

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

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

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### ABSTRACT

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

**METHODS:** A cross-sectional, population-based study was carried out at long-term care facilities in Passo Fundo/RS (2016-2018). The population was composed of 281 residents, evaluated for sociodemographic variables (medical records), handgrip strength (manual dynamometry), and chronic pain (self-report). The statistical analysis used the descriptive statistics and the Student t-test of independent samples ( $p \leq 0.05$ ).

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

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

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

### RESUMO

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

**MÉTODOS:** Estudo transversal de base populacional, realizado em instituições de longa permanência de Passo Fundo/RS (2016-2018). A população foi composta por 281 residentes, avaliados quanto às variáveis sociodemográficas (registros médicos), a força de preensão manual (dinamometria manual) e a dor crônica (autorrelato). A análise estatística utilizou a estatística descritiva e o teste *t* Student de amostras independentes ( $p \leq 0,05$ ).

**RESULTADOS:** A amostra foi composta por 173 idosos (80,95±8,94 anos). A maioria residia em instituições privadas, eram mulheres, viúvas e com escolaridade de 1 a 8 anos. A prevalência de dor crônica foi de 39,3% e a força de preensão manual média foi de 7,0±6,42kg (mão direita) e 6,24±5,96kg (mão esquerda). A força de preensão manual foi maior nos grupos dos idosos do sexo masculino (mãos direita e esquerda:  $p=0,000$ ) e dos idosos não longevos (mão direita  $p=0,017$ ; mão esquerda  $p=0,002$ ). Não houve diferença nos valores de força de preensão manual entre os grupos com e sem dor crônica ( $p>0,05$ ).

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

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

### INTRODUCTION

Individuals aged 65 and over in developed countries and over 60 in underdeveloped or developing countries are considered elderly<sup>1</sup>. In Brazil, estimates indicate that by 2025, the elderly population could reach 32 million people<sup>2</sup>. With human aging, a

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series of physiological insufficiencies and changes in cellular, tissue, and systemic activity occur. Thus, the elderly has changes in the neuromuscular system, reduced muscle mass, and strength, flexibility, resistance, joint mobility, coordination, and balance<sup>3</sup>. The elderly is the group of individuals who suffer major consequences from chronic musculoskeletal pain, a condition that affects 100 million people worldwide. Pain is one of the main factors that impact the quality of life (QoL), productivity<sup>4</sup>, and functionality, especially in the elderly<sup>5</sup>.

Such complications resulting from the senescence process are significant and interfere with the functionality and performance of activities of daily living<sup>6</sup>. In this sense, the hands, which are complex structures with particular functions, such as the handgrip strength (HGS), and fundamental to effectively perform activities of daily living (ADL)<sup>7</sup>, physiologically present growth in their values of grip strength until the third decade of life, which after that has declined<sup>8</sup>. In addition, individuals with pathological conditions that cause pain present even more impaired values<sup>7,9</sup>. In this sense, it can be assumed that institutionalized elderly, who may have decreased HGS due to pain, are more susceptible to falls, difficulty performing ADL, impact on their functionality and mobility, and even the higher risk of mortality. The literature has already presented the values of the HGS and its relationship with chronic pain in community elderly<sup>10</sup>. However, few studies explore this relationship in institutionalized elderly, which becomes a problem, as this population has worse physical and cognitive conditions than their peers in the community, which may interfere with their health status<sup>11</sup>. Knowing the prevalence of chronic pain and HGS values in residents of long-term care facilities for the elderly (LTCF) is fundamental for understanding the health profile of this population, as well as for outlining health promotion strategies and QoL in this context, and contribute to the implementation of public policies in the care of these elderly. Thus, this study aimed to verify the prevalence of chronic pain and to analyze the HGS in institutionalized elderly.

## METHODS

A population-based, descriptive and exploratory cross-sectional study that is part of a project entitled "Patterns of Aging and Longevity: Biological, Educational and Psychosocial Aspects of Institutionalized Elderly" (PROCAD) developed by the Graduate Program in Human Aging from the University of Passo Fundo. The study was conducted in Passo Fundo/RS, one of the most populated cities in the state, characterized as an important regional health and education hub. In addition, the municipality has 24 LTCF that house about 450 elderly people<sup>12</sup>.

The sample calculation was performed using the formula " $n = Z^2 \cdot p \cdot (1-p) / e^2$ ", where the letter "n" corresponds to the desired sample size; the letter "Z" corresponds to the deviation of the acceptable average value to reach the desired confidence level (adopting the most commonly used value for this type of calculation: 1.96), the letter "p" corresponds to the expected proportion (adopted the value of 58.1%, taking into consideration the findings of Barbosa et al.<sup>13</sup> and the letter "e" corresponds to the

admitted margin of error (adopting the most commonly used value for this type of calculation: 0.05). Thus, the sample size needed to meet the aim of this study would be approximately 374 individuals.

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

The data collection period was between December 2016, and July 2018. The data collection procedure and the elaboration of the data collection instrument has already been described<sup>12</sup>. Sociodemographic and health data were included in a questionnaire prepared by the authors themselves, which recorded the type of LTCF, gender, age, marital status, education, and the presence of chronic pain.

The MPF was assessed by manual dynamometry using a Kratos<sup>®</sup> device. This instrument measures the handgrip strength produced through an isometric contraction recorded in kilograms(kg)<sup>8</sup>. In this study, the recommendations of the American Society of Hand Therapists were used, where the individual should be seated, with the shoulder adducted, elbow flexed at 90°, neutral forearm and wrist with 30° extension. Three attempts were made, and then the arithmetic mean calculated<sup>14</sup>.

This study was approved by the UPF Human Research Ethics Committee under opinion number 2.097.278. The study is in accordance with the guidelines of National Health Council Resolution 466/2012, which deals with regulatory standards and ethical aspects of research involving human beings, and the Declaration of Helsinki.

## Statistical analysis

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

## RESULTS

The study population consisted of 281 elderly residents in LTCF in the city of Passo Fundo/RS. Based on the inclusion and exclusion criteria, the sample involved 173 institutionalized elderly, with a mean age of  $80.95 \pm 8.94$  years old (60-100). 108 institutionalized elderly (16 elderly did not answer about the presence or absence of chronic pain, and 92 elderly could not perform the manual dynamometry test) were excluded, totaling a sample loss of approximately 38%. Table 1 presents the data regarding the characterization of the sample studied.

Most of the elderly lived in private LTCF, were long-lived, widows with education from 1 to 8 years of study. The prevalence

**Table 1.** Characterization of the sample. Passo Fundo/RS, 2019

Variables	n	%
<b>LTCF type</b>		
Private	94	54.3
Philanthropic	79	45.7
<b>Gender</b>		
Male	50	28.9
Female	123	71.1
<b>Age group</b>		
Non-long lived	66	38.2
Long-lived	107	61.8
<b>Marital status</b>		
Married	06	3.5
Single	36	20.8
Divorced	30	17.3
Widower	101	58.4
<b>Education</b>		
Illiterate	30	17.3
1 to 8 years	118	68.2
9 years or more	22	12.7
Did not answer	03	1.7
<b>Chronic pain</b>		
Yes	68	39.3
No	105	60.7

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

of chronic pain was 39.3%, and the mean HGS was 7.0±6.42 (0-30.0) kg in the right hand and 6.24±5.96 (0-27.0) kg in the left hand. Table 2 presents the relationship between the HGS and the dependent variables chronic pain, gender, and age group of institutionalized elderly.

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

**DISCUSSION**

The institutionalized elderly presented very low HGS values compared to the reference values for this age group, which are 30.0kg for men and 20.0kg for women<sup>15</sup>. The prevalence of chronic pain was also low in the study sample compared to other studies conducted in the same context<sup>13,16</sup>. Still, there was no relationship between the HGS and chronic pain, but between the HGS and the factors gender and age.

In this study, it was found that the profile of the institutionalized elderly consisted predominantly of private residents of LTCF, women, long-lived, widows and with education from 1 to 8 years<sup>12</sup> and that are in agreement with other studies<sup>11,17,18</sup>.

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

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

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

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

HGS	Variables		CI	p-value
	With chronic pain	Without chronic pain		
Right hand	7.04±7.06kg	6.97±6.01kg	-1.91 – 2.04	0.948
Left hand	6.85±6.95kg	5.85±5.21kg	-0.83 – 2.85	0.283
	Men	Women		
Right hand	10.99±8.07kg	5.37±4.77kg	3.66 – 7.57	0.000*
Left hand	10.20±7.29kg	4.63±4.43kg	3.77 – 7.36	0.000*
	Long-lived	Non-long-lived		
Right hand	6.09±5.72kg	8.47±7.21kg	-4.33 – -0.42	0.017*
Left hand	5.16±5.28kg	7.99±6.95kg	-4.61 – -1.02	0.002*

HGS = handgrip strength; CI = confidence interval; \* p<0.05.

ment of HGS in this population and the design of public policies for this population.

The results presented in this study on the relationship between HGS and gender (higher in men) and the relationship between HGS and age (higher in non-long-lived elderly), corroborate a recent study with 114 individuals in different age groups, which showed HGS was higher in males, and the peak was in the 30-39 age group, with decline thereafter. In addition, the prevalence of chronic pain and chronic diseases was higher among the elderly compared to the younger ones<sup>8</sup>, reinforcing the importance of investigating the relationship between HGS with variables that may influence it, such as chronic pain.

Among the various factors that may influence the values of HGS, chronic pain can be cited<sup>8</sup>, because, during static contraction, the activity of the aching muscle decreases and other muscles are used in a compensated way to perform the desired movements, increasing the individual's pain<sup>27,28</sup>. Thus, it is believed that the loss of muscle strength, including the hands, may be related to this cycle. However, to confirm this hypothesis, further studies with this aim are needed.

In this sense, a study analyzed the HGS of the elderly with and without chronic upper limb pain. The authors assessed 119 elderly from the community and found that the overall HGS was 16.6kg (right hand) and 15.2kg (left hand). When comparing the groups, they found that the right hand HGS was 14.7kg (group with chronic pain) and 15.2kg (group without chronic pain), and the left hand was 14.0kg (group with chronic pain) and 13.5kg (group without chronic pain)<sup>10</sup>. Such values are much higher than those found in this research.

This work showed that, regardless of having chronic pain or not, older men presented higher HGS than women in all measurements, except in the left-hand HGS, and only in the left-hand measurement of the women group there was a significant difference in the values of HGS among individuals with and without chronic pain<sup>10</sup>. These findings corroborate the current study, as it was found that men had higher HGS values than women, and there was no relationship between HGS and chronic pain in institutionalized elderly.

The institutionalized elderly has worse health conditions than their peers in the community, especially cognitive and functional<sup>11</sup>. This may justify the reason why the institutionalized elderly presented very low HGS values compared to other studies already presented, performed with community elderly<sup>10,26</sup>. This finding is reinforced by another study that assessed 71 elderly (42 community residents and 29 residents in LTCF) and showed that the institutionalized elderly had lower HGS values than the community elderly<sup>29</sup>.

This study is not free to present limitations. As this was a large research, a large team was needed to perform data collection, and several interviewers were required to apply the sociodemographic questionnaire and the manual dynamometry test. To minimize possible biases, they were previously trained and oriented, as explained in the "methods" section in another published study<sup>12</sup>. In addition, the lower than expected number for the sample size and the non-differentiation of individuals by diseases or causes

of chronic pain were factors that could influence the results obtained, but do not prevent data generation, encouraging future research on this subject.

## CONCLUSION

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

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