

## HANDGRIP STRENGTH AND THE FEAR OF FALLING IN ELDERLY

Força de preensão palmar em idosos e o medo de cair

Fuerza de agarre de la mano en los ancianos y el miedo a caerse

*Ana Júlia de Souza Garcia<sup>1</sup>, Isabella Ue Toy<sup>2</sup>, Patrícia Nascimento Peres<sup>3</sup>, Marcelo Picinin Bernuci<sup>4</sup>, Mirian Ueda Yamaguchi<sup>5</sup>***How to cite this article:**Garcia AJS, Toy IU, Peres PN, Bernuci MP, Yamaguchi MU. Handgrip strength and the fear of falling in elderly. 2021 jan/dez; 13:581-587. DOI: <http://dx.doi.org/0.9789/2175-5361.rpcfo.v13.9325>.**ABSTRACT**

**Objective:** Verify the relation between handgrip strength, fear of falling, and sociodemographic and anthropometric data in 60+ years old people. **Methods:** It's a study with transversal quantitative approach done in public places of Maringá-PR. Sociodemographic information and anthropometric data (were obtained, followed by filling of the instrument "Falling Efficiency Scale – International" (FES – I Brazil). The handgrip strength (FPP) was obtained by digital manual dynamometer (T.K.K. 5401 Grip-D, Takey<sup>®</sup>, Smedley; Tokyo, Japan). **Results:** Among 258 individuals that were part of this research, the majority were women. 64 percent of the interviewed are very concerned about falling, even though about 60 percent of the interviewed has a regular FPP. **Conclusion:** The handgrip strength test may not be a good predictor of overall muscle strength in the high elderly, and the fear of falling, for being a subjective measure, is not related with the muscular capacity to avoid falls.

**DESCRIPTORS:** Aged; Accidental falls; Health promotion, Quality of life; Risk factors.**RESUMO**

**Objetivo:** Verificar a relação entre a força de preensão palmar, o medo de quedas, e dados sociodemográficos e antropométricos entre indivíduos com 60 anos ou mais. **Método:** Trata-se de um estudo de abordagem quantitativa do tipo transversal realizado no município de Maringá – Paraná. Foram obtidos dados sociodemográficos e antropométricos, seguido pelo preenchimento do instrumento "Escala de Eficácia de Quedas – Internacional" (FES – I Brasil). A força de preensão palmar (FPP) foi determinada com dinamômetro manual digital (T.K.K. 5401 Grip-D, Takey<sup>®</sup>, Smedley; Tokyo, Japan). **Resultados:** Dentre os 258 indivíduos que participaram da pesquisa, a maior parte (66,28%) eram mulheres. 64% dos entrevistados mostrou grande preocupação em cair, apesar de aproximadamente 60% dos entrevistados apresentar FPP normal. **Conclusão:** Para os idosos hígidos a força de preensão palmar não influenciou no medo de cair, por ser uma medida subjetiva, não se relaciona com a capacidade muscular global para evitar quedas.

**DESCRIPTORIOS:** Idosos; Acidentes por quedas; Promoção da saúde; Qualidade de vida; Fatores de risco.

- 1 Academic Student of Medicine, Centro Universitário de Maringá - UNICESUMAR, Maringá-PR-Brazil.
- 2 Academic of the Medicine Course, Centro Universitário de Maringá - UNICESUMAR, Maringá-PR-Brazil.
- 3 Master, Professor of Physiotherapy, Centro Universitário de Maringá - UNICESUMAR, Maringá-PR-Brazil.
- 4 PhD, Professor of the Post-Graduation Program in Health Promotion of UNICESUMAR and Researcher of the Cesumar Institute of Science, Technology and Innovation - ICETI, Maringá-PR-Brazil.
- 5 Cesumar Institute of Science, Technology and Innovation - ICETI and Postgraduate Program in Health Promotion of the University Center of Maringá - UniCesumar

## RESUMEN

**Objetivo:** Verificar la relación entre la fuerza de agarre de la mano, el miedo a caerse y los datos sociodemográficos y antropométricos entre las personas de 60 años o más. **Método:** Este es un estudio cuantitativo de enfoque transversal realizado en Maringá - Paraná. Se obtuvieron datos sociodemográficos y antropométricos, seguidos de completar el instrumento "Escala de efectividad de caídas - Internacional" (FES - I Brasil). La fuerza de prensión manual (FPP) se determinó con un dinamómetro manual digital (T.K.K.5401 Grip-D, Takey®, Smedley; Tokio, Japón). **Resultados:** Entre las 258 personas que participaron en la encuesta, la mayoría (66,28%) eran mujeres. 64% de los encuestados mostró una gran preocupación por las caídas, aunque aproximadamente 60% de los encuestados tenían FPP normal. **Conclusión:** Para los ancianos sanos, la fuerza de agarre de la mano no influyó en el miedo a caerse, ya que es una medida subjetiva, no está relacionada con la capacidad muscular general para evitar caídas.

**DESCRIPTORES:** Ancianos; Accidentes por caídas; Promoción de la salud; Calidad de vida; Factores de riesgo.

## INTRODUCTION

The World Health Organization (WHO) defines as elderly the population aged 65 and over, and, supported by the world standard of aging, points to the need to focus on actions aimed at healthy aging in order to increase quality of this growing population and reduce health care spending.<sup>1</sup> It is therefore considered that in healthy aging the functional capacities of individuals are maintained, even in the face of the natural process of reducing common physical and mental capacities as they move forward.

About this theme, studies seek to understand elements that can serve as determinants of healthy aging. The incidence of falls is an important indicator with regard to quality and life expectancy among older people.<sup>2-4</sup> It is estimated that over 70% of accidental deaths of people aged 75 and older result from fractures caused by falls,<sup>5</sup> which are considered the sixth leading cause of death in the elderly.<sup>6</sup> This issue has worrying consequences for the elderly, their families and the Unified Health System (SUS), due to the high mortality rate and the high costs of treating comorbidities. associated.<sup>7-8</sup>

In this context, the fear of falling assumes an important meaning in the life of the elderly because it brings the possibility of reduction or restriction of activities of daily living, impairing functional capacity, and, as a result of restriction, resulting in general weakening and dependence, social isolation and Possible institutionalization.<sup>9-11</sup> It is then asked what would be the main elements capable of generating fear of falling in the elderly. From this perspective, changes in handgrip strength, anthropometric, sociodemographic, health conditions, and history of falls could have significance in the genesis of fear of falling, since all are related to frailty in the elderly.<sup>12-14</sup>

Thus, the present study aims to verify the relationship between handgrip strength, fear of falling, and sociodemographic and anthropometric data among

individuals aged 60 years or older. We believe that the data presented here may guide future discussions on the design of more effective strategies for the prevention of falls in the elderly and subsequently ensure the maintenance of functional independence of this population and improvement of quality of life.

## METHODOLOGY

This is a cross-sectional quantitative study conducted in the city of Maringá - PR, in public places such as squares, banks, clubs, markets, fairs, churches, public parks and the University of the Third Age. The experimental protocol was approved by the Ethics Committee and Research with Human Beings, Opinion No. 2,042,910, and all study participants signed the Informed Consent Form (ICF).

The sample was calculated from the total population of elderly residents of the city of Maringá and considering a 5% estimation error and 95% reliability, totaling 258 individuals. Recruitment was performed for convenience during the presence of researchers in public places during busy hours, and immediate assessment of the subjects approached to apply the inclusion and exclusion criteria.

The sample comprised individuals of both sexes, of the same age group and / or above 60 years old, with no history of cognitive impairment or severe and limiting physical disability. The exclusion criteria adopted were: wheelchair users or elderly unable to walk independently, people with severe cognitive impairment and subjects who could not perform or complete the tests.

Anthropometric data (weight, height) were collected using a digital scale and measuring tape, respectively, and the calculation of body mass index (BMI).

Data on fear of falling were collected through the application of the International Falls Effectiveness Scale - I (FES-I), developed by the European Network for Fall Prevention and validated for Brazilian elderly by Camargos et al. (2010).<sup>15</sup> The scale presents questions about the concern about the possibility of falling when performing<sup>16</sup> external activities and social participation, and although it is not a predictive tool for falls, it is an indicator of its possible occurrence.<sup>15</sup> The questions present individual scores from one to three. four, ranging in total from 16 to 64, with up to 16 points lacking concern; up to 32 mild concern; up to 48 moderate concern and up to 64 extreme concern.<sup>5,15</sup> A score greater than or equal to 23 points is associated with sporadic fall, and a rating greater than 31 points with recurrent fall.<sup>15</sup>

Hand grip strength (FPM) data were obtained with the aid of a digital hand-held dynamometer (T.K.K. 5401 Grip-D, Takey®, Smedley; Tokyo, Japan). The study participants were seated in a chair without armrest, with the spine erect, knees flexed at 90°, shoulder in adduction and neutral rotation, elbow flexed at 90°, with forearm in half pronation and wrist in neutral position, can be moved up to 30° in length.

The evaluator held up the dynamometer and the arm held suspended in the air. The test was performed on the dominant hand, repeated three times, with an interval of 30 seconds between measurements, recording the average of the values found and throughout the test the individual received a verbal incentive.<sup>16</sup>

For the analysis of the maximum force performance of the MPF, the reference values were used, according to gender and age range.<sup>17</sup> To verify the association between fear of falling and MPF, anthropometric, sociodemographic data, history of falls and health condition, we used the chi-square test when both variables are nominal qualitative, the ordinal chi-square test when both variables are ordinal qualitative and the Cochran-Armitage test when one variable is ordinal qualitative and the other nominal qualitative, with only two categories. All analyzes were performed with the aid of the R (R Development Core Team) statistical environment, version 3.3.1.

Approval for the research project was issued on May 3, 2017, and has the following protocol number 2,042,910. This research was conducted according to the ethical standards required by the local Research Ethics Committee (CEP).

## RESULTS

Data regarding the sociodemographic characterization of the study participants are presented in Table 1, highlighting that most of the interviewees are female, and the average age is 70.20 years. Data regarding BMI, health conditions, history of falls and fractures of the study participants are presented in Table 2. Most respondents are overweight and have good health (51.9%), and 48.45 % of respondents have a history of falls.

**Tabela 1** - Distribuição de frequências das características sociodemográficas dos participantes do estudo.

Variable	Frequency	%
<b>Gender</b>		
Female	171	66,28%
Male	87	33,72%
<b>Age</b>		
Under 60 years old	7	2,71%
From 60 to 69 years old	120	46,51%
From 70 to 79 years old	103	39,92%
From 80 to 89 years old	28	10,85%
<b>Schooling</b>		
Illiterate	22	8,53%
Middle School	151	58,53%
High School	43	16,67%
College	32	12,40%
Post Graduate	10	3,88%

Variable	Frequency	%
<b>Profession</b>		
Retired	70	27,13%
Homeowner	59	22,87%
Other	123	47,67%
Didn't answer	6	2,33%
<b>Average Income</b>		
Up to 1 wage	73	28,29%
Up to 2 wages	75	29,07%
Over 2 wages	98	37,98%
No income	9	3,49%
Didn't answer	3	1,16%
<b>Family composition</b>		
Lives alone	95	36,82%
Lives with spouse	82	31,78%
Lives with spouse and children	20	7,75%
Lives with spouse, children and grandchildren	12	4,65%
Others	48	18,60%
Didn't answer	1	0,39%

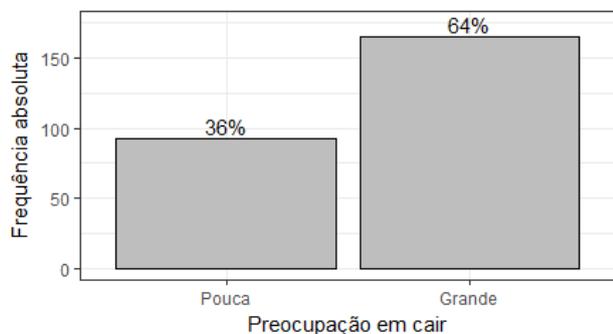
**Table 2** - Distribution of BMI, health condition, history of falls and fractures of the study participants.

Variable	Frequency	%
<b>BMI</b>		
Underweight	20	7,75%
Proper weight	104	40,31%
Overweight	134	51,94%
<b>Health condition</b>		
Bad or very bad	7	2,71%
Regular	76	29,46%
Good	134	51,94%
Excellent	40	15,50%
Didn't answer	1	0,39%
<b>Falling history</b>		
Yes	125	48,45%
No	133	51,55%
<b>Fractures</b>		
Yes	35	28,00%
No	88	70,40%
Didn't answer	2	1,60%

According to the criteria proposed by Delbares for the FES - I Brazil (Falls Effectiveness Scale) score, almost two thirds of the participants (64%) were very concerned about

falling, as shown in Figure 1. The elderly who participated in the study had normal FPM, and in 13.2% the force was considered weak, intermediate FPM in 26.0%, as shown in Figure 2.

**Figure 1** - Frequency distribution of the score obtained on the fall efficacy scale related to the fear of falling of the study participants.



**Figure 2** - Frequency distribution of the manual pressure strength classification of the study participants.

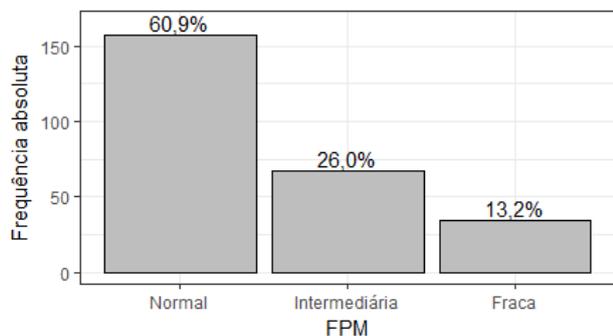


Table 3 presents data regarding associations between fear of falling and FPM, anthropometric, sociodemographic data, history of falls and health condition. It is noted that the classification proposed by Delbares for the FES - I score, related to concern about falling, is significantly associated with gender, history of falls and health condition (p values of 0.0002; 0.0188 and 0, 0003, respectively), and women are more concerned with their history of falls and those who consider their condition to be poor and regular. There is not sufficient sample evidence that BMI classification is significantly associated with FES classification. Moreover, in the present study FPM and age showed no significant association with the fear of falling.

**Table 3** - Frequency distribution and association test results between the FES classification and some characteristics of the study participants.

Variable	FES		Test	
	Little	Large	P value	
<b>FPM</b>			0,098	0,1168
Regular	63	94		
Intermediate	20	47		
Weak	10	24		
<b>IMC</b>			-0,012	0,8528
Underweight	5	15		
Proper weight	41	63		
Overweight	47	87		
<b>Idade</b>			0,006	0,9176
Under 70 years old	47	79		
Between 70 and 79	35	68		
Between 80 and 89	11	17		
<b>Gender</b>			-0,233	0,0002
Female	48	123		
Male	45	42		
<b>Falling history</b>			-0,146	0,0188
Yes	36	89		
No	57	76		
<b>Health condition</b>			-0,223	0,0003
Bad or very bad	1	6		
Regular	18	58		
Good	51	83		
Excellent	22	18		

## DISCUSSION

The results reveal that, contrary to expectations, changes in the Handgrip Strength (FPM) test are not significantly related to concerns about falling, according to the FES classification. This statement can be demonstrated by the fact that although almost two thirds of respondents claimed to be afraid of falling, more than half of the elderly had a normal FPM according to the reference values adopted here.

From the analysis of sociodemographic data, it was found that a significant portion of the elderly interviewed reported

living alone. This is a tendency of people living in urban centers, like this study, when compared to those living in rural areas, and although their families worry about the risk of violence and falls, they respect the elderly person's desire to live themselves and create strategies to achieve this, as they recognize the need to give freedom to these individuals.<sup>18</sup> This greater autonomy has been shown to be beneficial for maintaining the independence of the elderly, as an overly protectionist family that performs activities by the elderly because they do not believe in their capacity as individuals tend to contribute to their functional decline.<sup>19</sup>

There was a predominance of fear of falling in females, which is related to the fact that, with advancing age, there is a marked loss of muscle mass induced by decreased estrogen and androgen production, especially in postmenopausal women, culminating in direct and indirect catabolic actions on the muscles and bones.<sup>20</sup> In addition, women, due to their nature, can better identify their health limitations, so that when compared to men, they use more preventive health services<sup>21</sup>, making them more aware of the risks of falls, including performing housework, as these events often occur indoors.

Another factor associated with the greater fear of falling is having experienced a fall previously, i.e. previous episodes of falls can be considered as a trigger for the emergence of anxiety from a new incident. However, the fear of falling is present regardless of the previous occurrence of the fall itself.<sup>23</sup> Interventions aimed at managing this fear of falling proved to be effective considering the fact that this sensation is influenced not only by physical factors, but also psychological and cognitive.

In line with the information presented above, there is also a greater fear of falls in individuals who consider, from self-perception, the quality of their health below the ideal for a healthy person. This understanding can trigger limitations in the performance of activities of daily living in these people, establishing a state of anxiety for fear of falling, culminating in isolation and decreased social life, and impairing their quality of life.<sup>25</sup>

Moreover, it is important to emphasize that the fear of falling represents a subjective and multicausal sensation, where each of these factors has a significant association with the fear of falling, which should be taken into consideration when promoting actions aimed at reducing them.<sup>26</sup> Another interesting finding is that, external activities involving social interactions are one of the main causes of concern about falling among the elderly in the communities,<sup>15</sup> a situation where the interviews of this study were conducted.

## CONCLUSION

Interventions related to the fear of falling should promote self-confidence for older people so that they feel safe enough to perform their daily tasks independently and assertively,

as they move too cautiously, with shorter steps, greater support and greater support rather than contributing to the stability of ambulation, they tend to make walking more unstable and more at risk of falls.<sup>23</sup>

However, the relationship between the MPF and the general muscular capacity is questioned, and in studies conducted with frail elderly, this test proves to be a quick and low cost alternative to estimate their functional capacity, however, even though the FPM relates to the good condition of the upper limbs, it may be risky to consider this measure in isolation, as the muscles evaluated are not those used to maintain and support body weight.<sup>27</sup>

Among the limitations found in this study, it is noteworthy that the participants were healthy elderly with no history of cognitive impairment or severe and limiting physical disability, unlike the population studied in most studies related to fear of falling, whose Most of the groups were institutionalized and / or considerably health-limited elderly.<sup>28</sup> These usually already have an overall decrease in muscle strength, predisposing them to a higher risk of falls. This difference between studies allows us to highlight the importance of our results, performed with healthy elderly. Moreover, it makes it impossible to compare our study with others of similar intent, given the difference between population samples.

Handgrip strength (PFM) is widely used in research as a predictor of body muscle strength, and therefore an important marker of frailty, potential disability, morbidity and mortality in the elderly, but is useful as part of clinical evaluation of these individuals only, and not as an evaluation method to identify the decline of their health.<sup>29</sup> In view of the results of the present study, it can be inferred that although the FPM test is a practical and simple test, It is not related to the fear of falling and its result cannot be considered as a predictor for higher incidence of falls in healthy elderly.

In addition, isolated analysis of slightly reduced FPM may be a subtle finding for the individual, not setting a factor that interferes with self-perception of their health, and therefore does not increase their concern about falling. Thus, while the FPM test is widely used because it is considered a good indicator of overall strength, 30 other elements should be used to measure overall muscle strength in healthy older adults.

Given the subjective quality of fear, it is inferred that muscle strength alone may not be the only element determining fear of falling in the elderly. Given this, it is suggested that future studies be conducted with healthy elderly in order to obtain a better understanding of this theme, which basically implies two important points: the first related to the index of falls in the context of public health; and the second is related to the quality of life of the elderly, since the fear of falls limits the autonomy of the healthy elderly.

## ACKNOWLEDGMENT

To the Cesumar Institute of Science, Technology and Innovation - ICETI for the granting of research grants.

## REFERENCES

1. Organization WH et al. Ageing and Life Course [internet]. [Acesso em: 04 maio 2018]. Disponível em: <https://www.who.int/ageing/en/>
2. Ciorba A, Bianchini C, Scanelli G, Pala M, Zurlo A, Aimoni C. The impact of dizziness on quality-of-life in the elderly. *Eur Arch Otorhinolaryngol* [Internet] 2016 [Acesso em: 18 outubro 2019];274(3):1245-50. Disponível em: <https://link.springer.com/article/10.1007%2F00405-016-4222-z>
3. Patel D, Ackermann Patel D, Ackermann RJ. Issues in geriatric care: falls. *FP essent* [Internet] 2018 [Acesso em: 17 outubro 2019];468:18-25. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/29714993>
4. Fonseca MA, Matias AGC, Gomes MLF, Matos MA. Impact of lower limb fractures on the quality of life. *Ortop traumatol Rehabil* [Internet] 2019 [Acesso em: 19 outubro 2019];21(1):33-40. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/31019108>
5. Pinheiro NCG, Holanda VCD, Melo LA, Medeiros AKB, Lima KC. Desigualdade no perfil dos idosos institucionalizados na cidade de Natal, Brasil. *Cien Saúde Colet* [Internet] 2016 [Acesso em: 17 outubro 2019];21(11):3399-405. Disponível em: <http://www.scielo.br/pdf/csc/v21n11/1413-8123-csc-21-11-3399.pdf>
6. Oliveira HML, Rodrigues LF, Caruso MFB, Freire NSA. Fisioterapia na prevenção de quedas em idosos: revisão de literatura. *Rev interdisciplin estud exp anim hum (impr)* [Internet] 2017 [Acesso em: 18 outubro 2019];9:43-7. Disponível em: <https://periodicos.ufjf.br/index.php/riec/article/view/24040>
7. Edelmut SVCL, Sorio GN, Sprovieri FAA, Gali JC, Peron SF. Comorbidities, clinical interurrences, and factors associated with mortality in elderly patients admitted for a hip fracture. *Rev bras ortop* [Internet] 2018 [Acesso em: 17 outubro 2019];53(5):543-51. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/30245992>
8. Madeiras JG, Silva ES, Yamaguchi MU, Bertolini SMMG, Costa CKF, Christofel HK, Bernuci MP, Massuda EM. Determinantes socioeconômicos e demográficos na assistência à fratura de fêmur em idosos. *Cien Saúde Colet* [Internet] 2019 [Acesso em: 18 outubro 2019];24(1):97-104. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1413-81232019000100097](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232019000100097)
9. Auais M, Alvarado B, Guerra R, Curcio C, Freeman EE, Ylli A, Guralnik J, Deshpande N. Fear of falling and its association with life-space mobility of older adults: a cross-sectional analysis using data from five international sites. *Age Ageing* [Internet] 2017 [Acesso em: 18 outubro 2019];46(3):459-65. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/28043980>
10. Bjerk M, Brovold T, Skelton DA, Bergland A. Associations between health-related quality of life, physical function and fear of falling in older fallers receiving home care. *BMC Geriatr (Online)* [Internet] 2018 [Acesso em: 27 setembro 2019];18(1). Disponível em: <https://bmgeriatr.biomedcentral.com/articles/10.1186/s12877-018-0945-6>
11. Buker N, Eraslan U, Kitis A, Kiter AE, Akkaya S, Sutcu G. Is quality of life related to risk of falling, fear of falling, and functional status in patients with hip arthroplasty? *Physiother Res Int* [Internet] 2019 [Acesso em: 19 outubro 2019];e1772. Disponível em: <https://onlinelibrary.wiley.com/doi/abs/10.1002/pri.1772>
12. Silveira T, Pegorari MS, Castro SS, Ruas G, Novais-Shimano SG, Patrizzi LJ. Association of falls, fear of falling, handgrip strength and gait speed with frailty levels in the community elderly. *Medicina (Ribeirão Preto Online)* [Internet] 2015 [Acesso em: 17 outubro 2019];48(6):549-56. Disponível em: <http://www.revistas.usp.br/rmrp/article/view/114961>
13. Martin JA, Ramsay J, Hughes C, Peters DM, Edwards MG. Age and Grip Strength Predict Hand Dexterity in Adults. *PLoS ONE* [Internet] 2015 [Acesso em: 18 outubro 2019];10(2): e0117598. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/25689161>
14. Trajkov M, Cuk I, Eminovic F, Kljajic D, Dopsaj M. Relationship between hand grip strength and endurance and postural stability in active and sedentary older women. *J electromyogr kinesiol* [Internet] 2018 [Acesso em: 17 outubro 2019];43:62-7. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/30237133>
15. Camargos FFO, Dias RC, Dias JMD, Freire MTF. Adaptação transcultural e avaliação das propriedades psicométricas da Falls Efficacy Scale - International em idosos Brasileiros (FES-I-BRASIL). *Braz j phys ther (Impr)* [Internet] 2010 [Acesso em: 16 outubro 2019];14(3):237-43. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1413-35552010000300010](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-35552010000300010)
16. Dias JA, Ovando AC, Küllkamp W, Junior NGB. Força de preensão palmar: métodos de avaliação e fatores que influenciam a medida. *Rev bras cineantropom desempenho hum* [Internet] 2010 [Acesso em: 18 outubro 2019];12(3):209-16. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1980-00372010000300011](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1980-00372010000300011)
17. Bohannon RW, Peolsson A, Massy-Westropp N, Desrosiers J, Bear-Lehman J. Reference values for adult grip strength measured with a Jamar dynamometer: a descriptive meta-analysis. *Physiotherapy* [Internet] 2006 [Acesso em: 16 outubro 2019];92(1):11-5. Disponível em: <https://www.sciencedirect.com/science/article/abs/pii/S0031940605000878>
18. Persequino MG, Horta ALM, Ribeiro CA. The family in face of the elderly's reality of living alone. *Rev bras enferm* [Internet] 2017 [Acesso em: 17 outubro 2019];70(2):235-41. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0034-71672017000200235](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672017000200235)
19. Alves RLT, Silva CFM, Pimentel LN, Costa IA, Souza ACS, Coelho LAF. Evaluation of risk factors that contribute to falls among the elderly. *Rev bras geriatr gerontol* [Internet] 2017 [Acesso em: 16 outubro 2019];20(1):56-66. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1809-98232017000100056](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1809-98232017000100056)
20. Li YZ, Zhuang HF, Cai SQ, Lin CK, Wang PW, Yan LS et al. Low grip strength is a Strong risk fator of osteoporosis in postmenopausal women. *Orthop Surg* [Internet] 2018 [Acesso em: 16 outubro 2019];10(1):17-22. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/29430846>
21. Silva SPC, Menandro MCS. As representações sociais da saúde e de seus cuidados para homens e mulheres idosos. *Saúde Soc* [Internet] 2014 [Acesso em: 15 outubro 2019];23(2):626-40. Disponível em: <https://www.scielo.org/pdf/sausoc/2014.v23n2/626-640>
22. Vitorino LM, Teixeira CAB, Vilas Boas EL, Pereira RL, Santos NO, Rozendo CA. Fear of falling in older adults living at home: associated factors. *Rev Esc Enferm USP* [Internet] 2017 [Acesso em: 19 outubro 2019];51:e03215. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/28403369>
23. Cruz DT, Duque RO, Leite ICG. Prevalence of fear of falling, in a sample of elderly adults in the community. *Rev bras geriatr gerontol* [Internet] 2017 [Acesso em: 18 outubro 2019];20(3):309-18. Disponível em: [https://www.researchgate.net/publication/318553310\\_Prevalence\\_of\\_fear\\_of\\_falling\\_in\\_a\\_sample\\_of\\_elderly\\_adults\\_in\\_the\\_community](https://www.researchgate.net/publication/318553310_Prevalence_of_fear_of_falling_in_a_sample_of_elderly_adults_in_the_community)
24. Bittencourt VLL, Graube SL, Stumm EMF, Battisti IDE, Loro MM, Winkelmann ER. Factors associated with the risk of falls in hospitalized adult patients. *Rev Esc Enferm USP* [Internet] 2017 [Acesso em: 18 outubro 2019];51:e03237. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/28746559>
25. Gazibara T, Kurtagic I, Kusic-Tepavcevic D, Nurkovic S, Kovacevic N, Gazibara T, Pekmezovic T. Falls, risk factors and fear of falling among persons older than 65 years of age. *Psychogeriatrics* [Internet] 2017 [Acesso em: 18 outubro 2019];17(4):215-223. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/28130862>
26. Park J-I, Yang J-C, Chung S. Risk Factors Associated with the Fear of Falling in Community-Living Elderly People in Korea: Role of Psychological Factors. *Psychiatry Investig* [Internet] 2017 [Acesso em: 18 outubro 2019];14(6):894-9. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5714736/>
27. Gerales AAR, Oliveira ARM, Albuquerque RB, Carvalho JM, Farinatti PT. The Hand-Grip Forecasts the Functional Performance of Fragile Elder Subjects: a Multiple-Correlation Study. *Rev bras med esporte* [Internet] 2008 [Acesso em: 18 outubro 2019];14(1):12-6. Disponível em: [https://www.researchgate.net/publication/262549119\\_The\\_hand-grip\\_forecasts\\_the\\_functional\\_performance\\_of\\_fragile\\_elder\\_subjects\\_a\\_multiple-correlation\\_study](https://www.researchgate.net/publication/262549119_The_hand-grip_forecasts_the_functional_performance_of_fragile_elder_subjects_a_multiple-correlation_study)
28. Rossetin LL, Rodrigues EV, Gallo LH, Macedo DS, Schieferdecker MEM, Pintarelli VL, et al. Indicators of sarcopenia and their relation to intrinsic and extrinsic factors relating to falls among active elderly women. *Rev bras geriatr gerontol* [Internet] 2016 [Acesso em: 15 outubro 2019];19(3):399-414. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1809-98232016000300399](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1809-98232016000300399)

29. Lenardt MH, Grden CRB, Sousa JAV, Reche PM, Betiolli SE, Ribeiro DKMN. Factors associated with loss of handgrip strength in long-lived elderly. *Rev Esc Enferm USP* [Internet] 2014 [Acesso em: 18 outubro 2019];48(6):1006-12. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0080-62342014000601006](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0080-62342014000601006)
30. Mattioli RA, Cavalli AS, Ribeiro JAB, Silva MC. Association between handgrip strength and physical activity in hypertensive elderly individuals. *Rev bras geriatr gerontol* [Internet] 2015 [Acesso em: 17 outubro 2019];18(4):881-91. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1809-98232015000400881](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1809-98232015000400881)

Received in: 14/09/2019

Required revisions: 16/10/2019

Approved in: 23/10/2019

Published in: 20/04/2021

---

**Corresponding author**

Mirian Ueda Yamaguchi

**Address:** Avenida Guedner, 1610, Jardim Aclimação

Maringá/PR, Brazil

**Zip code:** 87.050-900

**Email address:** mirianueda@gmail.com

**Telephone number:** +55 (44) 99973-5504

---

**Disclaimer: The authors claim to not have conflict of interest.**