

# Association of chronic pain with strength, levels of stress, sleep and quality of life in women over 50 years

*Associação de dor crônica com força, níveis de estresse, sono e qualidade de vida em mulheres acima de 50 anos*

*Asociación de dolor crónico con fuerza, niveles de estrés, sueño y calidad de vida en mujeres mayores de 50 años*

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**ABSTRACT** | The literature presents the need for investigations related to the chronic osteoarticular pains of older adults, which are more prevalent in women, since they negatively influence biopsychosocial parameters. To understand the relationship between pain dimensions and health parameters of these individuals is necessary for a better preventive and therapeutic approach. This study aims to identify associations between levels of chronic pain and levels of strength, quality of life, stress and sleep in women. Participants were recruited from a physical education program for older adults, aged between 50 and 70 years. Pain was assessed using a multidimensional instrument on pain parameters. Global cognitive status, physical activity level, quality of life, stress and sleep were also assessed. The muscular strength of the participants was analyzed using the sit up test and the elbow flexion and extension test. The participants were 56 women, mean age 63.7±7.7 years, and 28.7±4.7 kg/m<sup>2</sup> body mass index (BMI). Most participants reported feeling pain (89.2%), 21.4% reported lower limb pain, and 67.8% reported experiencing upper limb pain. The sensory dimension of pain was associated with stress, but not with the other variables, which were not related to any aspects of pain. In addition, there may be an influence of age in the interpretation of evaluative pain.

**Keywords** | Pain; Elderly; Chronic Disease; Physical Activity; Quality of Life.

**RESUMO** | A literatura apresenta a necessidade de investigar as dores osteoarticulares crônicas em idosos, uma vez que essas influenciam negativamente parâmetros biopsicossociais. Entender a relação entre as dimensões da dor e parâmetros de saúde dos indivíduos acometidos é necessário para melhor abordagem preventiva e terapêutica. Este trabalho tem o objetivo de identificar relações entre níveis de dores crônicas e força, qualidade de vida, estresse e sono em mulheres (as mais acometidas pelas dores osteoarticulares crônicas). Foram recrutadas participantes de um programa de educação física para idosos, com idade entre 50 e 70 anos. A dor foi avaliada por meio de um instrumento multidimensional. Foram avaliados também estado cognitivo global, nível de atividade física, qualidade de vida, estresse e sono. A força muscular das participantes foi analisada por meio do teste de sentar e levantar e do teste de flexão e extensão de cotovelo. Participaram 56 mulheres, com média de idade de 63,7±7,7 anos, e 28,7±4,7kg/m<sup>2</sup> de índice de massa corporal (IMC). A maior parte das participantes relatou sentir dor (89,2%); 21,4% relataram dor nos membros inferiores e 67,8%

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relataram dor nos membros superiores. A dimensão sensorial de dor foi associada ao estresse, mas não às demais variáveis, que não se relacionaram a nenhum dos aspectos da dor. Além disso, pode haver influência da idade na interpretação da dor avaliativa.

**Descritores** | Dor; Idoso; Doença Crônica; Atividade Física; Qualidade de Vida.

**RESUMEN** | La literatura presenta la necesidad de investigar los dolores osteoarticulares crónicos en ancianos, ya que estos dolores influyen negativamente parámetros biopsicosociales. Entender la relación entre las dimensiones del dolor y los parámetros de salud de los individuos afectados es necesario para un mejor enfoque preventivo y terapéutico. Este trabajo tiene el objetivo de identificar relaciones entre niveles de dolores crónicos y fuerza, calidad de vida, estrés y sueño en mujeres (las más acometidas por los dolores osteoarticulares crónicos). Se reclutaron participantes

de un programa de educación física para ancianos, con edad entre 50 y 70 años. El dolor fue evaluado por medio de un instrumento multidimensional. Se evaluaron también el estado cognitivo global, el nivel de actividad física, la calidad de vida, el estrés y el sueño de las participantes. La fuerza muscular fue analizada por medio de la prueba de sentarse y levantarse y de la prueba de flexo-extensión de codos. Participaron de la investigación 56 mujeres, con media de edad de 63,7±7,7 años, y 28,7±4,7kg/m<sup>2</sup> de índice de masa corporal (IMC). La mayoría de las participantes relató sentir dolor (89,2%); el 21,4% relató dolor en los miembros inferiores y el 67,8% relató dolor en los miembros superiores. La dimensión sensorial del dolor se asoció al estrés, pero no a las demás variables, que no se relacionaron a ninguno de los aspectos del dolor. Además, puede haber influencia de la edad en la interpretación del dolor evaluativo.

**Palabras clave** | Dolor; Ancianos; Enfermedad Crónica; Actividad Física; Calidad de Vida.

## INTRODUCTION

Several Brazilian studies show that middle-aged individuals (40 to 59 years) and those over 60 years present a higher prevalence of chronic pain (varying between 51 and 67%), mainly musculoskeletal pain (14 to 47%)<sup>1-3</sup>. Chronic pain is the main cause of complaints in hospitals and outpatient clinics and a frequent symptom in anamnesis for older adults<sup>4,5</sup>. Approximately 45% to 80% of the older adults institutionalized suffer at least one type of pain, being 61% prevalent for middle-aged individuals, especially women. Moreover, it is estimated that 80 to 85% of individuals over 65 years of age present at least one significant health problem that predisposes them to report pain<sup>3-6</sup>.

Even though it does not appear as a direct indicator of death and dependence, the pain assessed in epidemiological research is related to functional limitations and different sociability and psychological conditions that interfere with quality of life. For the pain treatment, the literature proposes programs with multicomponent exercises to stimulate brain plasticity and help maintain the pain threshold. Among the characteristics of multicomponent programs, the adherence of the female audience predominates<sup>7-9</sup>.

Although the exercise was presented as painful, the mechanisms of association between pain and physical exercise are still not well understood. Even presenting this

painful effect, some studies show an increase in chronic pain in individuals participating in physical education programs, demonstrating the need for additional studies in this context<sup>1,8,10</sup>.

Muscle strength capacity is an important component of physical fitness related to health, besides playing a relevant role for daily physical performance<sup>11,12</sup>. The literature shows that individuals with chronic pain may have a considerable reduction in muscle strength and performance. One study reported that one-third of women diagnosed with chronic pain had reduced muscle strength or reduced flexibility in upper limbs in daily tasks<sup>13</sup>.

Today, the focus of the scientific literature has been on the studies of pain in adults due to the increased prevalence of painful involvement in this age group<sup>11-13</sup>. Studies have shown that chronic pain can affect individuals even before the old age through osteoarticular lesions, for example<sup>12</sup>. Aging in this painful context can lead to reduced quality of life and other health-related measures. Thus, the relationships between pain, behavioral aspects, physical and quality of life in the aging population lack evidence to prevent and treat pain in this age group more efficiently. Currently the literature presents studies with multidimensional scales for the analysis of pain. However, no study has named and distinguished their dimensions in its data interpretation and understanding, which is of

fundamental importance for the understanding of pain<sup>13</sup>, because its qualitative results highlight the influence of its dimensions on the painful experience, allowing better treatment to the public more affected by the pain, especially middle-aged women. Given this context, our study aims to verify the relationship of levels of chronic pain with levels of strength, quality of life, stress and sleep of women over 50 years of age participating in a physical education program.

## METHODOLOGY

The participants in the study initially signed the Informed Consent Form after having all the doubts answered by the responsible researcher. This project was submitted and approved by the Ethics Committee of Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto of Universidade de São Paulo (CAAE 24579513.4.0000.5407, ReBEC: RBR-8hqwmx).

### Sample

To analyze the association between pain, strength, quality of life, stress and sleep in the middle-aged and older population, a cross-sectional descriptive methodological study was carried out, assessing a convenience sample of 56 middle-aged women and older women, Brazilian, participants in the Physical Education Program for Older Adults (Pefi). To characterize the sample, we used the following instruments: Mini Mental State Examination (MMSE)<sup>14</sup>, Brazilian Economic Classification Criterion<sup>15</sup>, body mass<sup>16</sup>, height<sup>16</sup>, waist circumference<sup>16</sup>, age and years of studies<sup>16</sup>. The inclusion criteria were: to be female, to be over 50 years old and to be a participant in Pefi. Exclusion criteria were to present acute pain, classified with less than six months<sup>2</sup>, and/or to present cognitive alterations evaluated by MMSE<sup>14</sup>.

### Evaluation instruments

To apply the tests and evaluations it was necessary to divide the procedures into three steps, carried out in three days. On the first day, participants were submitted to motor tests. On the second day, the health assessment instruments were answered by the participants, ending with the application of the MMSE by a trained researcher. Each assessment day lasted approximately

40 minutes. The final step consisted of presenting and responding to the pain questionnaire. For the application of this questionnaire, the participants were called in pairs for better explanation and help, if necessary. The McGill Pain Questionnaire was answered for each pain the women felt, if there were five painful regions, five questionnaires were answered. For this reason, the application of the questionnaire ranged from three to ten minutes.

For the pain assessment, we used the Brazilian version of the McGill Pain Questionnaire (Br-MPQ)<sup>17</sup>, adapted and validated for the Portuguese language by Pimenta and Teixeira<sup>17</sup>. Quality of life was measured using the Quality of Life Questionnaire (SF-36), which was prepared by Ware and Sherbourne in 1992, validated and translated into Portuguese by Ciconelli et al.<sup>18</sup>.

The muscular strength capacity was analyzed through the sitting-rising test for lower limb strength, which should be performed in a backrest chair without lateral support. In the elbow flexion and extension test for upper limb strength, the person should be seated and perform the movement with their dominant limb with a 2.27 kg halter. Both tests consist of performing as many repetitions as possible for 30 seconds<sup>19</sup>.

In order to analyze the health parameters, a sociodemographic and clinical questionnaire was used, as well as the International Physical Activity Questionnaire (IPAQ), short version<sup>20</sup>. In order to evaluate the stress, the Stress Symptom Inventory, validated by Lipp and Guevara<sup>21</sup> and standardized by Lipp, in 2000, was applied. Sleep disturbances were assessed using the Epworth Daytime Sleepiness Scale<sup>22</sup>.

### Statistical analysis

Data were entered in an Excel program and processed using the SPSS 20.0 program. Analysis of variance and comparison of means (1-way ANOVA and Student's t-test), association analysis (chi-square) and dispersion variables (mean and standard deviation) were performed. The significance level was set at 5%.

## RESULTS

The study included 56 women aged 50 to 70 years. Table 1 shows the sample characteristics. No statistical difference was found between the groups, except for age. Table 1 also shows the characterization of the sample profile.

Table 1. Characterization of the sample profile

	Adults (n=24)	Older adults (n=32)	Total (n=56)
Age (years)	55.9±3.0	64.5±3.4*	62.5±8.7
Years of study (years)	10.2±4.5	10.2±4.7	10.2±4.9
Body mass (kg)	71.2±17.7	71.6±18.4	71.4±17.7
Height (m)	1.56±0.3	1.56±0.4	1.56±0.3
BMI (kg/m <sup>2</sup> )	28.6±4.8	28.9±4.9	28.7±4.8

\*p<0.05 versus Adult women in the Student's t-test; BMI: body mass index.

The participants belonged to classes C1 (38.32%), B1 (36.76%), B2 (20%), C2 (1.74%) and D (3.39%). Regarding the level of physical activity, classified by IPAQ, 21.63% were very active; 15% were active; 6.77% of the participants, irregularly active; 25% irregularly active A; 26.71% irregularly active B; and 5% sedentary. No participant reported having acute pain or presented cognitive performance below the cut-off score<sup>14</sup>.

Most participants reported feeling pain (89.22%). Lower limb pain was reported by 21.43% of women, with the knee being the most mentioned structure. Upper limb pain was reported by 67.87% of the participants, and the shoulder was the most commonly reported region. Regarding pain intensity, 8.79% said it was severe,

9.91% said very severe, 21.97% said moderate, 26.37% reported mild pain, and 32.96% reported almost no pain. As to the classification of pain, there was 60.43% evaluative, 17.58% sensory, 15.40% miscellaneous and 6.59% affective pain.

For better analysis of the pain, the parameters of prevalence of pain dimension and pain index score, measured by the McGill instrument, were analyzed with strength tests and clinical instruments. For this comparison, the one-way ANOVA comparison test was performed. Understanding that the age of the participants could be a considerable factor for the report of pain, the Chi-square test was performed in order to analyze the association between the age of the participants (adult and older adult) and pain parameters.

Table 2 shows the comparisons of means of health assessment instruments in painful dimensions. Differences were found between the means of the groups in two levels of stress in relation to the classifications of prevalence of the pain dimension. The means of the items reported in relation to stress symptoms were higher in the group that reported sensory pain than in the group with evaluative pain. Regarding the intensity of pain, as shown by the pain index score, no statistically significant results were found (Table 3).

Table 2. Comparison of means of health assessment instruments in painful dimensions, by one-way ANOVA

	Painful dimensions (mean±standard deviation)			
	Evaluative pain	Sensory pain	Miscellaneous pain	Affective pain
EFE (no. rpts)	18.0±4.6	16.5±3.4	16.6±5.8	22.6±5.8
SRT (no. rpts)	15.2±4.5	13.3±4.6	13.3±3.0	19.3±5.5
PD (points)	59.5±9.9	63.5±9.8	62.4±8.3	53.0±10.2
MD (points)	54.4±10.7	53.9±11.0	55.6±15.3	55.3±12.0
Sleep (points)	7.3±5.8	7.3±4.8	7.6±5.5	8.3±4.0
Stress 1 to 15 (items checked)	1.9±2.0	2.1±1.5	3.6±1.1	1.0±1.0
Stress 16 to 30 (items checked)	1.6±1.5	4.2±3.4*	2.3±1.1	0.3±0.5'
Stress 31 to 53 (items checked)	1.4±1.4	3.2±2.4*	2.6±1.5	0.3±0.5

\*p<0.05 in Tukey post-hoc versus evaluative pain; 'p<0.05 in Tukey post-hoc versus sensory pain; EFE: elbow flexion and extension; SRT: sitting-rising test; PD: physical domain of SF-36; MD: mental domain of SF-36; Sleep: Epworth Daytime Sleepiness Scale; Stress: Stress Symptom Inventory.

Table 3. Comparison of means of health assessment instruments in pain intensities according to the pain index score, by one-way ANOVA

	Pain Index Score (mean±standard deviation)			
	Absence of pain	Mild pain	Moderate pain	Severe pain
EFE (no. rpts)	18.3±4.4	16.7±3.3	17.2±4.2	23.5±3.5
SRT (no. rpts)	15.2±4.4	13.9±4.7	14.1±4.4	22.5±0.7
PD (points)	58.8±9.8	62.9±9.4	61.5±9.7	53.8±14.4
MD (points)	54.4±11.2	52.6±9.1	55.2±12.6	62.2±1.0
Sleep (points)	6.8±5.8	7.5±5.4	9.2±4.5	6.5±3.5
Stress 1 to 15 (items checked)	2.1±2.1	1.8±1.2	2.2±1.7	0.5±0.7
Stress 16 to 30 (items checked)	1.7±1.5	3.3±3.5	1.7±1.3	0.0±0.0
Stress 31 to 53 (items checked)	1.6±1.5	2.5±2.5	1.6±1.2	0.0±0.0

EFE: elbow flexion and extension; SRT: sitting-rising test; PD: physical domain of SF-36; MD: mental domain of SF-36; Sleep: Epworth Daytime Sleepiness Scale; Stress: Stress Symptom Inventory.

In Tables 4 and 5, the comparison between women aged 50 to 59 years and those aged 60 years or older indicates that, for the most part, adults and older adults reported evaluative pain and absence of pain in the assessment of intensity. An interesting finding from Table 4 is that, although the number of women was not the same in both groups, the older women reported evaluative pain 10% more than the adults – datum without statistical significance but that may confer clinical relevance to this result. No statistically significant result was found for the chi-square.

Table 4. Cross-reference table between age and painful dimensions by chi-square, adjusted by the Monte Carlo method

	50 to 59 years (n)	60 years or over (n)	p-value
Evaluative pain	14	21	0.256
Sensory pain	6	3	
Miscellaneous pain	0	3	
Affective pain	1	2	

Table 5. Cross-reference between age and pain intensity score by chi-square, adjusted by the Monte Carlo method

	50 to 59 years (n)	60 years or over (n)	p-value
Absence of pain	10	18	0.272
Mild pain	7	4	
Moderate pain	4	5	
Severe pain	0	2	

## DISCUSSION

Chronic pain is a difficult symptom to assess because it is a subjective experience and because it is influenced by several environmental, emotional, behavioral and social factors, as observed in the pain dimensions of the results<sup>11,12</sup>.

One factor that could have influenced the perception of pain is the sequence of application of tests performed in the study, since the physical tests were performed before the assessment of the pain perception. The participants had already performed physical exercises for at least three months and performed the same sequence of tests and evaluations, being exposed to the same influences and physiological conditions. Participants did not report the onset of any type of pain, other than the one felt before the battery of physical tests when addressed in the application of the pain questionnaire.

In this article, the relationship between pain and stress level was found and, in the comparison between different age groups, we observed that, in both groups (adults and older adults), most women reported evaluative pain, which may have been influenced by the decrease in the cognitive reserve, resulting in an interference with the reports of pain. Regarding strength, quality of life and sleep tests, no statistically significant data were found.

This article was composed of middle-aged and older women, and we observed that age may have an influence on the moment of the interpretation of the pain by the individual (Table 4). Muñoz et al.<sup>23</sup> reported that the clinical manifestations of pain in old age are different from those commonly observed in younger patients. This observation corroborates previous reports that indicate that aging individuals appear to be less sensitive to painful stimuli in the sensory dimension, because the old age reduces pain in all areas, except for the joints<sup>24</sup>.

According to Busse<sup>25</sup>, as age advances, the functionality of a diversity of specialized sensory receptors is reduced. Unipolar neuron terminations alter their electrophysiological activity, leading to less



painful stimulation. Even with this change, sensitivity is more prevalent in older adults, because their thresholds are reduced. Pain, in turn, is associated with less body movement, which contributes to further decrease its sensory and functional capacity to perform activities of daily living. However, this variability in older adults, when compared with that of an adult, should not be attributed only to age<sup>25</sup>. According to the same author, the stimulus-response reaction is reduced in the aging process, with nociceptive attenuation and an association with reduced cognitive capacity.

Although the participants in this study showed adequate cognitive performance, the cognitive-evaluative dimension was presented in Table 3 as the one with the highest prevalence among the age groups. This dimension allows the individuals to evaluate their behaviors and experiences based on previous experiences with similar current situations<sup>26</sup>. The main cognitive components evaluated in this dimension are memory, attention, thought, decision and reasoning, which are also presented as the first aspects to be reduced with the presence of chronic pain, thus collaborating to the inefficiency in the individual's motor performance<sup>25</sup>.

This diversity of pain perception is evident in older individuals, with persistent pain due to the variety of physical, psychological and social states found in some patients<sup>24</sup>. This diversity in the perception of pain is due to the individual's knowledge of the psychosocial and environmental factors that surround them and in relation to what they are experiencing, considering their beliefs, thoughts and attitudes towards this unhealthy state in old age<sup>26</sup>.

The study by Santos et al.<sup>27</sup> showed that the older population may overestimate the pain sensation, exceeding the description of pain intensity, especially when it involves some decline in cognitive function, or when measured by a one-dimensional scale, which justifies the use of Br-MPQ. Older people mistakenly believe that this painful symptom is a component of the aging process<sup>27-28</sup>. In this study, we can observe that individuals with high performance in tests of upper and lower limb strength show high levels of pain intensity. This result, even without presenting a statistically significant difference, is interesting and clinically relevant, requiring thus future investigations. The study by Corrêa et al.<sup>28</sup> also found that cognitive variables related to behaviors and emotions are more associated with the modulation of the intensity of exacerbated chronic pain than sensory

factors. Thus, different cognitive levels contribute to the levels of suffering associated with chronic pain.

In the study by Celich and Galon<sup>1</sup>, the prevalence of shoulder pain related to the reduction in strength in this joint structure was observed. In addition, the increase in pain in older adults is associated with the self-perception of strength reduction, showing that cognitive factors have an influence and the importance of pain assessment through multidimensional scales<sup>28</sup>.

The study by Lima et al.<sup>29</sup> indicates a dissociation between the reduction in pain tolerance threshold and sarcopenia, since the capacity to generate muscle strength does not affect the pain perception. However, when there is a decrease in the self-perception of strength, there is a reduction in the pain threshold, which can be exacerbated by psychological factors. It is noteworthy that studies show that this sensitivity occurs in parallel to the reduction in muscle strength<sup>1,3,24</sup>; however, in this study, it was not possible to observe such behavior in the study sample.

One of the main findings of this study was the difference in stress levels in the report of sensory and evaluative pain in items 16 to 30 (most of the symptoms related to physical stress) and in items 31 to 53 (double of items of symptoms related to psychological stress) of the Stress Symptom Inventory. This indicates that sensory pain, through pain receptors, can modulate stress levels<sup>17,23</sup>.

It is important to emphasize that the increase in pain intensity must be considered as a very severe symptom to be analyzed in the health care of people in the aging process and in the planning of actions aimed at the well-being of this population. This type of investigation becomes important as it helps in the recognition of pain by health professionals, collaborating with effective ways of evaluating it and, subsequently, solving it. For the next studies, a longitudinal methodological approach is suggested in order to identify the effect of physical exercise on pain, quality of life, stress, sleep and upper and lower limb strength.

This study shows important limitations regarding the lack of information on the use of analgesic and muscle relaxation medications at the moment of the assessment. Also, more sophisticated instruments for pain analysis, such as algometry, were not used, which would yield objective results in relation to sensitive pain.

Another limiting factor was the application of the pain perception test soon after the physical tests, reducing the control of the influence of muscle damages in the participants.

## CONCLUSION

An association between stress and the sensory dimension of chronic pain was found in women over 50 years of age participating in a physical education program. No statistically significant associations of chronic pain with health parameters of quality of life, sleep and muscle strength were found.

This study showed that Br-MPQ is an instrument that presents easy applicability and comprehension for the sample studied. In addition, the instrument was able to verify that pain and stress are related to each other for the determination of pain perception. Pain, being the fifth vital sign, needs to be seen as a disease and not just as a symptom, since it can be influenced and interfere in different aspects of the individual's life, as already presented in the literature<sup>1,7,23</sup>.

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