

# Musculoskeletal pain, multimorbidity and associated factors in individuals followed at a physiotherapy service: cross-sectional observational study

*Dor musculoesquelética, multimorbidade e fatores associados em indivíduos acompanhados por serviço de fisioterapia: estudo observacional de corte transversal*

Ana Francisca Ferreira<sup>1</sup>, Jesús Enrique Patiño Escarcina<sup>1,2</sup>, Dryele Teles C. Luz<sup>1</sup>, Ruan Barbosa Souza<sup>1</sup>, Eduardo Martins Netto<sup>1</sup>

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** Musculoskeletal pain is among the most disabling conditions, aggravating multimorbidity scenarios. Difficulties in the treatment of pain and multimorbidity highlight the importance of the study of these populations. The objective of this study was to determine the frequency of musculoskeletal pain and multimorbidity, the main complaints in patients admitted to physiotherapy services.

**METHODS:** This is a cross-sectional observational study. Patients 50 years or older were evaluated using the Brief Pain Inventory, Roland Morris Disability Questionnaire for general pain, socio-demographic and clinical data form, and timed-up-and-go test. Descriptive analyses were performed through the distribution of absolute numbers and proportions for categorical variables.

**RESULTS:** The sample consisted of 62 patients with 2 or more painful regions, 88.7% women with a median age of 67 years [IQR 62-72], 81% with body mass index above normal, 71% hypertensive and 97% with multimorbidity. The median of painful regions was 7 [IQR 4-8], the most prevalent being low back and knees (87%); 66% of patients describe severe pain, and median pain duration of 7.5 years [IQR 3-15]. The high number of painful regions had greater interference ( $p < 0.05$ ) in the lives of individuals and was associated with females ( $p = 0.04$ ) and the occurrence of a fall in the last year ( $p < 0.003$ ).

**CONCLUSION:** The described population is mostly composed of hypertensive, overweight women with multimorbidity, chronic pain and a high number of painful regions, interfering in activities and in the affective components of life. A continuous study of chronic, diffuse musculoskeletal pain and multimorbidity is necessary, seeking better interventions for these patients.

**Keywords:** Chronic pain, Multimorbidity, Musculoskeletal pain.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** Dores musculoesqueléticas estão entre as condições mais incapacitantes, agravando quadros de multimorbidade. Dificuldades no tratamento da dor e multimorbidade ressaltam a importância do estudo dessas populações. O objetivo deste estudo foi determinar a frequência de dor musculoesquelética e multimorbidade, principais queixas em pacientes admitidos em serviço de fisioterapia.

**MÉTODOS:** Este é um estudo observacional de corte transversal. Pacientes com 50 anos ou mais foram avaliados através do Inventário Breve de Dor, Questionário de Incapacidade de Roland Morris para dor em geral, formulário de dados sociodemográficos e clínicos e teste *timed-up-and-go*. Foram realizadas análises descritivas através da distribuição de números absolutos e proporções para as variáveis categóricas.

**RESULTADOS:** A amostra foi composta por 62 pacientes com 2 ou mais regiões dolorosas, 88,7% mulheres com mediana de idade de 67 anos [IQR 62-72], 81% com índice de massa corpórea acima da normalidade, 71% hipertensos e 97% com multimorbidade. A mediana de regiões dolorosas foi de 7 [IQR 4-8], sendo as mais prevalentes lombar e joelhos (87%); 66% dos pacientes descrevem dor intensa e mediana da duração da dor de 7,5 anos [IQR 3-15]. O alto número de regiões dolorosas teve maior interferência ( $p < 0,05$ ) na vida dos indivíduos e foi associado ao sexo feminino ( $p = 0,04$ ) e a ocorrência de queda no último ano ( $p < 0,003$ ).

**CONCLUSÃO:** A população descrita é majoritariamente composta por mulheres hipertensas, com sobrepeso, multimorbidade, dor crônica e alto número de regiões dolorosas, interferindo nos componentes de afetividade e atividades da vida. Faz-se necessário contínuo estudo da dor musculoesquelética crônica, difusa e multimorbidade, buscando melhores intervenções para estes pacientes.

**Descritores:** Dor crônica, Dor musculoesquelética, Multimorbidade.

Ana Francisca Ferreira Stagliorio – <https://orcid.org/0000-0003-4161-9144>;

Jesús Enrique Patiño Escarcina – <https://orcid.org/0000-0003-2948-5550>;

Dryele Teles Conceição da Luz – <https://orcid.org/0000-0001-8976-4506>;

Ruan Barbosa Souza – <https://orcid.org/0000-0002-6392-2112>;

Eduardo Martins Netto – <https://orcid.org/0000-0003-1691-6761>.

1. José Silveira Foundation, Research and Innovation Center, Salvador, BA, Brazil.

2. Federal University of Bahia, Collective Health Institute, Salvador, BA, Brazil.

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## Highlights

- Almost all patients had multimorbidity and described a median of 7 painful regions
- The high number of painful regions had high interference in the lives of individuals
- Two-thirds of the patients described severe pain, and median duration of 7.5 years.

## Correspondence to:

Ana Francisca Ferreira

E-mail: [ana.stagliorio@gmail.com](mailto:ana.stagliorio@gmail.com) [ana.stagliorio@fjs.org.br](mailto:ana.stagliorio@fjs.org.br)

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## INTRODUCTION

Virtually every adult has experienced one or more brief episodes of musculoskeletal pain (MSP) associated with injury or overuse<sup>1</sup>. Data from the World Health Organization (WHO) indicate that 20% to 33% of the world population, with varying age and diagnosis, lives with MSP<sup>2</sup>. As for work-related disorders, musculoskeletal disorders represent 61%<sup>3</sup>. However, literature reports bring more variation to this statistic, noting that MSP affects between 13.5% and 47% of the general population, and the prevalence of diffuse chronic pain (CP) varies between 11.4% and 24%<sup>4</sup>.

A population-based study conducted in 2017 observed that the prevalence of CP was 39% in Brazil and 30% in the Northeast of Brazil<sup>5</sup>. In a recent systematic review, a national prevalence of CP of 45.6% was observed, being 41.7% in the Northeast and 41.4% in the state of Bahia<sup>6</sup>. Despite the recent advances in the comprehension of pain mechanisms bringing the possibility of new treatments, the management of CP remains generally unsatisfactory<sup>7</sup>. The presence of pain, besides generating physical and emotional stress as well as losses for the patients and their caregivers, is a cause for economic burden to society<sup>8</sup>.

Musculoskeletal diseases comprise about 150 different conditions, of which hip and knee osteoarthritis, rheumatoid arthritis, low back and neck pain and gout represent about 75% of the total<sup>9</sup>, and all of them present pain and its limiting consequences as a common factor<sup>10</sup>. The global burden (or impact) of pain related to musculoskeletal conditions is second among the most disabling, second only to mental disorders, according to the Global Burden of Disease (GBD) study<sup>2</sup>. MSP is significantly disabling, especially when it comes to older adults, resulting in low levels of physical activity, decreased mobility, depression, cognitive impairment, falls, and worsened quality of sleep<sup>11</sup>.

Despite evidence that there is a significant burden of musculoskeletal diseases associated with pain, current estimates probably underestimate both prevalence and burden<sup>10</sup>. Most MSP disorders increase with age, and as there is an increase in chronic noncommunicable diseases (NCDs) and multimorbidity and a reduction in the level of physical activity related to MSP, the overall burden of pain will also increase substantially<sup>10</sup>. Multimorbidity can be defined as the coexistence of two or more chronic conditions with none of them being considered the main one<sup>10,12</sup>. The classification of multimorbidity in studies, however, can vary greatly, since different authors consider different diseases. The various musculoskeletal diseases, for example, are considered a single disease by several authors<sup>13,14</sup>. More recently, considering the important impact of musculoskeletal diseases on health, some studies already consider conditions such as low back pain and osteoarthritis of other joints, for example, independently<sup>15</sup>.

The growing burden of nonfatal diseases, injuries, and impairments represents a challenge for health systems and economies<sup>9</sup>. It's imperative to approach CP as an important health component in multimorbidity and chronic stress, aiming at a global health improvement. The need for a better comprehension of the

factors involved in the evolution and prognosis of MSP in the context of multimorbidity is evident, thus allowing for a better assessment when designing therapeutic strategies.

The present study's objective was to determine the frequency of MSP and multimorbidity, main symptoms and limitations in patients admitted to the physical therapy service.

## METHODS

A cross-sectional observational study was conducted in the physical therapy service of the *Instituto Bahiano de Reabilitação* (IBR) of José Silveira Foundation (FJS), between August 2019 and January 2020. The IBR serves, through the Brazilian public health system (*Sistema Único de Saúde* - SUS), patients with indications for rehabilitation referred by institutions in Bahia, Brazil, and is a reference of care excellence in the state.

Participants in the study included all adults over 50 years old admitted with complaints of MSP for more than 3 months, excluding those with pain originated from trauma, in a postoperative period of less than 3 months, and those with cognitive or sensory impairment. Assessments for sociodemographic and clinical data were performed, as well as weight and height. The Roland Morris Disability Questionnaire (RMDQ) for general pain was applied to identify the impact of pain on 24 aspects of daily life, including sleep, mood, and domestic chores. This questionnaire was originally developed and validated in patients with low back pain<sup>16</sup> and was later modified and validated for the Portuguese language for the use of this tool in the evaluation of patients with pain in general<sup>17</sup>.

Next, the Brief Pain Inventory (BPI) was applied to characterize the affected body regions, the intensity of pain and the degree of pain interference in the individual's life, assessing the "activity" and "affective" dimensions<sup>18,19</sup>. This questionnaire was developed to capture two aspects of pain: severity and interference. It is recommended for studies in patients with chronic pain<sup>20</sup> and was validated for use in the Brazilian population in 2011<sup>19</sup>.

For the classification of multimorbidity, only 4 conditions were evaluated: the presence of diabetes mellitus (DM), systemic arterial hypertension (SAH), low back pain and osteoarthritis in other regions<sup>15</sup>. Multimorbidity was defined as the coexistence of two or more chronic health conditions with none being the main one<sup>12</sup>. The list of diseases that are considered in the various studies that classify multimorbidity is greatly varied. Most authors consider large groups of diseases and thus multiple musculoskeletal diseases are computed as a single condition. More recently, classifications have been presented that segment the varied musculoskeletal diseases, which consider low back pain and osteoarthritis in other joints as independent conditions<sup>15</sup>. Therefore, given the characteristics of the study population and the evidence of the important impact of these multiple conditions on the lives of patients, this segmented classification was chosen for the present study.

The timed-up-and-go (TUG) test was used to assess mobility, which quantifies the walking time at a safe and comfortable pace. The patient starts the test from a sitting position in a metal chair without arms, with the back resting on the backrest, gets up,

walks for a distance of three meters, turns 180 degrees, and returns to the initial position<sup>21</sup>. The test was performed twice in each volunteer and the mean of the two times was recorded. Several studies have been conducted using the TUG test to determine the cut-off point predictor of fall risk in different populations and diseases<sup>22-24</sup>.

This research was evaluated by the Human Research Ethics Committee of the *Climério de Oliveira* maternity clinic of the Federal University of Bahia and approved on June 15, 2019 under opinion No. 3.394.021, CAAE 15185019.4.0000.5543. The original text followed the recommendations of The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement<sup>25</sup>.

### Statistical analysis

These data were organized into tables and described using descriptive and summary statistics. Associations between scales were assessed using the Mann-Whitney test. A level of significance of 5% and power of 80% was set for the use of the statistical tests. Data were analyzed using the Statistic Package for Social Science SPSS<sup>®</sup> version 27.0.

## RESULTS

Sixty-two patients participated in the study, 89% (n=55) were women with a median age of 67 years (IQR: 62-72), 57% (n=38) were unemployed and 26% (n=16) lived alone. The median body mass index (BMI) was 28.4 (IQR: 26.3-32.2), with 81% (n=50) overweight or obese and 37% (n=23) obese. 29% (n=18) had DM and 71% (n=44) had SAH. About 96.8% (n=60) of patients were classified as having multimorbidity<sup>15</sup>.

Participants reported a median of 7.5 years (IQR: 3-15) lived with MSP. All patients had at least one month of admission and reported previous physical therapy elsewhere, and 90.32% received physical therapy intervention for more than six months. Regarding areas of pain, the BPI scale showed that participants had a median of 7 (IQR: 4-8) pain areas, reporting up to 13 pain areas. The intensity of the worst pain experienced in the past 24 h presented a median of 8 out of a maximum of 10 [IQR: 7-9], and 66% (n=41) of individuals scored this pain as severe (8 to 10/10). The median pain at the time of assessment was 5/10 (IQR: 0-6), and 19% (n=12) of patients were pain-free at the time of assessment. The following pain areas were the ones most frequently reported: knees (87%, n=54) (both (68%, n=42) or one of them (19%, n=12)), and low back (87%, n=54). The main areas reported as the site of the worst pain were knees (40.3%, n=25) and the lower back (38.7%, n=24), which in general was perceived in the lower limbs (52%, n=32). 69% (n=43) of the patients reported continuous use of pain drugs at the time of the interview. 29% (n=18) of the participants reported a fall in the last year (Table 1). Among those who fell only 77% were older adults, and the median time to perform the TUG test, which assesses functional mobility, was 14.13 seconds [IQR 12.3-15.9] (Table 2).

In the evaluation of pain interference in aspects of the individual's life through the BPI interference domain (BPIi), the

**Table 1.** Clinical and demographic characteristics of patients aged 50 years or older undergoing physiotherapy treatment for musculoskeletal pain in a reference center in the city of Salvador

Variables	
Age (years) – med (IQR)	67 [62-72]
Female gender – n (%)	55 (88.7%)
Stratified BMI – n (%)	
Normal	12 (19.4%)
Overweight	27 (43.5%)
Obesity	23 (37.1%)
Diabetes <i>mellitus</i> – n (%)	18 (29%)
Hypertension – n (%)	44 (71%)
Living alone – n (%)	16 (25.8%)
Not working – n (%)	38 (57.1%)
Income – med (IQR)	1898 (999-2.600)
Up to 1.000 – n (%)	22 (35.5%)
1.001 to 2.000 – n (%)	20 (32.3%)
> 2.000 – n (%)	20 (32.3%)
Number of painful areas – med (IQR)	7 (4-8)
Painful areas most frequently reported – n (%)	
Knees	54 (87%)
Lumbar	54 (87%)
Shoulders	34 (54.8%)
Ankles and feet	27 (43.5%)
Cervical	26 (41.9%)
Hips	21 (33.9%)
Main painful region – n (%)	
Knees	25 (40.3%)
Lumbar	24 (38.7%)
Cervical	6 (9.7%)
Hip	5 (8.1%)
Ankle and foot	2 (3.2%)
Intensity of the worst pain in the last 24h – med (IQR)	8 (7-9)
Years lived with musculoskeletal pain – med (IQR)	7.5 (3-15)
Continuous use of analgesics – n (%)	43 (69.4%)
Presence of multimorbidity – n (%)	60 (96.8%)
Occurrence of falls in the last year – n (%)	18 (29%)

BMI = body mass index; med = median; IQR = interquartile range.

median of general interference was 5.7 (IQR 3.7-7.1), in the “activity” dimension the median was 6.3 (IQR: 4.3-7.8) and in the “affective” dimension the median was 4.5 (IQR: 2.0-7.0). In the evaluation of the level of disability through the RMDQ, the median score was 16 (IQR 11-20) (Table 2). The RMDQ score showed no association with the variables studied. However, significantly higher scores were obtained in those with low back pain (17 vs. 6; p=0.024) when compared to neck pain. Larger but non-significant differences were observed in the hip (11 vs. 6; p=0.233), knee (15 vs. 6; p=0.079), and ankle and foot (20 vs. 6; p=0.094) when compared to neck pain (Table 3).

**Table 2.** Questionnaires and functional scale scores of patients aged 50 years and older in physiotherapy treatment for musculoskeletal pain

Measuring tools	Median (interquartile range)
Roland Morris Disability Questionnaire for general pain	16 (11-20)
Brief Pain Inventory - Interference on the "activity" domain	6.3 (4.3-7.8)
Brief Pain Inventory - Interference on the "affective" domain	4.5 (2-7)
Brief Pain Inventory - Interference (general score)	5.7 (3.7-7.1)
Timed-up-and go test	14.13 (12.3-15.9)

**Table 3.** Roland Morris Disability Questionnaire scores medians for pain in general (RMDQ) and Brief Pain Inventory (BPI) according to main pain and comparison of pain sites with neck pain in patients 50 years or older in physiotherapy treatment for musculoskeletal pain

Main pain	RMDQ		IBDi	
	M (I)	P value*	M (I)	P value*
Cervical	6 (4-15)		4,36 (2,57-6,14)	
Hip	11 (10-18)	0,233	4,57 (4,43-5,29)	0,715
Knees	15 (10-21)	0,079	6,21 (3,36-7,57)	0,391
Lumbar	17 (15-19)	0,024*	5,29 (3,57-7,79)	0,452
Ankle and foot	20 (17-23)	0,094	6,29 (6,14-6,43)	0,241

\* Comparison of medians (M) and interquartile range (I) of the Roland Morris Disability Questionnaire values for general pain (RMDQ) and interference domain of the Brief Pain Inventory (IBDi) for the reported main area of pain and comparisons with cervical pain. \* p<0,05.

## DISCUSSION

Chronic MSP of non-traumatic origin in multiple body areas was very frequent in adults older than 50 years. Chronic pain is considered a maladaptive phenomenon<sup>26</sup> and more than a comorbidity, being currently considered a health condition in its own right<sup>7</sup>. As identified in the present study, the literature associates the female gender with chronic pain, besides other sociodemographic factors, such as advanced age, low socioeconomic status, work situation, occupational factors and history of abuse or violence<sup>7</sup>. The report of pain intensity in the 24 hours prior to the interview was alarming (8 - 10/10) being pointed out as the reason for the continuous use of painkillers by 69.4% of the participants. However, at the time of the assessment, a lower pain intensity was identified (5/10) and 19% of patients reported being painless. It is likely that this difference is associated with the time of day because other studies have found that pain worsens at night when lying down due to fatigue<sup>27</sup>. Other factors that can influence the perception of pain are contextual, such as the patient being in the rehabilitation place, receiving attention and care, or even for having left home and, in several cases, being the only moment of distraction and social interaction<sup>4,28</sup>. This finding also highlights the importance of carefully evaluating the history of the patient with CP to correctly design the therapeutic plan, so that the absence of pain at the time of assessment is not a determining factor.

The number of painful areas pointed out by the patients (up to 13) is worrisome, because it is known that in individuals with several painful conditions, anxiety, depression and catastrophic thoughts are associated with CP and worse prognosis<sup>7</sup>. A retrospective study with information from more than 100 million patients in the United States observed that the mean number of pain diagnoses per patient was 2.7 (SD: 1.3)<sup>29</sup>. This difference is possibly due to population and socioeconomic characteristics, such as the multimorbidity character present in this group (96.8%), considering only the conditions: low back pain, osteoarthritis, hypertension, and DM. Hypertension was the most frequent comorbidity present in the participants (71%). Other studies point out that the prevalence of multimorbidity can be up to 100%<sup>30</sup> in similar populations and is associated with reduced functionality and high mortality<sup>15</sup>.

One of the most frequently reported pains (87% of the sample) was low back pain, similar to what has been reported in other studies with prevalences of up to 75%<sup>31</sup>. Low back pain is a public health problem among "working-age" adults worldwide and its prevalence and incidence increase with aging<sup>9</sup>. Low back pain was the leading cause of "years lived with disability" (YLD) in 126 of the 195 countries and territories studied, a worrisome situation given its association with loss of functional capacity and work capacity<sup>9</sup>. In Brazil, low back pain is the leading cause of YLD, according to estimates from the GBD study<sup>32</sup>. In Canada, low back pain is among the five main complaints in emergency services<sup>33</sup>. The prevalence of low back pain in the general population is estimated to be up to 20%, and is more frequent in males<sup>34</sup>. In individuals older than 65 years, the prevalence was close to 65%<sup>35</sup>. Some characteristics such as aging, high intensity of physical activity, high load on the spine, stooping and twisting of the spine have been described as risk factors for developing chronic low back pain<sup>34</sup>.

Osteoarthritis (OA) in more than one joint was present in 98.4% of the participants, and the knee joint was the most affected (87%). OA is the most common chronic joint disorder and the leading cause of joint pain, loss of function, and disability in adults<sup>26</sup>. In general, it is the second most prevalent musculoskeletal disorder<sup>9</sup>, affecting 34% of individuals over 65 years<sup>26</sup> and up to 80% of the population over 75 years old, mainly in the knees<sup>36</sup>. The high physical load at work has been shown to be the main occupational risk factor for developing OA in several anatomical regions<sup>36</sup>. Other factors for OA include kneeling, climbing stairs regularly, bending over, and repetitive movements<sup>37</sup>. It has been observed that patients eventually reduce their participation in activities as an attempt to avoid triggering pain episodes<sup>26</sup>. The type of OA pain classified as intense had a greater impact on the quality of life of OA patients than constant pain, albeit of lesser intensity<sup>26</sup>.

The assessment of the degree of interference of CP in the performance of activities and in affective aspects of life was similar (6 and 5/10). Similarly, the literature describes that many patients with CP have clinically significant depressive symptoms, as well as low self-reported quality of life scores<sup>38</sup>.

According to the RMDQ assessment, low back pain as the main pain was the most disabling. These findings are also supported

by the literature, since low back pain is one of the main causes of years lived with disability, related to reduced functional and working capacity<sup>9</sup>. The negative effects of pain on mood, social participation and recreational activities, as well as sleep have also been documented<sup>26</sup>, which corroborates the present findings of disability levels (median 16/24 in the RMDQ) and the degree of interference of pain in the patients' life activities.

The present study pointed out that 71% of the individuals had a TUG test time above the cut-off point for fall risk for the older adults (12.47 seconds), and 35.5% above the cut-off point for frail older adults (15 seconds), according to the national literature<sup>24</sup>. According to a recent systematic review and meta-analysis, the presence of pain in several body areas is related to a risk factor for future falls in older adults living in the community (non-institutionalized)<sup>39</sup>, highlighting the need of awareness about this risk and the implementation of prevention strategies. It is noteworthy that 29% of the patients who were evaluated have already reported the occurrence of a fall in the previous year, but only 77% of them are older adults, which leads us to conclude that the health condition of these non-older adults who have presented falls is deteriorating at an early age.

There are reports in the literature that BMI impacts the performance of functional tests<sup>40</sup>, but this association was not observed in this sample. The implementation of exercise programs for individuals presenting multimorbidity is extremely important due to the broad benefits of exercise on health, and good results are reported, however, it requires more care<sup>41</sup>.

According to literature data, individuals living in areas with greater economic deprivation are more likely to present multimorbidity, and the presence of a mental health disorder is strongly associated with higher numbers of physical health conditions<sup>13</sup>. The predominance of women in this sample also corroborates findings in the literature which noted that women tend to report MSP in multiple sites more than men<sup>38</sup>. There are reports of an association between the number of health conditions and the occurrence of falls<sup>42</sup>, and, in this sense, an association between the number of painful areas and the occurrence of falls in the last year we observed ( $p < 0.003$ ). Patients presenting multimorbidity are more likely to use multiple drugs, which is common in the older adult population, and may result in adverse events<sup>43</sup>, such as increased risk of falls<sup>44</sup>. The context of multimorbidity complicates the clinical management of the patient because a drug for one health condition may be harmful to the other health condition, meaning that following the guidelines for each condition may not be the best therapeutic strategy<sup>43</sup>. This is a challenge for a health system organized for individual diseases and not for multimorbidity<sup>13</sup>.

The study draws attention to the association of CP and multimorbidity. In individuals older than 65 years, there is a high prevalence of multimorbidity, and 94% of these patients have more than two health conditions<sup>14</sup>. The low prevalence of specific combinations of multimorbidity and the high prevalence of associated psychiatric and social problems added to the overall complexity of multimorbidity results in the difficulty to perform controlled and prospective studies<sup>14</sup>, which represented a limitation also in the design of the present study. Besides the potential limitation of this study regarding the heterogeneity in

the context of multimorbidity, there is also the fact that not all participants had similar durations of physical therapy treatment, which could condition the present findings.

Nevertheless, chronicity of symptoms was a common factor, and was reinforced by the report that over 90% of the subjects had been under physiotherapy treatment for over 6 months, and with persistent symptoms, justifying inclusion for final analysis. These patients presenting multimorbidity are further affected by being assisted by a complex and fragmented healthcare system, structured to treat diseases and not people<sup>45</sup>. A systematic review highlights the difficulty in obtaining improvement in clinical outcomes in this population, but focusing on functional difficulties in a case of multimorbidity could be more effective<sup>46</sup>. Furthermore, the living conditions of each individual determine how they cope with their health condition<sup>47</sup>. Coping can be defined as the cognitive efforts and behavioral practices developed by the individual in situations considered as stressful. In individuals with CP (not related to cancer), coping can be influenced by biological, psychological, and sociocultural factors<sup>47</sup>, which can be barriers or facilitators<sup>48</sup>. The literature highlights that in patients with CP there are reports of dissatisfaction with the current treatment in two thirds of the affected patients and the persistence of CP for years<sup>7</sup>, bringing to light the fundamental importance of the search for more efficient analgesic therapeutic strategies and the implementation of longitudinal and continuous therapeutic interventions.

The present study described the findings of a population with CP and multimorbidity composed mostly of hypertensive, overweight women and with a high number of painful areas, a scenario that interferes with the affectivity and life activity of these individuals.

## CONCLUSION

A continuous effort is needed to study, identify, and understand the multiple factors involved in chronic and diffuse MSP and multimorbidity in order to provide better interventions for these patients. A focus on approaching the complexity of multimorbidity, including the management of the intensity of the most important pain, improvement of functional capacity, and using strategies to minimize risk of falls, is critical.

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## AUTHORS' CONTRIBUTIONS

### Ana Francisca Ferreira

Data Collection, Conceptualization, Project Management, Research, Methodology, Writing - Preparation of the original, Writing - Review and Editing, Supervision, Visualization

### Jesús Enrique Patiño Escarcina

Statistical analysis, Conceptualization, Methodology, Writing - Review and Editing

**Dryle Teles C. Luz**

Data Collection, Research

**Ruan Barbosa Souza**

Data Collection, Research

**Eduardo Martins Netto**

Statistical analysis, Conceptualization, Resource Management, Project Management, Methodology, Writing - Review and Editing

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