budapest criteria, sympathectomy proved to be an effective surgical instrument in this specific patient population.

Pulsed radiofrequency
It is a therapeutic modality that has been used for years for diseases associated with neuropathic pain. Recently, the application of pulsed radiofrequency to the dorsal root ganglia has been used effectively to produce long-term pain relief for neuropathic pain modalities. One study presented two cases of patients who suffered from type I CRPS after stroke and were successfully treated with the application of pulsed radiofrequency current to the cervical ganglia. Both cases suggest that pulsed radiofrequency is an option that should be considered for the treatment of therapy-resistant type I CRPS patients. Moreover, pulsed radiofrequency is a safer alternative treatment due to its slightly less invasive nature, and the injury produced by the limited and controllable pulsed radiofrequency current.

CONCLUSION
There was an agreement in the scientific literature regarding the diagnosis and the variety of CRPS treatment methods. It has been found that the basis of the diagnosis of this syndrome remains clinical and there is no “gold standard” to drive the diagnosis as there are no precise image indicators or serum markers. It is currently believed that patient follow-up should be multidisciplinary and multiprofessional due to the various components involved in the disease. Therefore, psychological assessment and treatment of their disorders, when present, ensure better adherence to the treatment instituted. However, early clinical identification and treatment are essential in preventing the progression of CRPS and appear to be more effective when initiated early.

REFERENCES
Atypical odontalgia: pathophysiology, diagnosis and management

Odontalgia atípica: fisiopatologia, diagnóstico e tratamento

André Hayato Saguchi¹, Ângela Toshie Araki Yamamoto², Cristiane de Almeida Baldini Cardoso², Adriana de Oliveira Lira Ortega²

ABSTRACT

BACKGROUND AND OBJECTIVES: Atypical odontalgia, a subtype of persistent idiopathic facial pain, is characterized by continuous pain in one tooth or more, or inside the alveolus after exodontia, with no apparent clinical causes. These patients run the risk of going through unnecessary dental/surgical procedures which would worsen their pain. Since the pathophysiology, diagnosis, and management of atypical odontalgia are not clear, this article aims to present an integrative literature review about these aspects.

CONTENTS: A review of articles related to the topic was conducted on the Pubmed database using the keywords “atypical odontalgia” OR “phantom tooth pain” OR “idiopathic tooth pain” OR “odontalgia” OR “atypical toothache”. Applying the inclusion criteria (publications in the last ten years, in English, as clinical trials, multicenter studies, case reports, reviews, integrative and systematic reviews, 114 articles were found, and 39 were selected after the application of the exclusion criteria (articles with no relation to the topic).

CONCLUSION: Although studies suggest the involvement of strong neuropathic mechanism, the psychological/psychiatric aspects might be considered not as a primary cause, but as an aggravator of the patient’s pain. Knowledge of other pathologies is recommended in order to determine the differential diagnosis. Also, complementary image tests, qualitative somatosensory test, and reference to an orofacial pain specialist should be considered. In case of uncertain diagnosis, it is recommended to avoid any dental procedures because the pain can get worse.

Keywords: Atypical odontalgia, Endodontic, Odontalgia.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A odontalgia atípica, um subtipo da dor facial idiopática persistente, se caracteriza por dor contínua em um ou mais dentes, ou no alvéolo, após exodontia sem qualquer causa aparente e é um desafio para o dentista. O desconhecimento por parte do profissional pode levar a procedimentos odontológicos desnecessários e mutiladores, piorando e/ou cronificando a dor do paciente. Diante desse panorama, o objetivo deste estudo foi apresentar informações referentes à fisiopatologia, diagnóstico e tratamento da odontalgia atípica através de uma revisão integrativa da literatura.

CONTEÚDO: A busca na base de dados Pubmed foi realizada com os termos: “atypical odontalgia” OR “phantom tooth pain” OR “idiopathic tooth pain” OR “odontalgia” OR “atypical toothache”. Aplicando-se critérios de inclusão (publicações nos últimos 10 anos, de língua inglesa, tipo ensaio clínico, estudo multicêntrico, relato de caso, revisão, revisão integrativa científica e sistemática) foram encontrados 114 artigos, dos quais 39 foram selecionados após aplicação do critério de exclusão (trabalhos sem relação com o tema).

CONCLUSÃO: Embora os estudos apontem forte envolvimento de mecanismos neuropáticos, aspectos psicogênicos/psiquiátricos devem ser levados em consideração como agravante do estudo de dor do paciente. Sugere-se conhecimento sobre as outras doenças existentes para se realizar um diagnóstico diferencial, exames complementares de imagem, realização do teste somatosensorial qualitativo, encaminhamento a um especialista em dor orofacial e neurologista, e em casos de dúvida, não realizar nenhum procedimento a fim de não piorar a sua dor.

Descritores: Endodontia, Odontalgia, Odontalgia atípica.

INTRODUCTION

Atypical odontalgia (AO) represents a clinical challenge for most dentists¹. Generally, when a patient complains of pain, its origin is odontogenic, and the professional can identify and treat its cause – for example, a typical toothache due to pulpitis, caries or periodontal problem. But in some situations, pain continues in one or more teeth or in the socket after extraction without any apparent dental cause², and the dentist faces the challenge of determining the true non-odontogenic origin of pain and properly diagnosing it¹³⁵. According to the 3rd edition of the International Headache Society (ICHD-3)³, the diagnostic criterion of AO is described by continuous pain in one or more teeth or socket after extraction, without any apparent dental and neurological causes. Pain lasts for more than two hours daily and persists for more than three months and may or may not be associated with a history of dental trauma (Table 1).
The difficulty in diagnosing AO is because the reported pain is identical to those of odontogenic origin without clinical and radiographic alterations\(^\text{4,6}\). The patient may have a history of extensive dental treatment without pain relief, which makes the diagnosis more complex\(^\text{7,8}\). Endodontic treatment, apicectomy and/or extraction may alleviate pain temporarily, but pain increases in intensity in a few days or weeks\(^\text{7,9}\).

The physiopathology is not well defined, and several mechanisms have been suggested in the last 50 years\(^\text{10}\). There is great controversy regarding AO and psychological factors, with studies that indicate a large percentage of individuals with depression\(^\text{11,12,18}\) and others question whether they could be secondary factors to neuropathic mechanisms\(^\text{52}\). Qualitative somatosensory testing (QST) used are based on the pain threshold\(^\text{45}\). The quantitative somatosensory testing (QST) used are based on the pain threshold using a mechanical stimulus and heat pain threshold tests, for example\(^\text{40}\). Sensory alterations after cold application were identified in AO patients, also suggesting the involvement of central neuropathic mechanisms\(^\text{8}\). Qualitative somatosensory testing (QualST) were also used to confirm neuropathic involvement\(^\text{45}\).

Currently, there is insufficient evidence to establish a treatment protocol for AO\(^\text{39}\). Tricyclic antidepressants, antiepileptics, anesthetics, and botulinum toxin, although reducing the pain of the patient\(^\text{2,22,25}\), have limited activity and have no proven effectiveness\(^\text{25,27}\).

Generally, the dental surgeon is the first healthcare professional with whom the AO patient consults. The lack of knowledge of this situation by the dentist can lead to unnecessary and mutilating dental procedures, such as endodontic and surgical treatments ranging from apicectomy to extraction\(^\text{28}\). Knowing the physiopathology and the diagnostic process allows the proper treatment, avoiding further injury to the patient\(^\text{29}\).

Given a scenario in which there is no consensus in the literature on the physiopathology, the diagnostic process, and its treatment, this study aimed to review these aspects, assisting the dentist in his/her professional activity.

### CONTENTS

This is an integrative literature review with a qualitative approach to identify physiopathological, diagnostic, and treatment aspects of AO. The methodological process was divided into 5 steps, according to Whittemore and Knaff\(^\text{30}\): 1) problem identification; 2) literature search; 3) assessment of information; 4) critical analysis of the information; 5) presentation of results.

A search was performed in the Pubmed database. As a search strategy, the following terms were used: "atypical odontalgia" OR "phantom tooth pain" OR "idiopathic tooth pain." The inclusion criteria were articles published in the last 10 years, in English, clinical trial, multicenter study, case report, review, integrative scientific review, and systematic review. After reading the title and the abstract, those who had no relation to the theme were excluded. In case of uncertainty of inclusion, the full article was read.

A total of 114 articles were found, and after applying the established inclusion criteria, 48 articles were chosen. Of these, 9 were excluded because they were not related to the theme, totaling 39 studies. The material was grouped according to the emphasis of the article: physiopathology, diagnosis and treatment. Information relevant to both steps is summarized in Table 2.

### PHYSIOPATHOLOGY

Current evidence suggests neuropathic mechanisms to explain the physiopathology of AO\(^\text{1,24,41,44,45,50}\), and the somatosensory tests suggest its description in central and peripheral\(^\text{19,23,38,47,52}\).

One of the tests performed is local anesthesia, which, when observing pain reduction, suggests the neuropathic mechanism of peripheral origin (peripheral sensitization)\(^\text{41}\). The quantitative somatosensory testing (QST) used are based on the pain threshold using a mechanical stimulus and heat pain threshold tests, for example\(^\text{40}\). Sensory alterations after cold application were identified in AO patients, also suggesting the involvement of central neuropathic mechanisms\(^\text{8}\). Qualitative somatosensory testing (QualST) were also used to confirm neuropathic involvement\(^\text{45}\).

#### Table 1. Diagnostic criteria of the “International Headache Society 3”

<table>
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<tr>
<th>Clause</th>
<th>Description</th>
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<tbody>
<tr>
<td>A.</td>
<td>Facial or oral pain that meets criteria B or C.</td>
</tr>
<tr>
<td>B.</td>
<td>Recurrent daily pain for more than 2h/day for more than 3 months.</td>
</tr>
<tr>
<td>C.</td>
<td>Pain has both characteristics: 1. Poorly located, and does not follow the peripheral nerve path; 2. Painful, “boring”, light.</td>
</tr>
<tr>
<td>D.</td>
<td>The neurological clinical examination is normal.</td>
</tr>
<tr>
<td>E.</td>
<td>The dental cause is excluded after proper investigation.</td>
</tr>
<tr>
<td>F.</td>
<td>The characteristics do not fall into any other diagnostic criteria of the ICHD-3.</td>
</tr>
<tr>
<td>G.</td>
<td>Facial or oral pain in the distribution/path of one or both branches of the trigeminal nerve that meets criterion I.</td>
</tr>
<tr>
<td>H.</td>
<td>History of an identifiable traumatic trigeminal nerve event, with evidence of positive clinical signs of trigeminal nerve dysfunction (hyperalgesia, allodynia) and/or negative (hypoesthesia, hypeoalgesia).</td>
</tr>
<tr>
<td>I.</td>
<td>Evidence of cause demonstrated by: 1. Pain is localized in the path of the trigeminal nerve affected by the traumatic event; 2. Pain developed within a period of less than six months from the traumatic event.</td>
</tr>
<tr>
<td>J.</td>
<td>The characteristics do not fall into any other diagnostic criteria of the ICHD-3.</td>
</tr>
</tbody>
</table>

*From A to F when atypical odontalgia falls into a subtype of persistent idiopathic facial pain. G to J: when atypical odontalgia is related to trigeminal nerve trauma.*
Table 2. Selected studies and relevant information

<table>
<thead>
<tr>
<th>Authors</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durham et al.</td>
<td>The use of a questionnaire to diagnose neuropathic pain (S-LANSS) is desirable because it has sufficient sensitivity and specificity. However, clinical examination and investigation cannot be neglected.</td>
</tr>
<tr>
<td>Garcia-Sáez et al.</td>
<td>The use of botulinum neurotoxin type A has been shown to reduce pain in patients with AO. However, randomized controlled trials (RCT) are suggested to prove their effectiveness.</td>
</tr>
<tr>
<td>Miura et al.</td>
<td>Attention to psychiatric comorbidity, common in patients with AO. There is no cause-effect relationship.</td>
</tr>
<tr>
<td>Malacarne et al.</td>
<td>Persistent dental pain is likely to be of neuropathic origin, but physiopathological mechanisms that explain the onset and maintenance of pain are not understood. A correct diagnosis must be established prior to any treatments.</td>
</tr>
<tr>
<td>Ghunry and McMillan</td>
<td>The physiopathology of orofacial pain is complex, sometimes associated with psychological comorbidities. Chronic pain has an impact on quality of life. Early diagnosis and referral. Attention to the biopsychosocial approach, which confines a multifactorial etiology to chronic orofacial pain. It should be treated as neuropathy.</td>
</tr>
<tr>
<td>Tu et al.</td>
<td>The presence of psychiatric comorbidities aggravated the quality of sleep but had little impact on pain experience. The presence of burning mouth syndrome in patients with AO contributes to more severe pain.</td>
</tr>
<tr>
<td>Takenoshita et al.</td>
<td>AO is not purely a sensory problem, but it has psychological involvement. It has a variable response to drug use, and it is necessary to investigate the different pharmacological responses to advance the treatment of AO.</td>
</tr>
<tr>
<td>Tait, Ferguson and Herndon</td>
<td>They consider AO, so the diagnosis occurs by exclusion. According to the authors, there is no diagnostic protocol with evidence. Treatments that are considered effective for orofacial pain are disappointing for AO.</td>
</tr>
<tr>
<td>Kobayashi et al.</td>
<td>The authors found no relationship between pain relief and duloxetine plasma concentration, which is used to treat AO.</td>
</tr>
<tr>
<td>Benoliel and Gaul</td>
<td>Enigmatic physiopathology. Neuropathic mechanisms are more relevant. Interdisciplinarity. Attention to psychiatric comorbidity. Careful interdisciplinary assessment is necessary to institute appropriate treatment.</td>
</tr>
<tr>
<td>Baad-Hansen et al.</td>
<td>There is no gold standard for diagnosis. A consensus on classification and taxonomy is needed. Prospective studies are necessary. Education and training for professionals are important to avoid iatrogenies. Careful interdisciplinary assessment is required to institute appropriate treatment.</td>
</tr>
<tr>
<td>Agbaje et al.</td>
<td>QualST can be used as a clinical diagnostic tool, as well as to investigate intraoral somatosensory function in patients with AO. QualST is a simple test to verify changes in somatosensory function.</td>
</tr>
<tr>
<td>Rafael, Sorin and Eli</td>
<td>It presents clinical characteristics and physiopathology of painful traumatic trigeminal neuropathy, and what to do to prevent it.</td>
</tr>
<tr>
<td>Toyofuku</td>
<td>The professional must be aware of the patient’s psychosomatic aspect, which is a priority as well.</td>
</tr>
<tr>
<td>Cuadrado et al.</td>
<td>The positive response to the use of botulinum neurotoxin type A suggests that its use is effective and safe in the treatment of neuropathies, but RCT are necessary to prove its effectiveness.</td>
</tr>
<tr>
<td>Porporatti et al.</td>
<td>QST can help in the differential diagnosis between pulpitis and AO with substantial accuracy. QST limitations: patient gets tired, it is difficult to examine painful areas.</td>
</tr>
<tr>
<td>Porporatti et al.</td>
<td>There is central sensitization involvement, and decreased pain with the anesthetic also suggests that there is peripheral involvement.</td>
</tr>
<tr>
<td>Porporatti et al.</td>
<td>It reinforces the role of the central nervous system sensitization. The most reliable method would be bilateral QST comparing pain threshold using a mechanical allodynia stimulus or heat pain threshold tests.</td>
</tr>
<tr>
<td>Baad-Hansen et al.</td>
<td>QST should be associated with neurophysiological tests or imaging examinations, where possible, to increase test sensitivity and specificity.</td>
</tr>
<tr>
<td>Forsell et al.</td>
<td>There is increasing evidence of neuropathic mechanisms for orofacial pain - including AO. The authors suggest that the diagnosis be based on clinical examination, medical history, QST, neurophysiological tests, etc.</td>
</tr>
<tr>
<td>Pig et al.</td>
<td>MRI may be of great value as it excludes inflammation processes in the mandibular and maxillary regions. When the diagnosis is uncertain, MRI raises the argument to avoid dental treatments and consider noninvasive treatments.</td>
</tr>
<tr>
<td>Yatani et al.</td>
<td>The authors present a guide for the treatment of non-odontogenic origin. The use of tricyclic antidepressants is the most commonly used but has no proven effectiveness.</td>
</tr>
<tr>
<td>Baad-Hansen et al.</td>
<td>The QST showed 87.3% abnormality in individuals with AO as an increase in mechanical and thermal stimuli and may be an appropriate tool for scanning patients with neuropathic pain.</td>
</tr>
<tr>
<td>Tarce, Barbieri and Sardella</td>
<td>Diagnosis and treatment are challenging. Physiopathology is unclear. They suggest more RCT to prove the effectiveness of drugs used in the treatment of AO.</td>
</tr>
<tr>
<td>Baad-Hansen et al.</td>
<td>QualST detect disturbances in individuals with AO, especially sensitivity to cold, touch, and bristle stimulation.</td>
</tr>
<tr>
<td>Zakrzewska</td>
<td>It reviews the literature on pain in the lower face and mouth. It addresses classification, epidemiology, and diagnosis.</td>
</tr>
<tr>
<td>Tinastepe and Oral</td>
<td>Neuropathic pain has complex physiopathology and may start after dental treatment such as endodontic treatment, implant surgery, and trauma when anesthetizing. Trigeminal neuralgia, mouth burning syndrome, and postherpetic neuralgia and AO are neuropathic conditions</td>
</tr>
<tr>
<td>Ciaramella et al.</td>
<td>Some psychological factors determine predisposition to the development of chronic pain after extraction. Individuals with AO had high levels of resentment and depression.</td>
</tr>
</tbody>
</table>
The physiopathology is not well defined\(^20,23\), its diagnosis is characterized\(^23\); beginning with its medical history, especially with regard to pain\(^1\).

1) Importance of medical history: patient assessment should be aware of this condition\(^36\) and cannot disregard it\(^22\). A high incidence of a diagnostic protocol\(^22\), after analyzing the data extracted from this study, it was possible to synthesize the main information for the professional who may be facing a diagnosis of AO: determining cause for triggering AO\(^15\), but professionals should be aware of this condition\(^36\) and cannot disregard it\(^22\). A high incidence of AO patients presents these comorbidities\(^22,23\), reaching 50% in another study\(^16\). “Neurotic and stressed”\(^16\) and “resentful and depressed”\(^15\) were striking characteristics described in individuals with AO. Moreover, such comorbidities may determine a predisposition to the development of chronic pain after extraction\(^15\). Tu et al.\(^32\), however, concluded that psychiatric comorbidity in patients with AO and mouth burning syndrome had little impact on pain experience.

The vascular cause presented by Rees and Harris\(^7\) and Kreisberg\(^17\) was mentioned in only two studies\(^20,22\), thus not being the main physiopathological mechanism of AO.

2) Importance of the clinical examination: the odontogenic causes of toothache must be totally ruled out. For this, a thorough clinical examination is necessary\(^3,10,24,40\). One should not forget Rees and Harris’s observations emphasizing that all possibilities of caries, pulp disease and crack/fracture of the crown or root should be excluded;

3) Complementary imaging tests: despite the limitations of periapical radiographs\(^34,35\) they should be used to assess the periapical region. Volumetric computed tomography should be performed to rule out any possibility of periapical endodontic alteration\(^10,31\). The use of magnetic resonance imaging (MRI), in cases of suspected non-inflammatory dental pain, can be of great value as it excludes inflammation processes in the mandibular and maxillary region. When the diagnosis is uncertain, MRI reinforces the importance of noninvasive management\(^43\).

4) In order to facilitate and assist the diagnostic process, two tools should be highlighted:

a) Visual analog scale: diagnostic tool for pain measurement\(^41,49\);

b) QST and QualST: are important allies in the diagnosis of AO\(^24,27,40,44,45,52\). QST is performed through several stimuli, and only mechanical and thermal stimuli are related to AO. Of the patients with AO submitted to these stimuli, 83.7% had some QST abnormality\(^44\). Performing bilateral QST (pain side versus pain free side) also helps to detect neuropathic changes\(^10\). Despite the indications, QST, when used outside hospitals and university clinics, is costly and often unfeasible, requiring the calibration and training of examiners\(^43\). QualST detects hypersensitivity disorders to touch, cold, and bristle stimulation\(^46\).

5) Exclude all hypotheses of non-odontogenic odontalgia. According to Yatani et al.\(^27\) and ICHD-3, after discarding the

<table>
<thead>
<tr>
<th>Table 2. Selected studies and relevant information – continuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nagashima et al.(^46)</td>
</tr>
<tr>
<td>Patel, Boros and Kumar(^46)</td>
</tr>
<tr>
<td>Abiko et al.(^22)</td>
</tr>
<tr>
<td>Thorburn e Polonowita(^10)</td>
</tr>
<tr>
<td>Bosch-Aranda et al.(^20)</td>
</tr>
<tr>
<td>Zagury et al.(^32)</td>
</tr>
<tr>
<td>Takenoshita et al.(^14)</td>
</tr>
<tr>
<td>Ito et al.(^33)</td>
</tr>
<tr>
<td>Ram et al.(^29)</td>
</tr>
<tr>
<td>List, Leijon and Svensson(^13)</td>
</tr>
</tbody>
</table>

AO = atypical odontalgia; QST = quantitative somatosensory testing; MRI = magnetic resonance imaging; RCT = randomized clinical trials; QualST = qualitative somatosensory testing.
hypothesis of dental pain, there are numerous other conditions of non-odontogenic origin that should be ruled out; 6) Refer the patient to other specialists: Given the difficulty of properly diagnosing and the various physiopathological mechanisms that could be involved, it is recommended to refer the patient to other specialists. Interestingly to note that in 1982, Kreisberg already suggested referral to the neurologist; 7) Consider psychological aspects: Although psychogenic and psychiatric factors have no determining relationship in the development of AO, there was a high incidence of these patients with psychiatric comorbidities. The professional should be aware of these comorbidities, giving AO a multifactorial etiology. Thus, a biopsychosocial and interdisciplinary approach is necessary; 8) A more holistic, psychosocial, and not purely mechanical approach is important. It is recommended to listen carefully to the patient’s complaint and his/her history of treatments; 9) Knowledge and training by professionals are important to avoid unnecessary and iatrogenic procedures.

**TREATMENT**

Like diagnosis, AO treatment is challenging. Tricyclic antidepressants are the most cited drugs in case reports and case-control studies, and for many authors, they are considered the first choice in treatment. However, these drugs cause adverse effects. Amitriptyline, for example, causes xerostomia, constipation, urinary retention, and weight gain and, depending on the dose and the patient, have varied responses regarding the effectiveness in pain remission. Serotonin and norepinephrine reuptake inhibitors, such as milnacipran and duloxetine, have also been used in the management of painful symptoms and although they have pain reduction, there is a need for randomized controlled trials (RCT) to prove its real effectiveness.

As already described, current evidence suggests neuropathic mechanisms to explain the physiopathology of AO. Thus, treating it as a neuropathy sounds coherent. However, results with therapies employed for neuropathic orofacial pain have been disappointing in AO studies. More recent studies have assessed the action of botulinum neurotoxin type A (Onabotulinum toxin A) in pain control. The good results regarding pain remission point it as a promising drug in the treatment of AO. However, as with tricyclic antidepressants and serotonin and norepinephrine reuptake inhibitors, the use of botulinum neurotoxin type A should be proven to be effective through more RCT.

Thus, the information obtained from the articles found can be summarized: 1) In cases of doubt, not performing endodontic and surgical treatments, as AO would be unnecessary and worsen the patient’s pain; 2) Knowledge and training by professionals in the diagnostic process are essential to avoid unnecessary and iatrogenic procedures; 3) Interdisciplinary work is important not only in the diagnosis, but also in the institution of the correct treatment. RCTs are necessary to assess the effectiveness of tricyclic antidepressants, serotonin and norepinephrine reuptake inhibitors and botulinum neurotoxin type A. 5) Minimizing the pain of patients with the lowest drug dose is the main objective and inadvertent use without the need for several drugs should be avoided; 6) And again, a holistic, psychosocial, and not purely mechanical approach is important. It is recommended to listen carefully to the patient’s complaint and his or her history of treatments.

After these reflections, it is important to emphasize that this study had limitations regarding the choice of database for the selection of studies. However, PubMed is considered the universal English language database with indexed high impact journals.

**CONCLUSION**

Recent studies use the 3rd edition of the ICHD classification, in which AO falls into the “persistent idiopathic facial pain” category (ICHD-13.12). Since the physiopathological process is not defined, the establishment of a protocol to make its diagnosis is fundamental. It is suggested knowledge about the other existing diseases to make a differential diagnosis, and the use of complementary exams such as volumetric computed tomography, MRI, and QualST. Tricyclic antidepressants and serotonin and norepinephrine reuptake inhibitors are the drugs of first choice in the treatment of AO. However, currently, the use of botulinum neurotoxin type A in pain management has been assessed. All these drugs require RCT to have their effectiveness proven. Given the possibility of AO, an interdisciplinary approach in the diagnostic process and definition of its treatment is guided.

**REFERENCES**

12. Schmutz RF, Brooke RJ. Atypical odontalgia. Update and comment on long-term fol-
Atypical odontalgia: pathophysiology, diagnosis and management


Pharmacological treatment of pain in pregnancy

Tratamento farmacológico da dor na gestante

Fábio Farias de Aragão¹, Alexandro Ferraz Tobias²

ABSTRACT

BACKGROUND AND OBJECTIVES: Non-obstetric causes of pain during pregnancy are very common and can be disabling if not treated properly. The objective of this study is to discuss the pharmacological treatment of pain during pregnancy with a focus on drug classification and pregnancy use, therapy options, teratogenicity, increased fetal malformations and gestational complications associated with the use of therapy.

CONTENTS: During pregnancy, the body goes through several anatomical and physiological changes. These changes can precipitate pain, which in some cases can lead to disability. In addition, pregnancy may exacerbate pre-existing painful conditions. The choice to prescribe a drug to a pregnant woman is difficult. The changes in the body of a pregnant woman influence drug absorption, distribution, metabolism, and excretion, and may alter the expected response.

CONCLUSION: The risks and benefits of the drug for the mother and the child should be considered, weighing the risks of not treating the disease adequately during pregnancy.

Keywords: Analgesic, Pain treatment, Pregnancy.

RESUMO

JUSTIFICATIVA E OBJETIVOS: As causas não obstétricas de dor durante a gravidez são muito comuns e podem ser incapacitantes se não forem tratadas adequadamente. O objetivo deste estudo foi discutir o tratamento farmacológico da dor durante o período gestacional com foco na classificação de fármacos e o uso na gravidez, opções de terapia, teratogenicidade, aumento de malformações fetais e complicações gestacionais associados ao uso da terapia.

CONTEÚDO: Durante a gravidez, várias alterações anatômicas e fisiológicas ocorrem no corpo. Essas alterações podem precipitar a dor, que em alguns casos pode levar à incapacidade. Além disso, a gravidez pode exacerbar condições dolorosas pré-existentes. A escolha de prescrever um fármaco para uma gestante é difícil. As alterações gravídicas no corpo da gestante influem na absorção, distribuição, metabolismo e excreção dos fármacos, podendo alterar a resposta esperada.

CONCLUSÃO: Deve-se considerar os riscos e benefícios do uso do fármaco para a mãe e filho, pesando-se os riscos de não tratar adequadamente a doença durante a gestação.

Descritores: Analgésicos, Gestação, Tratamento da dor.

INTRODUCTION

During pregnancy, non-obstetric causes of pain are very common and can be disabling if not properly treated. A recent study, with a cohort of over 500,000 pregnant women in the United States, found that 14% received an opioid prescription at least once during the delivery period, and 6% received opioids throughout all quarters².

During pregnancy, many anatomical and physiological changes take place in the body. These changes can precipitate pain, which, in some cases, can lead to disability. In addition, pregnancy can boost pre-existing painful conditions. Pain conditions during pregnancy can be bracketed in a system-based classification, such as musculoskeletal, rheumatological, neuropathic, and pelvic-abdominal pain syndromes³.

Choosing to prescribe a drug to a pregnant woman is difficult. The changes in the body of a pregnant woman influence the absorption, distribution, metabolism, and excretion of drugs, and may change the expected response. Also, it should be considered the risks and benefits for both the mother and the child when using the drug, considering the risks of not treating properly the disease during pregnancy and lactation. Risk assessment can focus not only on structural malformations (teratogenicity), but also on functional changes, changes in gestational dynamics (changes in fetal weight, abortion, prematurity, and neonatal death), and postpartum complications³.

The goal of this research was to discuss the pharmacological treatment of pain during pregnancy, focusing on drug classification and usage in pregnancy, therapy options, teratogenicity, increase in fetal malformations, and gestational complications associated with therapy use.

CONTENTS

Descriptive summary of available evidence on pharmacological approaches to pain management during pregnancy. It was conducted a search on the medical literature at Pubmed, Cochrane...
Library, Ovid, and Google, using the terms “pain management”, “pregnancy pain”, “obstetric pain”, “opioid use”, “antiepileptic drug pregnancy” and “antidepressant pregnancy” in articles in English, Portuguese and Spanish, in the last 20 years or older, when relevant. The most relevant articles on the topic were selected and included in the paper.

**DRUG CLASSIFICATION FOR USE IN PREGNANCY**

In order to avoid the administration of drugs with potential risk and to facilitate their prescription during pregnancy, several classification systems based on animal and human data have been developed. Drug use risk classification systems in pregnant women in the United States (US Food and Drug Administration - FDA) (Table 1), the Swedish (Farmaceutiska Specialiteter i Sverige - FASS) and the Australian (Australian Drug Evaluation Committee - ADEC) (Table 2), shared as a characteristic the categorization of drugs into letters.

The US system classifies drugs as **A** when adequate controlled studies in pregnant women showed no risk to the fetus. The Australian and Swedish systems do not use controlled studies as a prerequisite to classify a drug as **A**, and they stratify category **B** (drugs used by a limited number of pregnant women) as **B1**, **B2**, and **B3**, based on animal data. In the Swedish classification, there is no category **X**.

However, these systems have been criticized due to: a) categorization in letters is considered too simplistic and does not adequately express adverse effects on the fetus; b) the categorization in letters gives the false impression that risks increase from **A** to **X** and that drugs in the same category present the same risk or potential for adverse effects; c) the categories do not discriminate between potential adverse effects based on severity, incidence or frequency.

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**Table 1. Pharmacological risk categories in pregnancy according to the Food and Drug Administration**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Controlled studies show absent risk. Appropriate well-controlled studies in pregnant women show no risk to the fetus.</td>
</tr>
<tr>
<td>B</td>
<td>No evidence of risk in humans. Findings in animals had shown risk, but not in humans, or if adequate studies with humans have not been conducted, and the findings in animals were negative.</td>
</tr>
<tr>
<td>C</td>
<td>Risk cannot be excluded. There are no positive studies for fetal risk in humans and animals or no studies at all. However, the potential benefits justify the potential risk.</td>
</tr>
<tr>
<td>D</td>
<td>Positive evidence of risk. Data of Investigation or aftermarket release show risk to the fetus. Even though, the potential benefits may outweigh the risk.</td>
</tr>
<tr>
<td>X</td>
<td>Contraindicated in pregnancy. Animal and human studies, or reports on research or aftermarket release, have shown a fetal risk that is greater than the potential benefits.</td>
</tr>
</tbody>
</table>

Adapted from IV Brazilian Guidelines for Asthma Management.

**Table 2. Pharmacological risk categories in pregnancy according to the criteria of the Farmaceutiska Specialiteter i Sverige and Australian Drug Evaluation Committee**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Farmaceutiska Specialiteter i Sverige</th>
<th>Australian Drug Evaluation Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Drugs used by many pregnant women without evidence of fetal damage.</td>
<td>Drugs used by many pregnant women without evidence of fetal damage.</td>
</tr>
<tr>
<td>B</td>
<td>Data in humans are insufficient and limited; classification is based on animal data (by allocation in one of three subgroups B1, B2 or B3).</td>
<td>Data in humans are insufficient and limited; classification was based on animal data (by allocation in one of three subgroups B1, B2 or B3).</td>
</tr>
<tr>
<td>B1</td>
<td>Experiments in animals did not provide evidence of an increased incidence of fetal damage.</td>
<td>Experiments in animals did not provide evidence of an increased incidence of fetal damage.</td>
</tr>
<tr>
<td>B2</td>
<td>Studies in animals are insufficient.</td>
<td>Studies in animals are insufficient.</td>
</tr>
<tr>
<td>B3</td>
<td>Studies in animals have shown evidence of increased incidence of fetal damage, but the significance in humans is uncertain.</td>
<td>Studies in animals have shown evidence of increased incidence of fetal damage, but the significance in humans is uncertain.</td>
</tr>
<tr>
<td>C</td>
<td>Drugs that, due to their pharmacological effects, have caused or are suspected of having caused reproductive disorders that may involve risks to the fetus, not being directly teratogenic</td>
<td>Drugs that have caused or may be suspected of causing harmful effects on the human or newborn fetus without causing malformations. These effects may be reversible.</td>
</tr>
<tr>
<td>D</td>
<td>Animal and/or human data indicate an increased incidence of fetal malformations or other permanent damages in humans.</td>
<td>The drugs have caused, are suspected of having caused, or can be expected to cause an increased incidence of human fetal malformations or irreversible damages.</td>
</tr>
<tr>
<td>X</td>
<td>Does not apply</td>
<td>Drugs that have such a high risk of permanent fetal damage that they must not be used during pregnancy.</td>
</tr>
</tbody>
</table>
Table 3. New Food and Drug Administration Standards for the Use of Drugs in Pregnancy, Subsection “Pregnancy”

<table>
<thead>
<tr>
<th>Pregnancy exposure record</th>
<th>If a pregnancy exposure record is available, this subsection should contain a statement of the existence of the record as well as contact information.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk summary</td>
<td>When drug use is contraindicated, this should be stated first. Risk statements shall be presented in the following order: Based on human data, based on animal data, based on pharmacology Human data are available: the risk summary should summarize the specific development of the outcome, its incidence, and the effects of dose, duration of exposure, and gestational exposure time. Animal data are available: labeling should summarize the findings in animals and describe the potential risk of any adverse outcome in humans. Affected species, time, dose, and results should be included. When the drug has a well-understood mechanism of action that may result in the adverse outcome(s) to the development associated with the drug, the risk summary should explain the mechanism of action and potential risks.</td>
</tr>
</tbody>
</table>
| Clinical considerations   | Requires titles, as relevant information is available, to:  
- Maternal and/or embryo/fetal risk associated with the disease  
- Dose adjustments during pregnancy and the postpartum period  
- Maternal adverse reactions  
- Fetal/neonatal adverse reactions  
- Labor  
Data                      | . Human data: Labeling should describe adverse outcomes of development, adverse reactions, and other adverse effects and the types of studies or reports, number of individuals and duration of each study, exposure information, and limitation of data.  
. Animal data: labeling should describe study types, animal species, dose, duration and timing of exposure, presence or absence of maternal toxicity, and limitation of data. |

Type of effect; d) dose, duration, frequency, route and gestational age for drug exposure are not taken into account.

In order to facilitate the prescribing process by providing a consistent and well-structured set of information on drug use during pregnancy and lactation, the FDA has published the Pregnancy and Lactation Labeling Rule (PLLFR), on December 2014, along with Pregnancy, Lactation, and Reproductive Potential: Labeling for Human Prescription Drug and Biological Products - Content and Format. An industry-oriented document that came into force in July 2015 (Table 3)8,9. They reformulate the contents and format of the package inserts by removing references to categories A, B, C, D, and X, replacing by a summary of perinatal drug risks, discussion of relevant evidence, and a synthesis of the most relevant data to decide for the drug prescription. Essential information on pregnancy identification, contraception, and infertility is also included. The information is divided into the subsections “Pregnancy,” “Lactation” and “Reproductive Potential of Men and Women”10.

On the other hand, abandoning category-based classifications requires that the professional reviews the available evidence. Thus, if the review is incomplete or the evidence is inconclusive, the risk of errors increases. Therefore, it is prudent that before prescribing a drug to pregnant or breastfeeding women, to conduct research on different platforms and measure the risks and benefits of the treatment.

**NON-OPIOIDS ANALGESICS**

**Paracetamol**

It is the most used analgesic and antipyretic during pregnancy and lactation. However, its use before birth has been associated with asthma, shorter anogenital distance in boys (predictor of low reproductive potential), autistic spectrum, neurological problems (motor development, communication), attention deficit hyperactivity disorder, behavioral changes, allergic diseases, among others. Nevertheless, studies are inconclusive, and paracetamol is considered a drug with no teratogenic effects and remains the safest analgesic during pregnancy and lactation11. Prenatal exposure to paracetamol may be related to the consequences of women’s reproductive health as a result of changes in ovarian development during intrauterine life12. Concerning maternal complications, the use of paracetamol may be related to the increased risk of developing pre-eclampsia, deep venous thrombosis, and pulmonary thromboembolism13. As studies are inconclusive and there is extensive experience in the use of the drug during pregnancy, paracetamol remains the analgesic of choice during pregnancy, and the lowest dose should be used for the shortest possible time. Paracetamol has classification B by the FDA.

**Dipyrone**

Although this drug has been withdrawn from the market in some countries, such as the United States, because of its association with agranulocytosis and aplastic anemia, it is still being used in parts of Europe, Asia, and South American countries, such as Brazil. Its use during pregnancy is not associated with congenital malformations, intrauterine death, premature birth, or low birth weight14. Although widely used in Brazil, two studies have shown a possible association between dipyrone use and childhood tumors: Wilms tumor and Leukemia15,16. On the other hand, in in vitro studies in animals, dipyrone showed little mutagenic or carcinogenic potential and only when administered in high doses17,18. Dipyrone is not directly related to major or minor fetal malformations, but its use should be limited to the lowest possible dose and shortest possible time19.
Acetylsalicylic acid (ASA)
Its use was limited to its analgesic properties during pregnancy. However, the prescription in this population has been increasing in recent years. ASA does not increase the incidence of miscarriages or intrauterine death, nor does it have teratogenic effects.
ASA has been used to treat and prevent pre-eclampsia, especially in high-risk patients, women with antiphospholipid antibody syndrome, and a history of recurrent miscarriage (associated or not with heparin), and patients who underwent to in vitro fertilization. When used in patients at high risk for developing pre-eclampsia, ASA reduces the incidence of pre-mature birth by 14% and restricted intrauterine growth by 20%, probably because of its action by reducing placental ischemia. ASA interferes with platelet function and may cause maternal or fetal bleeding. However, when used at low doses, it has not shown a significant effect on the risk of intraventricular hemorrhage and neonatal bleeding.
Low-dose ASA (60-150mg/day), when used in the first quarter, is not associated with an increased incidence of congenital malformations, postpartum bleeding, placental rupture, or adverse effects on anesthesia. When used in the third quarter, it was not associated with an increased incidence of intraventricular hemorrhage, neonatal hemorrhage, or premature closure of the arterial duct.
When used at low doses, ASA is safe and has positive effects on reproduction. Low-dose aspirin has classification C by the FDA, but doses above 150mg per day are considered class D.
NON-STEROIDAL ANTI-INFLAMMATORIES
Non-steroidal anti-inflammatory drugs (NSAIDs) are among the most widely used classes of drugs during pregnancy, whether derived from propionic acid (naproxen, ibuprofen, ketoprofen), phenylacetic acid (diclofenac sodium), salicylates (acetylsalicylic acid), oxicams (meloxicam, piroxicam) or indole (indomethacin). Their mechanism of action is the inhibition of prostaglandin production by direct inhibition of the cyclooxygenase (COX) enzyme. Regarding non-selective COX inhibitors, it is not clear if there is an association between their use and the increased incidence of miscarriage when used in the first trimester or near conception.
On the other hand, a study with more than 65,000 women showed that the use of NSAIDs is not an independent risk factor for abortion. Studies in humans suggest an association between NSAIDs use and reduced female fertility, and it is prudent to avoid its use in women trying to conceive. Regarding congenital malformations, the situation of NSAIDs is more complex. In most studies, the risk for any malformation does not increase significantly with its use but maybe increased under some conditions, notably heart defects. On the other hand, a study that specifically assessed the risk of interventricular septal defects found no association.
The use of NSAIDs in the third trimester of pregnancy may be associated, in the fetus, with the premature closure of the ducus arteriosus (which may lead to neonatal pulmonary hypertension), oligohydranmios (caused by reduced fetal urinary output), necrotizing enterocolitis and intracranial hemorrhage. In the mother, it may be related to prolonged labor period and postpartum hemorrhage. Although short-term administration is unlikely to be associated with fetal arterial duct closure, it is common practice to avoid NSAIDs after 28 to 32 weeks until the end of pregnancy.
Regarding selective COX-2 inhibitors, it was expected to have fewer adverse effects than non-selective ones, but the same problems are present, such as oligohydranmios and premature closure of the arterial duct. As there are few studies on the use of this class of drugs during pregnancy, they are considered class C until the second trimester, and D in the third trimester. Non-selective anti-inflammatory have FDA classification B up to the second trimester, and classification D in the third.

OPIOID ANALGESICS
Opioids are important drugs in the treatment of acute pain during pregnancy, especially when associated with NSAIDs. However, for chronic pain, the risks and benefits of its use should be discussed with the woman, and the guidelines of the American Pain Society recommend minimal use or no use if possible.
Opioid use during the first trimester has been associated in some studies with cardiac abnormalities, spina bifida, and gastroschisis, while others, to demonstrate these associations have failed to relate any malformations to opioid use. Opioids do not seem to have an important teratogenic effect, but there are doubts about cardiovascular defects, especially with synthetic opioids.

Codeine
In a study with 67,982 pregnant women, it was observed that codeine was used in 2,666 (3.9%) of the cases. No differences in fetal survival rate or incidence of malformations were observed between pregnant women who used or not codeine. On the other hand, its use was associated with a higher incidence of elective and emergency cesarean and postpartum hemorrhage when used at the end of pregnancy. However, these changes may be due to the underlying disease rather than drug use. It is considered Class C by the FDA and Class A by ADEC.

Tramadol
In a study that evaluated 1,682,846 pregnant women, it was observed that tramadol was used by 1,751 (0.1%) of the cases. The malformations observed are cardiovascular defects (OR 1.56 CI 95% 1.04-2.29) and clubfoot (OR 3.63 CI 95% 1.61-6.89). In more advanced stages of pregnancy, it does not appear to cause major fetal effects, unless used chronically, and may lead to neonatal abstinence syndrome (NAS). There is no evidence of alterations when used during lactation. It is considered Class C by the FDA and by ADEC.
**Morphine**

When used in the first trimester, there are no reports of malformations and must be used with caution. During pregnancy, morphine changes its pharmacokinetics, with increased plasma clearance, shortening of half-life, decreased distribution volume, and increased formation of the 3-glucuronide metabolite. Morphine and its metabolite rapidly cross the placenta and establish maternal-fetal balance within approximately 5 minutes. Newborns exposed to shorter half-life opioids, such as morphine, are more likely to have SAN. It is Class B by the FDA and C by the ADEC.

**Fentanyl**

The use of fentanyl during pregnancy and lactation, when used as transdermal, may be a good option for the treatment of chronic pain. In a case report of a pregnant woman who used the fentanyl patch (125µg/h) throughout pregnancy, it was observed that the newborn had mild symptoms of NAS and did not require pharmacological treatment. On the other hand, in another report of a pregnant woman who used the fentanyl patch (100µg/h), the newborn had prolonged NAS, requiring oral morphine treatment until the 29th day of life. These differences may be due to individual drug variation. It is Class C by the FDA and B by the ADEC.

**Methadone and buprenorphine**

Both are safe when used to treat opioid dependence during pregnancy. Prenatal exposure does not seem to alter physical, cognitive, and language development in children followed up to the 36th month of life. It is Class C by the FDA and ADEC.

**ANTIDEPRESSANTS**

**Tricyclic antidepressants (TCA)**

Use during pregnancy at therapeutic doses does not appear to be associated with an increased incidence of malformations. Chronic use, or the use of high doses near delivery, may cause NAS, and the dose must be reduced between 3 and 4 weeks before delivery. Although some studies relate the use of TCA with malformations (eye, ear, face, and digestive system), it is noteworthy that despite slight increases in the incidence of malformations described in some studies, most do not show any increase. Due to a large number of pregnant women who used amitriptyline without reporting toxic effects on the fetus, its use seems safe during pregnancy. Amitriptyline is Class C by the FDA and ADEC; nortriptyline is Class C by the ADEC and D by the FDA.

**Tetracyclic antidepressants**

Maprotiline is the most studied drug, and its use is considered safe during pregnancy. It is Class B by the FDA.

**Selective serotonin and norepinephrine uptake inhibitors**

One population study did not show teratogenic effects related to venlafaxine use. It is Class C by the FDA and B2 by the ADEC. In general, the use of duloxetine during pregnancy is associated with an increased incidence of miscarriage, but no malformations. Near delivery, it can lead to respiratory changes in the newborn, and during lactation, less than 1% of the drug passes to the milk, suggesting that it may be compatible with lactation. On the other hand, there are few studies to ensure its safety during pregnancy and lactation. It is Class C by the FDA and B3 by the ADEC.

**MUSCLE RELAXANTS**

**Baclofen**

When taken orally, it is related to fetal malformations such as omphalocele. When used by intrathecal route, it seems to have no harmful effects on the fetus and has a low concentration in breast milk. It is Class B3 by the ADEC.

**Cyclobenzaprine**

It is considered safe during pregnancy and is one of the most commonly used analgesics for the treatment of pregnancy-related low back pain. Despite a report of early closure of the ductus arteriosus, this drug is already widely used in pregnant women.

**Anticonvulsants**

These drugs are used because of the risk of major (cardiac, urogenital, central nervous system, craniofacial) and minor malformations, restricted intrauterine growth, and cognitive deficits. In addition, monotherapy and the lowest effective dose should be prioritized.

**Gabapentin**

There are only a few reports of pregnant women who used gabapentin, with no evidence of increased incidence of malformations. It may be related to increased risk of fetal loss, restricted intrauterine growth, and premature birth. It is Class C by the FDA and B3 by the ADEC.

**Pregabalin**

In a study evaluating 477 pregnant women who used pregabalin in the first trimester, RR 1.33 (CI 95% 0.83-2.15) was found for major congenital malformations, but when used in monotherapy, RR was 1.02 (CI 95% 0.69-1.51). Thus, when used in monotherapy, it does not seem to increase the incidence of congenital malformations. It is Class C by the FDA and B3 by the ADEC.

**Carbamazepine**

It is associated with an increased incidence of malformations between 1 and 8.7%, especially when doses above 1000mg per day are used. It is Class C by the FDA and B3 by the ADEC.

**Lamotrigine**

It does not seem to increase the incidence of malformations. When used at doses below 300mg per day, the incidence of mal-
formations is about 2.0%; above this dose it can reach 4.5%\(^6\). It is Class C by the FDA and D by the ADEAC.

**CONCLUSION**

The increased use of opioid or nonopiod analgesics by pregnant women may raise doubts about the appropriate treatment options to offer to this population. Evaluation and effective handling are limited by contraindications and risks to the fetus.

The decision to use pharmaceutical therapy should be based on an assessment of the risks and benefits to the mother and fetus, taking care to offer all therapeutic options to ensure the well-being of the pregnant woman, minimize fetal teratogenicity and avoid chronic symptoms and long-term disability. Understanding the most frequent painful complaints, accurate diagnosis, knowledge of the risks of analgesic for the maternal-fetal unit, and consultations with experts allow you to control unwanted symptoms and make pregnancy more enjoyable.

**REFERENCES**

stabilizers in pregnancy: what do we know and how should we treat pregnant women with depression. Birth Defects Res. 2017;109(12):933-56.


Instruments that evaluate the functioning in individuals affected with chikungunya and the International Classification of Functioning. A systematic review

Instrumentos que avaliam a funcionalidade em indivíduos acometidos com a chikungunya e a Classificação Internacional de Funcionalidade. Revisão sistemática

Marina Carvalho Arruda Barreto¹, Bárbara Porfírio Nunes¹, Shamyr Sulyvan de Castro²

ABSTRACT

BACKGROUND AND OBJECTIVES: Currently, chikungunya has become an important health problem due to its painful symptomatology and the chronicity of this condition, which may compromise the functioning of individuals. Thus, using the International Classification of Functioning, Disability and Health, which focuses on functioning in the biopsychosocial context, this review sought to detect and assist in the selection of the most appropriate tool for measuring functioning in clinical practice and research. The objective of this study was to review the articles that have the functioning of individuals with chikungunya as an outcome, analyzing the instruments used for their evaluation and their relationship with the Classification model.

CONTENTS: Systematic review of the literature in the Scielo, Pubmed, Scopus, LILACS, PEDro, and Cochrane databases. Observational or interventional studies were included. For the methodological evaluation of the articles, the Grading of Recommendations Assessment, Development and Evaluation system was used. From a total of 1579 studies found, after applying the inclusion/exclusion criteria, and reading, five articles remained. The following frequencies were analyzed: health condition (3.86%), function (3.86%), body structure (0.86%), activity (67.82%), engagement (8.15%), environmental factors (8.15%) and personal factors (7.3%). Only one of the five articles covered all the domains of the International Classification of Functioning.

CONCLUSION: There is a lack of tools that approach the functioning according to the model proposed by the International Classification of Functioning, Disability and Health, for the population with chikungunya.

Keywords: Chikungunya fever, Disability and health, International Classification of Functioning.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Atualmente a chikungunya vem se tornando um importante problema de saúde devido à sua sintomatologia dolorosa e à cronicidade dessa condição, que pode comprometer a funcionalidade dos indivíduos. Assim, através da utilização da Classificação Internacional de Funcionalidade, Incapacidade e Saúde, que tem como foco a funcionalidade no contexto biopsicosocial, esta revisão buscou detectar e auxiliar na escolha da ferramenta mais adequada para a medição da funcionalidade na prática clínica e nas pesquisas. O objetivo deste estudo foi revisar as publicações que possuem a funcionalidade de indivíduos com chikungunya como desfecho, analisando os instrumentos utilizados para sua avaliação, verificando sua relação com o modelo da Classificação.

CONTEÚDO: Revisão sistemática da literatura, nas bases de dados Scielo, Pubmed, Scopus, LILACS, PEDro e Cochrane. Foram incluídos estudos observacionais ou de intervenção. Para a avaliação metodológica dos artigos foi utilizado o sistema Grading of Recommendations Assessment, Development and Evaluation. De um total máximo de 1579 estudos encontrados, após aplicação de critérios de inclusão/exclusão e leitura, restaram 5 artigos. Analisando a frequência dos domínios da Classificação Internacional de Funcionalidade, Incapacidade e Saúde encontrou-se: condição de saúde (3,86%), função (3,86%), estrutura do corpo (0,86%), atividade (67,82%), participação (8,15%), fatores ambientais (8,15%) e fatores pessoais (7,3%). Apenas um dos cinco artigos contemplava todos os domínios.

CONCLUSÃO: Há carência de ferramentas que abordem a funcionalidade de acordo com o modelo proposto pela Classificação Internacional de Funcionalidade, Incapacidade e Saúde para a população com chikungunya.

Descritores: Classificação Internacional de Funcionalidade, Febre de chikungunya, Incapacidade e saúde.

INTRODUCTION

Chikungunya (CHIK) is a painful health condition caused by the Aedes mosquito bite infected with the chikungunya virus. It is an acute viral fever with symptoms such as fever, chills, headache, myalgias, arthralgias, skin rash, lymphadenomegaly, and conjunctivitis. The disease can become chronic, resulting in arthritis.

Chikungunya outbreaks have become more frequent in recent years, affecting various countries around the world. In Brazil, outbreaks of the disease occurred in the northeastern region, particularly in the state of Ceará, between 2013 and 2016, with an estimated number of cases of around 1 million.

The objective of this review was to analyze the studies that have evaluated the functioning of individuals affected by chikungunya, focusing on the instruments used for this evaluation, and their relationship with the International Classification of Functioning, Disability and Health (ICF).

Methodology

A systematic review of the literature was conducted in the Scielo, Pubmed, Scopus, LILACS, PEDro, and Cochrane databases. Observational or experimental studies were included. The evaluation of the methodological quality of the articles was performed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system. From a total of 1579 studies found, after applying the inclusion/exclusion criteria and reading, five articles were selected for analysis.

From the analysis of the selected studies, it was observed that there is a lack of tools that approach the functioning according to the model proposed by the ICF, for the population with chikungunya.

Conclusion

There is a lack of tools that approach the functioning according to the model proposed by the ICF, for the population with chikungunya. This review sought to detect and assist in the selection of the most appropriate tool for measuring functioning in clinical practice and research.
virus (CHIKV). After the year 2000, there was a geographical expansion of the CHIKV. The main symptoms are polyarthralgia, high fever in the early days, fatigue, edema, headache, among others. In the acute condition, the population reports difficulties in getting around and performing their activities of daily and working life, adding to the losses in interpersonal relationships. There are reports that the limitations remain in chronic stage. Due to the painful and disabling symptoms, CHIK has become a major public health problem.

In the context of a holistic analysis of the person, not having the disease as the main focus, the World Health Organization (WHO) published the International Classification of Functioning, Disability, and Health (ICF). This instrument promotes an approach to functioning and disability in the biopsychosocial context. It proposes a new approach that increases environmental, personal, participation and activity factors in understanding the individual's situation.

The ICF has seven domains: health condition, body functions, and structures, activity, participation, environmental and personal factors. There is a dynamic relationship between these domains, presenting itself as a network of correlations. The concept of functioning brought by the WHO is a complex interaction between the health condition and contextual factors through a single and standardized language of health.

This study aimed to study the instruments used to measure functioning in individuals affected with CHIK and to compare their consistency with the ICF model, seeking to detect whether these instruments are related to ICF, helping to make the most appropriate choice to measure functioning in clinical practice and research. Also, to check if the functioning is being approached according to the model proposed by the ICF.

**CONTENTS**

A systematic literature review study conducted from May to July 2018. Scielo, Pubmed, Scopus, LILACS, PEDro and Cochrane databases were used in English, Portuguese, and Spanish.

The following descriptors were used: impairment, functional performance, functionality, functional capacity, disability, chikungunya fever, chikungunya virus, in English, Portuguese, and Spanish. The combination was applied as follows: (“Impairment” OR “Functional Performance” OR “Functionality” OR “Functional Capacity” OR “Disability”) AND (“Chikungunya Fever” OR “Chikungunya Virus”).

The inclusion criteria for the selection of articles were publications as of 2001 (year of publication of the ICF), and that assessed the functioning in individuals affected with CHIK. Review articles, theses, and dissertations were excluded.

The search and selection of studies were performed by two researchers independently, with a third researcher for cases of disagreement, which was not necessary. The researchers found 783 and 1579 articles, respectively. They used the same databases and descriptors, but one used the filters at the time of the search, and the other did not, creating the difference found in the number.

First, duplicate studies were excluded. Then, the screening by title and abstract was performed. The articles were read in full, with the selection of the eligible ones. All steps were performed individually. In the end, both found the same articles, five in total. Many studies assessed functional capacity or quality of life and not functioning, as was the expected outcome, so they excluded. Some articles addressed functioning in the microbiological aspects of mosquitoes. Figure 1 describes the selection process.

The selected studies were assessed according to methodological quality using the Grading of Recommendations Assessment, Development and Evaluation (GRADE). A system designed to achieve unification that is sensitive to grading the quality of evidence. Publications can be graded into four levels of scientific evidence: high, moderate, low, very low. Among the articles found, four had low evidence and one moderate (Table 1). The selected articles assessed the functioning through questionnaires, with no repetition of instruments. The second stage of the research consisted of coding these instruments by the ICF domains. This process consisted of the extraction of significant concepts considering the outcomes of the articles. The coding according to the ICF domains was performed by two independent coders taking into account the established and published rules. The process findings were compared, and discrepancies resolved with the supervision of the third researcher. The coding data are described in table 2 and figure 2.
Instruments that evaluate the functioning in individuals affected with chikungunya and the International Classification of Functioning. A systematic review

Table 1. General distribution of articles according to the number of participants, objectives, measurement instrument used and methodological quality score

<table>
<thead>
<tr>
<th>Authors</th>
<th>No. of participants</th>
<th>Objectives</th>
<th>Functioning instruments</th>
<th>Quality scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepúlveda-Delgado et al.</td>
<td>10</td>
<td>Assess the association between joint involvement, self-reported disability, and inflammatory biomarkers.</td>
<td>WHO Disability Assessment Schedule 2.0</td>
<td>Low</td>
</tr>
<tr>
<td>Rahim et al.</td>
<td>3869</td>
<td>Investigate the effects of chronic rheumatic and musculoskeletal symptoms on the functional status of people affected by the chikungunya epidemic in Calicut district, Kerala, southern India, in 2009.</td>
<td>Health Assessment Questionnaire (Modified - CRD pune version).</td>
<td>Low</td>
</tr>
<tr>
<td>Moro et al.</td>
<td>250</td>
<td>Describe the clinical course and outcome of long-term chikungunya infection.</td>
<td>Recent-Onset Arthritis Disability (ROAD)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Bouquillard et al.</td>
<td>307</td>
<td>Analyze the characteristics and progression of rheumatic manifestations in patients with post-chikungunya joint pain.</td>
<td>Health Assessment Questionnaire</td>
<td>Low</td>
</tr>
<tr>
<td>Heath et al.</td>
<td>240</td>
<td>Investigate epidemiological, demographic, physical, and behavioral risks. Factors associated with the development of chikungunya virus-related chronic arthralgia in Granada</td>
<td>Arthritis Impact Measurement Scale</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 2. Frequency distribution of the domains of the International Classification of Functioning and Health contained in each instrument

<table>
<thead>
<tr>
<th>Article</th>
<th>Instruments</th>
<th>ICF domains n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepúlveda-Delgado et al.</td>
<td>WHO Disability Assessment Schedule 2.0</td>
<td>Health condition n:9 (11.54%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Function n:6 (7.7%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Body structure n:1 (1.28%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity n:39 (50%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Participation n:10 (12.88%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Personal factors n:8 (10.25%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental factors n:5 (6.41%)</td>
</tr>
<tr>
<td>Rahim et al.</td>
<td>Health Assessment Questionnaire (Modified - CRD pune version).</td>
<td>Activity n:46 (86.80%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental factors n:7 (13.20%)</td>
</tr>
<tr>
<td>Moro et al.</td>
<td>Recent-Onset Arthritis Disability (ROAD)</td>
<td>Function n:3 (13.04%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Body structure n:1 (4.35%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity n:18 (78.26%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Participation n:1 (4.35%)</td>
</tr>
<tr>
<td>Bouquillard et al.</td>
<td>Health Assessment Questionnaire</td>
<td>Activity n:31 (100%)</td>
</tr>
<tr>
<td>Heath et al.</td>
<td>Arthritis Impact Measurement Scale</td>
<td>Function n:2 (4%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity n:2 (48%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Participation n:8 (16%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Personal factors n:9 (18%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental factors n:7 (14%)</td>
</tr>
</tbody>
</table>

Figure 2. Domains of the International Classification of Functioning and Health that encodes the total frequency in the included instruments
The frequency in which the domains appear in the collected instruments were: health condition (3.86%), function (3.86%), body structure (0.86%), activity (67.82%), participation (8.15%), environmental factors (7.3%) and personal factors (8.15%). All domains were covered by at least one instrument, and only 1 covered all domains.

**DISCUSSION**

There was a range of articles that aimed to assess the functioning of people with CHIK. However, when analyzing the studies, the final sample consisted of five studies. This small number is due to the fact that most had the quality of life and/or functional capacity as their outcome, not functioning. When analyzing the years of publication, there was an increase from 2016 to 2018, a fact that may be correlated with the increased geographic distribution of the virus\(^1\). The objective of the selected publications is directly related to the confirmation of the profile of the population affected with CHIK, having functioning as an outcome, which is with the purpose of this review.

Regarding the methodological assessment of the studies, most publications are of low quality, showing that the methodological elaboration needs to be more rigorous in execution, according to the GRADE system guidelines.

Among the selected articles, there was no repetition of instruments for the analysis of functioning, nor a consensus on which tool to use to assess the given outcome. In contrast, Gomes, Buranello and Castro\(^{22}\) found a physical test used in nine studies, by reviewing the instruments that assess functioning in the elderly.

It was observed that the population affected with CHIK has pain and difficulties in moving one or some joints, mainly: ankles, wrists, hands, and knees\(^{3,18,19}\), compromising the functioning of individuals to perform their activities and interpersonal relationships. When analyzing the correlation of the instruments with the ICF, a deficit in the structure domain was noted – CRD Pune version), a version of the Stanford Health Assessment Questionnaire that assessed functional status through 20 questions\(^{25}\). This tool is widely used to assess rheumatic pathologies\(^{26}\), and it is necessary to have an instrument that can address all the domains, excluding Health Structure and Condition.

The study has a prominent character since functioning is being seen as one important indicator to assess the population’s health\(^{29}\), and it is necessary to have an instrument that can address this outcome entirely. CHIK has become a major public health problem and data from this population need to be obtained for better clinical management.

As a limitation of this study, there were a small number of articles that assessed the outcome in CHIK. It is attributed to the recent geographical expansion of the virus, resulting in a limited number of studies that seek to determine the consequences of this health condition. However, functioning is an indicator that has been gaining proportion in recent years, both in the field of science and health. Another limitation is regarding the languages of the publications since the search took place in only three languages.

The WHODAS 2.0 was one of the questionnaires chosen to perform functioning analysis in individuals with CHIK\(^{17}\). When analyzing the correlation with the ICF, it was noticed that it addressed all domains, being the only one to present this characteristic, but 50% of its questions were activity-oriented, not homogeneous among the domains, WHO created it intending to analyze health and disability levels based on ICF\(^{23,24}\). Although not a validated instrument for CHIK, it is generic and cross-cultural, providing a standard measurement of functioning for any health condition\(^{24}\).

**CONCLUSION**

The instruments used to measure functioning have shown to be related to the conceptual framework of the ICF, but most did...
not contemplate the structure in its entirety. WHODAS 2.0 stands out as the most reliable option for the assessment of this outcome, as it can cover all the concepts proposed by the classification, but it has limitations, lacking validated tools that show a complete approach to functioning and validated for the CHIK population. In addition, it is clear that the choice of instruments to measure functioning is not being made considering the relationship with the ICF.

REFERENCES

In vivo methods for the evaluation of anti-inflammatory and antinociceptive potential

Métodos in vivo para avaliação do potencial anti-inflamatório e antinociceptivo

Silvio de Almeida Junior

ABSTRACT

BACKGROUND AND OBJECTIVES: The constant search for bioactive compounds with anti-inflammatory and antinociceptive activities are of interest to research centers. For the characterization of these activities, trials on guinea pigs are necessary. Therefore, the purpose of this study was to demonstrate some methods to evaluate the anti-inflammatory and antinociceptive potential of natural products.

CONTENTS: A stimulus is required to evaluate these activities, and the induction of inflammatory or nociceptive process can be by chemical inducers like formaldehyde, carrageenan, among others, or electronic equipment such as the hot plate. For all assays, the baseline and post-dose measurement of the studied compound is always compared with a control group. The planning of the experiment, as well as its conduct in accordance with well-established protocols, are important tools in the success of the work. The tests presented evaluated the antinociceptive and anti-inflammatory activity as well as the mechanisms involved.

CONCLUSION: It was possible to evaluate that the tests present in the literature today meet the researcher's need for the elucidation of the anti-inflammatory and antinociceptive activity of new compounds.

Keywords: Abdominal contortion, Formalin, Hot plate, Paw edema.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A busca constante por compostos bioativos com atividade anti-inflamatória e antinociceptiva são de interesse dos centros de pesquisas. Para a caracterização dessas atividades são necessários ensaios em coelhos. Frente a isso, o objetivo deste estudo foi demonstrar alguns métodos para a avaliação do potencial anti-inflamatório e antinociceptivo de produtos naturais.

CONTEÚDO: Para a avaliação dessas atividades é necessário um estímulo, sendo que a indução de processo inflamatório ou nociceptivo pode ser por induadores químicos como formol, carrageína, entre outros, ou ainda, equipamentos eletrônicos como placa quente. Para todos os ensaios, sempre é realizada a mensuração basal e posterior à administração do composto que está sendo estudado em comparação com um grupo controle. O planejamento do experimento, assim como toda a condução conforme protocolos já bem ilustrados, são ferramentas importantes no êxito do trabalho. Os testes apresentados avaliaram atividade antinociceptiva e anti-inflamatória assim como mecanismos envolvidos.

CONCLUSÃO: Foi possível avaliar que os testes presentes na literatura hoje, atendem a necessidade do pesquisador na elucidação da atividade anti-inflamatória e atividade antinociceptiva de novos compostos.

Descritores: Contorção abdominal, Edema de pata, Formalina, Placa quente.

INTRODUCTION

Natural products that carry biological activities are consumed daily around the world to help maintain human health, an ancient tradition that has been inherited for millennia. From popular knowledge, scientific investigation of the efficacy of these products is necessary1. Among the diversity of natural products found, only a small portion have their phytochemical characterizations and biological potential investigated. The selection of active compounds present in natural products is a significant challenge faced by researchers, as is the elucidation of the mechanisms of action of these compounds. Discoveries require biological assays, which should be chosen with caution, since they need to be accurate in detecting the specific effect, have sensitivity and reproducibility4. The amount of research carried out in search of compounds that are effective for application as an anti-inflammatory agent or with antinociceptive activity and which bring benefits with the fewest possible adverse effects caused by their use is well known. For the good conduct of the experiments, it is necessary the previous study of the methodologies that will be applied, as well as the tested doses and number of animals. One of the most commonly used tests for antinociceptive
evaluation is the formalin test. There were 395 articles published, and the anti-inflammatory activity is paw edema, with 244 articles, as evidenced by consulting the Pubmed database, in 2018 (until October). Therefore, this study aimed to address the topics related to the main \textit{in vivo} methods for the evaluation of new compounds with anti-inflammatory and antinociceptive potential, as well as the mechanisms involved.

\section*{Contents}

Due to the rejection rate of drugs available on the market due to the adverse effects, it is necessary to study new compounds with effective activities. Within ethnobotany, it is necessary to evaluate these activities, since the number of publications is increasing within this area. The selection of promising compounds within anti-inflammatory and analgesic activities begins with the culture of folk medicine followed by the chemical evaluation of these natural products. The literature mentions compounds such as alkaloids, essential oils, flavonoids, tannins, saponins, and phenolic compounds as responsible for the expected anti-inflammatory and analgesic activity, with greater effect than the drugs found in the market\textsuperscript{5,6}.

To prove these activities, it is necessary to use animal models according to protocols, always respecting the ethical principles. All procedures must go through their own committee, responsible for the evaluation before the beginning of the experiments. Another important observation is the use of the smallest number of animals possible, correct application of the techniques, and the minimum suffering caused to the animal\textsuperscript{7,8}.

\section*{Animal Selection}

Animals such as \textit{Mus musculus} mice, weighing on average 30±5g, and \textit{Rattus norvegicus} rats weighing 150±20g on average are used as a model for \textit{in vivo} testing. The choice of an animal model is based on the test performed and the expected result. It is advised to acclimate the animal for seven days, under controlled temperature conditions (25±3° C) and light/dark (12h) cycle with plenty food and water\textsuperscript{9}.

\section*{Acetic acid-induced writhing tests\textsuperscript{10}}

The abdominal writhing test in mice is a widely used method to evaluate the analgesic activity of substances against pain of inflammatory origin, where the acetic acid (AA) in the concentration of 0.6\% (0.1mL/10g of the animal) induces lesions on the abdomen of the mice, which is enough to cause the spasms translated as writhing. The compound being tested must be applied at the pre-defined concentrations. After 60 minutes, apply the peritoneal injection of AA and place the animal in an acrylic box so that it is possible to observe the number of contractions performed for 20 minutes\textsuperscript{11}.

\section*{Evaluation of analgesic and/or anti-inflammatory activity by formalin test\textsuperscript{12}}

The formalin test is a test performed to evaluate analgesia, which consists of the evaluation of the inflammatory process at two moments: the so-called neurogenic phase and the inflammatory phase. The test is performed with mice receiving treatment 1h before the beginning of the test, along with negative control (vehicle), and positive control intraperitoneally (usually morphine, 2.5mg/kg b.w., i.p. administered 40 minutes before the analysis). The test begins with the intraplantar injection of 20μL of formalin at 2.5\% in the right posterior pelvic limb and measuring the time the animal licks, shakes or bites the formalin-injected paw. From zero to five minutes are necessary to evaluate the painful sensitivity in the so-called neurogenic phase, in which the direct activation of nociceptors by the chemical agent occurs. Then, 15 to 30 minutes to determine pain sensitivity in the phase called inflammatory pain, which involves the spinal cord-reinforced synaptic transmission, as well as the release of local mediators such as prostaglandins and histamines\textsuperscript{13}.

\section*{Formalin-induced orofacial pain. Adapted\textsuperscript{14}}

The formalin-induced orofacial pain test is performed to evaluate analgesia in the trigeminal nerve region of action where the literature describes several related diseases, leading to a mild to severe chronic pain. The test can be performed on rats or mice and consists of applying 50μL of the irritant substance, in this case, formalin at 2\%, in the right cushion region of the animal’s vibrissae. The application is subcutaneous, and the grooming process is evaluated by scratching the area where the formalin was applied to the front limbs, evaluating how often the animal performed the self-cleaning act, compared to controls\textsuperscript{15,16}.

\section*{Hot plate test\textsuperscript{17}}

The assay consists of exposing the animal to a hot surface for thermal stimulation to evaluate central mechanism-mediated analgesic activity. It is a model that assesses the antinociceptive activity of opioid drugs, but other centrally active drugs, such as sedatives and hypnotics, show activity in this experimental model\textsuperscript{18}. The motor performance evaluation aims to detect the occurrence of motor incoordination, allowing a more accurate interpretation of the test results to determine the antinociceptive activity. Therefore, drugs that promote relaxation or sedation alter the motor performance and may interfere with the response, without necessarily being antinociceptive\textsuperscript{19}. For this, a hot plate kept at 55°C should be used, where the animal will be placed during the time limit of 20s or until it flicks its paw to perform the act of licking (latency time). Measurements should be performed at zero, 30, 60, and 90 minutes after treatment. Along with the treated groups, one group with morphine (4.0mg/kg b.w.) should be included as the reference compound\textsuperscript{17}.

\section*{Randall-Selitto test\textsuperscript{20}}

It is used for nociceptive evaluation that tests the gastrocnemius muscle pressure. Pain measurement requires the use of an analgesiometer (Ugo-Basile, Stoelting, Chicago, IL). To perform the test, animals, usually rats, are allowed to rest in a dimly lit room with controlled temperature to reduce the
stress level. After 30 minutes, the animal has the lower pelvic limb placed on the equipment. After placing the animal, the equipment begins to apply pressure in grams, gradually, until the animal feels discomfort, flicking the limb or vocalizing. The equipment itself records the pressure supported in grams. The test should be performed before the administration of the drug tested and within 30 min, 1, 2, 3, and 4 hours, and compared with known analgesic drugs.21,22

**Von Frey test**23

The von Frey test, or rat paw gradually increase pressure test, consists of applying pressure in grams to the rat’s hind limbs through electronic equipment. Initially, the described test used manual forms and has been changed to electronic forms for better and more accurate results; however, it is still possible to find work performed with manual equipment. The animal is positioned on the equipment, and through von Frey’s rigid-tip monofilaments, the mechanical pain thresholds are applied and measured in grams. This test is used to evaluate the antinociceptive activity. The test is performed up to six times so that it is possible to obtain a measurement of three close paw flick values after applying a linear pressure. The result is quantified as the change in pressure (D reaction in grams) obtained by subtracting the average of three values expressed in grams (strength) observed before the experimental procedure (zero hour) from the average of three values in grams (strength) after the administration of the stimuli that vary according to the experiment.24

**Tail flick test**20

It is used to evaluate the antinociceptive activity promoted by the central nervous system and is simple to perform. The animal (rat) is placed on the equipment, and its tail rested on a spot where a beam of light will be focused that will heat the animal’s tail. A baseline test should be performed, and animals with tail flick time longer than 7.9s should be excluded. After the administration of the evaluated natural product, perform the measurement within 2 hours (30, 60, 90, 120 minutes).19,25

**Carrageenan-induced intraplantar edema**26

Intraplantar injection of carrageenan induces an acute and progressive increase in the volume of the injected paw. This edema, which is proportional to the intensity of the inflammatory response, is a useful parameter in the evaluation of the anti-inflammatory activity. Carrageenan triggers the inflammatory process mediated by prostaglandins, reaching pick levels between 2 and 3 hours after application.27,28 The inhibition of the edema caused by carrageenan involves the mechanism related to the prostaglandin synthesis, especially PGE2α and PGF2α, and its activity is compared to non-steroidal anti-inflammatory drugs (NSAIDs).29 Before testing, the volume of the animal’s lower pelvic limb (hind paw) should be evaluated by plethysmometry. The administration should be in a vehicle control group to assess the solvent used for solubilization of the tested compound, a control group with an NSAID, and the test groups with well-defined doses. After 1h of the application, the volume should be measured at 30, 60, 120, and 180 minutes by the paw injection in the plethysmometer.30

In addition to carrageenan, which is the most used proinflammatory mediator, histamine, dextran, xylene, and serotonin, bradykinin and prostaglandin can be used.31

**Croton oil-induced ear edema in mice**36

The importance of the test is to evaluate the ability to inhibit edema formation in the ear of the animals tested after the topical application of croton oil. To perform this test, the compound of interest should be administered one hour before on the surface of the inner ear. It should be decided which ear will receive the induction of the inflammatory process with croton oil, and which will receive acetone in the same quantity as the oil for the negative control. Measure the edema formation with the application of the compound, and in acetone. The test can also be used by adding a group of animals tested with drugs already known in the market, such as indomethacin and dexamethasone.37

**Carrageenan-induced peritonitis**38

It is possible to produce an inflammatory response, using carrageenan, in the peritoneal cavity with predominance of many polymorphonuclear cells present in the exudate. The treatment of the animals should be performed with the group of the vehicle used, a group with NSAID drug and test groups with well-defined concentrations. Apply carrageenan by intraperitoneal injection and wait for 4 hours for the animal to have an anti-inflammatory action and exudate formation. After the expected period, euthanize the animal and wash the peritoneum with heparinized PBS solution for polymorphonuclear cell counting. The number of leukocytes should be compared to the test group for analysis.39

**Pleurisy**40

In the pleurisy test, the systemic anti-inflammatory effect is evaluated through the exudate volume, that is, in an inflammatory process in the pleural region, the number of existing proteins tends to increase, and the number of defense cells (leukocytes) increases significantly.41 In order to perform this study, a gavage treatment must be performed in the animals of the control group, with vehicle solution, a group with a known drug, and test groups with well-defined concentration, and after 60 minutes, induce the inflammatory process with carrageenan injection into the pleural region. Six hours after the induction of the inflammatory process, the animals should be euthanized, and the pleural cavity opened. Rinse with physiological solution and EDTA (Ethylenediaminetetraacetic acid) and perform cell count in a Neubauer chamber, always comparing to the negative control.42

**CONCLUSION**

The benefits that are achieved during these studies are undeniable, but ethical principles must be followed in using the number of animals tested and expected results. The use of animals for experimental purposes is of paramount importance, and it is up to the researcher to know how to choose the best tests that support the hypothesis towards the obtention of molecules with analgesic or anti-inflammatory potential.
ACKNOWLEDGMENTS

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REFERENCES

6. Marques RG, de Miranda ML, Caetano CE, Biondo-Simões Mde L. Towards a Bra-
8. Batista EK, Trindade HH, Lira SR, Muller JB, Silva LL, Batista MC. Atividades anti-
13. Cazanga V, Hernandez A, Morales B, Pelissier T, Constandil L. Antinociception indu-
14. deduced by copper salt revisited: interaction with ketamine in formalin-induced intraplan-
24. Durta R, Lunzer MM, Auger JL, Akgin E, Portoghese PS, Binstadt BA. A bivalent compound targeting CCR5 and the mu opioid receptor receptor inflammatory arth-
26. Patemi I, Amirreimoum M, Shamsizadeh A, Kaeidi A. The effect of metformin on mor-
34. position and antioxidant, analgesic, and anti-inflammatory effects of methanolic ex-
38. Vysakh A, Jayesh K, Helen LR, Jyothsri M, Lahra MS. Acute oral toxicity and anti-in-
41. phora clinoepioides ameliorated rheumatoid arthritis and inflammatory paw ede-
42. ma in different models of acute and chronic inflammation. Biomed Pharmacother. 2018;97:170-21.
48. Sreeja PS, Arunachalam K, Martinis DTO, Lima JCDS, Balogun SO, Pavan E, et al. Sphenoside invoculata var. paniciulata (C.B. Clarke) Munir: chemical characteri-
50. Amundola G, Di Rosa M, Sorrentino L. Leucocyte migration and lyosomal enzy-
**CASE REPORT**

**BACKGROUND AND OBJECTIVES:** Notalgia paresthetica is a neuropathic sensory syndrome located in the dorsal region between T2-T6 dermatomes and is characterized by a chronic evolution with periods of remission and exacerbation. The objective of this study was to demonstrate a case of notalgia paresthetica, from its clinical and laboratory investigation to the treatment adopted.

**CASE REPORT:** A 77-year-old female patient, retired, attended the Outpatient Pain Service of the University Hospital of the Federal University of Maranhão. The main complaint was severe pruritus in the right dorsal region with extension to the breasts, associated with intermittent pain, burning, shock and tingling, worsening with physical effort and movement. Her sleep quality worsened because of the pain. At the physical examination, no pain was reported on palpation of the site, with mild hyposthesia in T5 and T6 dermatomes, without altering the thermal sensitivity. She denied a history of skin lesions. The patient received conservative pharmacological treatment, with significant improvement in pain and sleep quality after six months.

**CONCLUSION:** Notalgia paresthetica is a syndrome of unknown etiology, and the lack of studies makes it difficult to optimize the indications and recommendations to direct the treatment. This report illustrates the handling of a case of paresthetica notalgia where gabapentin was used as therapeutic management for pain control, for which it proved to be efficient.

**Keywords:** Neuralgia, Pain, Pharmacologic treatment, Pruritus.

**ABSTRACT**

**JUSTIFICATIVA E OBJETIVOS:** A notalgia parestésica é um distúrbio neuropático sensível que acomete a região dorsal entre os dermátomos de T2 a T6, caracterizando-se por uma evolução crónica com períodos de remissão e exacerbação. O objetivo deste relato foi descrever um caso de notalgia parestésica, desde a sua investigação clínica e laboratorial até a conduta adotada.

**RELATO DO CASO:** Paciente do sexo feminino, 77 anos, apontada, compareceu para atendimento no Serviço Ambulatorial de Dor do Hospital Universitário da Universidade Federal do Maranhão, tendo como queixa principal prurido intenso em região dorsal direita com extensão para as mamas, associada a dor intermitente, em queimação, choque e pontadas, piorando com esforço físico e movimento. Seu sono não era reparador. Ao exame físico, não referiu dor à palpação do local, com discreta hipoestesia em dermátomos T5 e T6, não havendo alteração de sensibilidade tórmica. Negava histórico de lesões de pele. O paciente recebeu tratamento conservador farmacológico, havendo melhora importante do prurido, da dor e da qualidade do sono após seis meses.

**CONCLUSÃO:** A notalgia parestésica é uma síndrome de etiologia ainda desconhecida, em que a escassez de estudos dificulta uma otimização das recomendações para direcionar o tratamento. Este relato ilustrou o manuseio de um caso de notalgia parestésica onde o tratamento com gabapentina foi empregado para o controle de dor, para o qual se mostrou eficiente.

**Descritores:** Dor, Neuralgia, Prurido, Tratamento farmacológico.

**RESUMO**

**INTRODUCTION**

Notalgia paresthetica (NP), first mentioned in 1934 by Astwazaturov, derives from the Greek vocabulary, *notos* (dorsum) and *algos* (pain), and is poorly described in the literature. Nevertheless, it is believed to be a common but underdiagnosed condition. It is a sensory neuropathic syndrome that affects the dorsal region between the T2 to T6 dermatomes and is characterized by a chronic evolution with periods of remission and exacerbation. The diagnosis is clinical, and the symptoms are localized itching associated with burning sensation, paresthesia, hyperesthesia and may present a well-delimited area of hyperpigmentation in the interscapular region.

The etiology is not well established, but is considered multifactorial, including genetic predisposition, increased local skin innervation, chemical agent neurotoxicity, and spinal nerve injury due to chronic trauma and/or compression by degenerative spinal changes, or adjacent soft tissues. Also, females have been described in the literature as the most affected, but there is no
preference for race. It is a disease that appears in adulthood, considered benign, but directly affects the quality of life of patients. The objective of this report was to show an NP case, since its clinical and laboratory investigation to the adopted approach.

CASE REPORT

Female patient, 77 years old, retired, attended for treatment at the Chronic Pain Outpatient Clinic of the University Hospital of the Federal University of Maranhão (HUUFMA), reporting as main complaint intense itching in the right dorsal region, extending to the inframammary region, associated with intermittent pain, burning sensation, shock and sting, worsening when moving or making efforts. Sleeping was not restful. Among her personal history, she reported a diagnosis of osteoporosis and tuberculosis five years before the appointment, denying diabetes mellitus, hypertension, and allergies. She denied a history of dorsal skin lesions. On physical examination, the patient had no palpable tense muscle band and trigger points in the affected region. There was no pain on palpation of the site, with mild hypoaesthesia in T5 and T6 dermatomes, with no change in thermal sensitivity. The dermoscopy was normal.

Nuclear magnetic resonance (NMR) of the cervical spine, thorax, and pelvis showed no changes. The lumbar NMR showed a degenerative discopathy with mild disc protrusion. Chest computed tomography (CT) showed bilateral apical pleural thickening and bronchiectasis.

The diagnostic hypothesis was NP, based on the main complaint of severe itching, subjective description of pain, and signs present on physical examination. The patient started the clinical treatment with gabapentin (300 mg) every 12 hours, orally, and codeine (30 mg) in case of pain.

After six months of treatment, the patient reported complete remission of the pruritus, with only a mild back pain in that interval, with full recovery using codeine. There was also an improvement in sleep quality. In addition to the pharmacological treatment, respiratory and motor home physical therapy were associated.

DISCUSSION

In this report, the case presented was of a patient with PN referring intense and intermittent pruritus and radiated back pain to the right breast, with shocks, stinging, and burning. NP, first mentioned in 1934, is described as a sensory neuropathic syndrome characterized by pruritus, pain, and upper back hypoaesthesia, between the dermatomes T2 and T6. It has no preference for a race and is described worldwide. It is not considered a severe condition but has a significant impact on the quality of life. It is clinically characterized by localized itching associated with pain, usually intermittent and paroxysmal, with varying intensity. In addition to a burning or cold sensation, there are complaints of paresthesia, hyperesthesia, and well-circumscribed hyperpigmented skin in the dorsal region, secondary to chronic scratches and friction of the symptomatic area.

The etiology is still unknown, although it is thought to be neuropathic pruritus caused by sensory nerve compression involving the posterior branches of the nerve roots from T2 to T6, and is mainly associated with degenerative changes in the vertebrae. Eventually, nerve compression can cause very intense dysesthesia and paresthesia, typically located in the region of the skin that is innervated by the injured nerve. This painful sensation occurs when the neurons responsible for integrating or transporting the itching perception are injured in any part of the peripheral or central nervous system, accounting for about 8% of all chronic pruritus cases.

Systemic drugs currently used to treat patients with NP with favorable results in relieving pruritus and pain, include gabapentinoids, tricyclic antidepressants, antihistamines, non-steroidal anti-inflammatory drugs, oral muscle relaxants, and anticonvulsants. In this case, we chose to use gabapentin, achieving satisfactory results as presented in some studies, with decreased pain intensity and pruritus.

Other available forms of treatment described are topical capsaicin cream, topical cortisosteroids, topical anesthetics (lidocaine), skin stimulation, paravertebral nerve block, and spinal nerve decompression surgery. However, there is no treatment considered as the standard. The evaluation of its effectiveness in NP is hampered by the lack of papers on the subject.

CONCLUSION

This report corroborated some findings already described in the literature, such as the good response to the use of gabapentinoids in patients diagnosed with PN. However, further studies are needed to characterize better and understand the pathogenesis of this disease, as well as to optimize and standardize the chosen therapy.

REFERENCES

ABSTRACT

BACKGROUND AND OBJECTIVES: Post-dural puncture headache is a common complication in neuraxial anesthesia and lumbar puncture diagnostic procedures. The pathogenesis of the headache is thought to be due to a leak of cerebrospinal fluid from the puncture site that exceeds the rate of cerebrospinal fluid production, causing a downward traction of the meninges and vasodilation of the meningeal vessels mediated by the autonomic nervous system. Nowadays, the conservative treatment involves hydration, and the use of caffeine, analgesics, hydrocortisone, gabapentin, and theophylline. However, an autologous epidural blood patch is considered the definitive treatment for post-dural puncture headache and has an efficacy of up to 75%. Since this procedure comes with intrinsic risks, an alternative is the sphenopalatine ganglion block.

CASE REPORT: We describe a case report using a sphenopalatine ganglion block to treat post-dural puncture headache in a patient submitted to cerebrospinal fluid pressure monitoring with a subarachnoidal catheter inserted with a low-gauge needle.

CONCLUSION: This is the first case report of a post-dural puncture headache caused by a subarachnoid monitoring catheter successfully treated with sphenopalatine ganglion block. This technique can be a non-invasive option in the management of post-dural puncture headache, which requires more study to evaluate its efficacy and safety.

Keywords: Headache, Post-dural puncture headache, Sphenopalatine ganglion block.

Sphenopatine ganglion block for post-dural puncture headache after invasive cerebrospinal fluid pressure monitoring. Case report

ABSTRACT

JUSTIFICATIVA E OBJETIVOS: A cefaleia pós-punção pontual é uma complicação comum nos procedimentos de anestesia neuroaxial e punção lombar diagnóstica. Acredita-se que a patogênese da cefaleia seja devida a um vazamento de líquido cefalorraquidiano do local da punção que excede a taxa de produção de líquido cefalorraquidiano, causando uma tração descendente das meninges e vasodilação dos vasos meníngeos mediada pelo sistema nervoso autônomo. Atualmente, o tratamento conservador envolve a hidratação e o uso de cafeína, analgésicos, hidrocortisona, gabapentina, teofilina, porém, o tampão sanguíneo peridural autólogo é considerado o tratamento definitivo para a cefaleia pós-punção pontual e tem eficácia de até 75%. Dado que esse procedimento vem com riscos intrínsecos, uma alternativa é o bloqueio ganglionar esfenopalatino.

RELATO DO CASO: O estudo relata um caso utilizando com sucesso o bloqueio ganglionar esfenopalatino para tratar cefaleia pós-punção dural em um paciente submetido à monitorização da pressão líquórica com um cateter subaracnoideo inserido com uma agulha de pequeno calibre.

CONCLUSÃO: Este é o primeiro relato de caso de cefaleia pós-punção dural causada por um cateter subaracnoideo e tratada com sucesso com o uso de bloqueio de gânglio esfenopalatino. Esta técnica pode ser uma das opções não invasivas no manuseio da cefaleia por hipotensão líquórica e requer maior estudo para avaliar sua eficácia e segurança.

Descritores: Bloqueio do gânglio esfenopalatino, Cefaleia, Cefaleia pós-punção dural.

RESUMO

INTRODUCTION

Post-dural puncture headache (PDPH) is a common complication in neuraxial anesthesia and lumbar puncture diagnostic procedures. The incidence of PDPH is inversely proportional to the gauge of the needle which punctures the dura, thus in anesthesia it is more common for the patient to experience PDPH after accidental dural puncture with 16-gauge Tuohy needle (70% chance of PDPH) than after dural puncture with 29-gauge Quincke needle (less than 2%)1. The pathogenesis of the headache is thought to be due to a leak of cerebrospinal fluid from the puncture site that exceeds the rate of cerebrospinal fluid production, causing a downward traction of the meninges and vasodilation of the meningeal vessels mediated by the autonomic nervous system1.
Nowadays, the conservative treatment involves hydration and the use of caffeine, analgesics, hydrocortisone, gabapentin, theophylline. Nevertheless, such treatment is not always effective, and an interventional technique is applied. Autologous epidural blood patch (AEBP) is considered the definitive treatment for PDPH and has an efficacy of up to 75%. However, this procedure comes with intrinsic risks, such as difficulty in identifying the epidural space, a new accidental dural puncture, patient discomfort during the procedure, infection, hemorrhagic and neurologic complications.

An alternative between conservative treatment and the AEBP is the sphenopalatine ganglion block (SPGB). The sphenopalatine ganglion is a neural structure located in the pterygopalatine fossa and has both a sympathetic and a parasympathetic component of the autonomous system, as well as somatic sensory roots. It can be accessed through transcutaneous or transnasal approaches. The SPGB has been successfully used in pain clinic practice to treat chronic headaches, atypical facial pain, and even trigeminal neuralgia. The transnasal approach is a noninvasive technique that can be easily performed and could be beneficial to PDPH by blocking the parasympathetic tonus at the cerebral vasculature, returning them to their normal diameter and relieving the headache with a low cost and low risks procedure. The related complications reported with the transnasal technique are minor bleeding and temporary nasal discomfort.

There are no clinical trials on this hypothesis; only two recent case reports showed the use of SPGB to treat PDPH in patients who underwent diagnostic lumbar puncture in the emergency room or obstetric anesthesia. Both case reports have shown positive results, eventually avoiding the necessity of AEBP in refractory patients to conservative treatments.

We describe a case report using SPGB to treat PDPH in a patient submitted to cerebrospinal fluid pressure monitoring with a subarachnoidal catheter inserted with a low-gauge needle.

**CASE REPORT**

The patient was a 45-year-old man, 85kg, 165cm, with a history of systemic arterial hypertension and hypercholesterolemia who underwent open thoracic surgery for aorta aneurysm correction with cerebrospinal fluid pressure monitoring. Upon the subarachnoid catheter withdraw, the patient developed PDPH, which was evaluated with the visual numeric scale, varying from zero to 10. He rated the intensity as 8 while sitting or standing, and zero while lying down. The surgical team initiated the conservative treatment with caffeine, analgesics, and hydration, but it was not effective after 12 hours.

We have confirmed the clinical diagnosis of PDPH, and we offered an SPGB as a non-invasive option to relieve the pain. The patient was also offered an AEBP and informed that the latter was the current definitive therapy.

After agreeing on the SPGB, the block was performed with the patient in the supine position, with the neck flexed and the head extended. Gauzes soaked in 15g of a 2% lidocaine gel were inserted carefully into each nostril until it reached the nasopharynx posterior wall. They were left in place for 10 minutes and removed (Figure 1).

![Figure 1. Sphenopalatine ganglion block](image)

After removal, the patient had no pain while sitting or walking (visual analog scale (VAS) score of zero/10). There was a minor discomfort during the gauze insertion, but no bleeding occurred. The previous clinical treatment was maintained, associated with gabapentin (600mg) per day was. The pain returned after 12 hours, but with the intensity of 3 using the VAS score and was considered mild and tolerable for about 5 hours sitting and walking. During this period, the patient refused AEBP, given the mildness of the pain and only the clinical treatment was maintained. After 5h, the patient was pain-free again. At 24h and 48h post block the patient had no pain. The treatment was suspended after 48h, and the patient was discharged. By a phone contact five days later, there were no reports of headache recurrence (Table 1).

<table>
<thead>
<tr>
<th>Days</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Patient submitted to a thoracic surgery for aorta aneurysm correction</td>
</tr>
<tr>
<td>3</td>
<td>Catheter withdrawal and PDPH symptoms and beginning of conservative treatment</td>
</tr>
<tr>
<td>3</td>
<td>Pain Team evaluation and treatment</td>
</tr>
<tr>
<td>4</td>
<td>Evaluation 24 hours after the procedure</td>
</tr>
<tr>
<td>5</td>
<td>Evaluation 48 hours after the procedure and discharge</td>
</tr>
<tr>
<td>10</td>
<td>Evaluation 7 days after the procedure</td>
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</table>

**DISCUSSION**

This is the first case-report of PDPH caused by an invasive monitoring anesthetic method, which was refractory to clinical treatment and solved with SPGB without the need for AEBP.

The supratentorial dura mater membrane is supplied by small meningeal branches of the trigeminal nerve (V1, V2, and V3).
The innervation for the infratentorial dura mater is via upper cervical nerves. The second division of the trigeminal nerve (V2) runs through the sphenopalatine ganglion (SPG), which is anatomically accessible to blocking due to its superficial location in the nasal cavity. The proposed mechanism is that with the SPGB, the parasympathetic tonus of the cerebral vasculature is reduced, allowing the dilated blood vessels to return to the normal diameter, reducing intracranial volume and thus alleviating PDPH symptoms. In a recent observational study, it was evidenced that there were temperature changes in both sides of the V1 area, which corroborates the theory that there is reduction of meningeal blood flow.

We used 2% viscous lidocaine because that was what was available at our institution. Although other studies had used 4-5% lidocaine, we had similar results with a lower concentration of lidocaine. In this case, the patient had complete pain resolution for 12h, a mild pain relapse for 5h and no pain in later evaluations. The analgesic treatment was maintained for the first two days after the block, which might have contributed to the prolongation of the analgesic effect. Another possibility is that once the parasympathetic tonus is reduced with the blockade, it does not increase again.

The SPGB can be performed in ambulatory patients. Non-specialized medical staff, surgical staff, and even the patient himself can use this simple technique, as it is already used for orofacial pain, headaches, and trigeminal neuralgia. Despite being a simple technique, SPGB requires training to increase its efficacy and reduce potential complications. This technique needs further clinical trials using different anesthetics, dosages and compared to conservative treatments, and the results achieved in this case report, and others are concordant and encouraging.

REFERENCES

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The Brazilian Journal of Pain (BrJP), printed version: ISSN 2595-0118, electronic version: ISSN 2595-3192, is the multidisciplinary medical journal of the Brazilian Society for the Study of Pain (SBED). This is a journal focusing on the study of pain in clinical and research contents, gathering scientists, physicians, dentists, veterinarians, epidemiologists, psychologists, physiotherapists and other health professionals aiming at publishing their basic or applied research in this area of knowledge. Articles are of full responsibility of the authors and its periodicity is quarterly. All submitted papers are reviewed and the journal follows the Uniform Requirements of Manuscripts submitted to Biomedical.

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