



EVALUATION OF THE MANUAL GRIPPING STRENGTH IN ELDERLY RESIDENTS IN A COMMUNITY

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ABSTRACT

Introduction: With the progressive rise of the elderly population, the concern is increased with the changes that comprise the physiological decline, among these factors, it is noticed that the decrease of muscle strength has a negative impact on the elderly functional capacity. **Objective:** Verifying the Manual Gripping Strength (MGS) in the elderly according to sex and age group. **Methods:** It is a cross-sectional and descriptive study of quantitative nature with 114 elderly people registered in the Basic Health Unit in the city of Vitória da Conquista, Bahia. A sociodemographic data questionnaire was applied, adding the evaluation of MGS. Data were tabulated and analyzed in SPSS 21.0, a descriptive analysis of the study variables was performed, by means of the absolute and relative frequency distribution. **Results** In this study, it was identified a greater frequency of female elderly (69.3%) and a greater distribution of elderly individuals with decreased muscle strength (Q25 = 19.75kg / f) (47.4%). According to gender and age group, the highest mean values of MGS were found in men (35.30 kg / f) and in the age group between 60 and 69 years (26.00 kg / f). **Conclusion:** The male elderly classified as young adults, showed better MGS compared to females and longevity serving as a warning to society.

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INTRODUCTION

The pursuit for longevity is continuously present in the population, nevertheless the process of physiological aging is characterized by a decrease in the individual functional

reserves, turning him as more vulnerable to intrinsic and extrinsic aggressions. Among the main changes seen, the decrease in muscle strength is evident, directly affecting the individual's functional capacity and independence (Mariano, Navarro, Saaia, Junior and Marques, 2013). Preserving muscular strength is important for maintaining the functionality and autonomy of the elderly, once their decline is estimated between 10-15% per decade, and generally this loss is more evident from the 50 to 60 years of age, leading to a

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major predisposition of the individual to postural instability, march insecurity, reduction of activities, excessive fatigue, among several other consequences. (Tavares, Muller, Fão, Manfredini e Piccoli, 2016) Several methods are used to evaluate the global muscular strength in the elderly individual, and among these methods, the Manual Gripping Strength (MGS) evaluation, through the dynamometer is highlighted being applied in physical fitness tests, to compare the effectiveness of several procedures, defining treatment goals, assess patient functionality, besides providing an individual's functional integrity rate (Wagner, Ascenço and Wibelinger, 2014). For Prato et al. (2017) MGS is major predictor of functional decline and mortality, being a great identifier of fragility and a sign of the need for measures to identify risk factors that are leading to this gradual loss of muscle strength and the formulation of measures of prevention to the individual according to their age group and gender, so that the possible consequences generated by the physiological aging are minimized. According to this argument and considering the gradual increase of the elderly population and the impact that the decrease of muscle strength can cause in the life of this subject and in the society to which they are a part, the present study had as goal to verify the elderly manual gripping strength according to sex and age group.

MATERIALS AND METHODS

It is a cross-sectional and descriptive study, of quantitative nature associated with a matrix research entitled "Falls and Elderly Associated Factors", it was performed in a Basic Health Unit of a traditional character of the city of Vitória da Conquista in the southwest region of the state of Bahia (urban zone), it was carried out from October to November 2017. In accordance with the Brazilian Institute of Geography and Statistics (IBGE), its population is 348,718 inhabitants, which makes it the third largest city in the state behind Salvador and Feira de Santana, and the fourth in the Northeast interior. The Health Unit choice to which the researchers reported for the investigation was through a raffle, with the goal of minimizing potential biases in the research direction. Nowadays, the city has seven traditional Basic Health Units that provide basic and free services to the population.

The population of the main research and of this study was characterized by all the elderly registered in the Basic Health Unit selected by the researchers to perform the collection, which fulfill the adopted inclusion criteria: only the elderly that present regularity in the unit and that have the availability to participate in all research stages. There were deleted from the study those elderly that were unable to understand the questions or did not complete some of the study stages and have upper limb amputation, which prevents them from performing the strength test. After administering the criteria and considering the refusals by some elderly, the final sample of the research was 114 individuals. The research followed all the principles of resolution 466/12 and counted with the approval of the Research Ethics Committee of the Northeast Independent College through the opinion: 1,859,525, substantiated by the CAAE number: 62170516.4.0000.5578. All the elderly were enlightened as to the research and only those who signed the Informed Consent Term (ICT) participated. For the data investigation a questionnaire composed by sociodemographic variables was used, followed by manual gripping strength (MGS) evaluation using the SAEHAN hydraulic dynamometer model SH500, with the

participant comfortably sitting in a chair without arms, with the feet flat on the floor and the hip and knee positioned at approximately 90 degrees of flexion. The shoulder of the limb tested was adducted and in neutral rotation, the elbow in flexion of 90 degrees, the forearm in the neutral position and the wrist between 0 and 30 degrees of length and between 0 to 15 degrees of adduction. The participant was oriented to perform a maximum contraction of the evaluated member twice holding the instrument, and the test was administered only to the dominant member. For analysis purposes, it was considered the major measure obtained. After obtaining the data, they were tabulated and examined in SPSS 21.0, being performed a descriptive analysis of the study variables, by means of the absolute and relative frequency distribution, grouped by gender and age.

RESULTS

It was determined on this study a higher frequency of female elderly (69.3%), between 60 and 69 years old (58.8%), married (57.0%) and with schooling referred to Complete primary education (52.6%), as shown in table 1.

Table 1. Elderly Distribution according to sociodemographic data. Vitória da Conquista/BA, 2017

	n	%
Sex		
Male	35	30,7
Female	79	69,3
Age group		
60 to 69 years old	67	58,8
70 to 79 years old	39	34,2
Above 80 years old	8	7,0
Marital Status		
Single	21	18,4
Married	65	57,0
Divorced	8	7,0
Widow(er)	20	17,6
Schooling		
Illiterate	13	11,4
Complete primary education	60	52,6
Incomplete High school	6	5,3
Complete High school	28	24,6
Complete College degree	7	6,1
Total	114	100,0

Source: Research data.

Regarding the Manual Gripping Strength, it was noticed that according to the values of the quartile there was a major distribution of the elderly classified with reduced muscle strength ($Q_{25} = 19.75 \text{ kg / f}$) (47.4%), according to data of table 2.

Table 2. Elderly MGS distribution according to Quartile and mean values. Vitória da Conquista/BA, 2017

	n	%
Quartile		
Reduced muscle strength ($Q_{25}=19,75\text{kg/f}$)	54	47,4
Moderate muscle strength ($Q_{50}=25,00\text{kg/f}$)	30	26,3
Good muscle strength ($Q_{75}= 30,00\text{kg/f}$)	30	26,3
Total	114	100

Source: Research data.

It was noticed that according to the data in Table 3, the highest mean values of MGS were found in men (35.30 kg / f) and in the age group between 60 and 69 years old (26.00 kg / f).

Table 3. Elderly MGS distribution according to sex and age group, Vitória da Conquista/BA, 2017

	Mean	Standard Deviation	IC (95%)	Minimum Value	Maximum Value
Sex					
Male	35,50	9,90	48,00	12,00	60,00
Female	21,60	6,04	35,00	10,00	45,00
Age group					
60 to 69 years old	26,00	9,96	50,00	10,00	60,00
70 to 79 years old	25,94	9,84	34,00	11,00	45,00
≥ 80 years old	22,56	7,20	22,00	12,00	34,00

Source: Research data.

Tabela 4. Elderly MGS distribution regarding sex according to the age group Vitória da Conquista/BA, 2017

	Sex					
	Male			Female		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Age group						
60 to 69 years old	16	32,9 kg/f	8,79kg/f	51	21,79kg/f	5,59kg/f
70 a 79 years old	16	32,79kg/f	7,79kg/f	23	18,29kg/f	5,39kg/f
≥ 80 years old	3	23,79kg/f	6,79kg/f	5	13,99kg/f	3,39kg/f

Source: Research data.

It was checked that MGS was lower in the age range ≥ 80 years for both male (23.79 kg / f \pm 6.79 kg / f) and female (13.99 kg / f \pm 3.39 kg / f), as seen in table 4.

DISCUSSION

The decrease of muscle strength in the elderly people can be recognized through the manual grip strength evaluation, which is considered a practicable way to evaluate the population, easy to apply and still a good marker of physical performance. It is known that the decrease in muscle strength seen by manual grip strength causes a dysfunction and a gradual loss of tissue function, leading to sarcopenia, having as consequences in fragility, functional decline, impaired walking, and functional disabilities (Silveira et al. al., 2015). The elderly sociodemographic profile in this study showed a greater frequency of female elderly (69.3%) and age group between 60 and 69 years (58.8%), similar to the characteristics found in another Brazilian study involving community-based elderly people assisted by the Basic Health Units, where female predominance was also observed (60.6%) in relation to the male, and the majority were in the age range of 65-69.9 years (25 , 6%) (Lenardt et al., 2016). According to these authors, in scientific studies related to the health area, the presence of the female population is more and more evident, since they are more interested in the aspects that involve their health, as well as the clarification of preventive measures, different from the male population.

Concerning the predominance of individuals with the age group between 60 and 69 years present in the sample of this study, it reflects the process of demographic transition that shows a population that is aging constantly, causing more and more people to enter the classification of young adults. The number of elderly people increased gradually by 40.3% between 2002 and 2012, with 10.8% of this population being 60 or older, increasing their participation in the country age composition, highlighting that the aging rate is growing with the transition from the 60 years of adult phase to the elderly phase (Miranda, Mendes e Silva, 2016). Regarding MGS in the present study, there was a greater distribution of elderly individuals with reduced muscle strength (47.4%). These values were found and they were superior to the study by Diz,

Queiroz, Tavares and Pereira (2015) that approach a cross-sectional study was carried out in Japan with 1,882 healthy elderly people aged between 65 and 89 years, where the prevalence of reduced muscle strength in the Japanese was 21.8% among men and 22.1% among women. It was observed that the increase in the prevalence of the muscular strength reduction with age assessed through the MGS occurred in both sexes. Such reduction is influenced by the multi factorial process of aging that creates changes in the quality and quantity of the skeletal muscles, where both contributes directly to the decrease of muscular strength levels. The seout comes generates functional damages being associated with an impaired state of health with large personal losses, increased in falls and fractures, such as physical weakness impairment in the ability to carry out activities of the daily lives, therefore encouraging a worse quality of life and the increased death risk in this population (Amaral et al., 2013). In this study, the highest mean values of MGS were found in the male (35.30 kg / f) as in the study of Gerales, Oliveira, Albuquerque, Carvalho and Farinatti (2008) who assessed and compared MGS in non-institutionalized elderly of varied age between 62-99 years.

In general, women presented values of MGS lower than those proposed by the norm (13.80 kg, representing a deficit of 37%), now men showed higher values than the female group being close to what was expected (25.2 \pm 5.1 kg). Men present relatively higher MGS than women at all stages of the human development. This can be explained by the fact that men present a greater concentration of hormones that are responsible for muscle protein turnover, such as testosterone and growth hormone (GH) (Virtuoso et al., 2014). Concerning MGS according to the age group, the elderly between 60 and 69 years obtained a higher value of strength (26.00 kg / f). This fact is enlightened by Silva, Menezes, Melo and Pedraza (2013) where in their study they observed that the elderly between 60 and 69 years present a major reserve of muscular mass when compared to the elderly over 80 where the reduction of muscular mass is expected, because aging causes gradual changes in nerve coordination that acts directly on the action of the innervated muscles, besides predisposing the elderly to the paralysis associated with a sedentary lifestyle which is less and less present in the elderly between 60 and 72 years.

It was also found that MGS was lower in the age range ≥ 80 years in both male (23.79 kg / f) and female (13.99 kg / f). The muscle strength loss is more marked and accelerated over 80 years old, and may reach 50% higher in women than in men. Studies address that individuals over 80 years of age are experiencing significant loss of strength, with an average reduction of around 18% in a year (Ansai et al., 2013).

Conclusion

This study presented as a restriction its transversal and descriptive character, which makes it not possible to identify an association between the variables and the reduced period of data collection where the amount could be better represented. Nevertheless, the results collected already show data that refer to the public health as well as the attention demand of the public and professionals that deal directly with the elderly population, serving as a basis for other future studies with attention oriented to the elderly health and its changes, where the comprehension of such changes is explored and preventive, educational and intervention measures regarding the maintenance of muscular strength in individuals over 60 years are administered, contributing to the reduction of the consequences that the loss of strength produces in the elderly promoting a better quality of life and the reduction of expenses in public health.

REFERENCES

- Amaral, J. F., Alvim, F. C., Castro, E. A., Doimo, L. A., Silva, M. V e Júnior J. M. N. 2013. Influence of aging on isometric muscle strength, fat-free mass and electromyographic signal power of the upper and lower limbs in women. *Braz J Phys Ther*.
- Ansai, J. H., Glisoi, S. F. N., Silva, T. O., Ferreira, F. P .C., Lunardi, A. C e Cera, C. T. N. 2013. Evolution of physical performance and handgrip strength in elderly assisted by an Interdisciplinary Domiciliary Assistance Program during one year. *Fisioter Pesq*, 20 (2), 197-202.
- Diz, J. B. M., Queiroz, B. Z., Tavares, L. B e Pereira, L. S. M. 2015. Prevalence of sarcopenia among the elderly: findings from broad cross-sectional studies in a range of countries. *Rev. Bras. Geriatr. Gerontol*, 18, 665-678.
- Geraldes, A. A. R., Oliveira, A. R. M., Albuquerque, R. B., Carvalho, J. M e Farinatti, P. T. V. (2008). The Hand-Grip Forecasts the Functional Performance of Fragile Elder Subjects: a Multiple-Correlation Study. *Rev Bras Med Esporte*, 14.
- Instituto brasileiro de geografia E Estatística – *Ibge*. 2017 Diretoria de Pesquisas, Coordenação de População e Indicadores Sociais, Estimativas da população residente com data de referência.
- Lenardt, M. H., Binotto, M. A., Carneiro, N. H. K., Cechinel, C., Betioli, S. E e Lourenço, T. M. 2016. Força de preensão manual e atividade física em idosos fragilizados. *Rev Esc Enferm USP*, 50, 88-94.
- Mariano, E. R., Navarro, F., Sauer, B. A., Junior, M. N. S. O e Marques, R. F. 2013. Muscular strength and quality of life in elderly women. *Rev. Bras. Geriatr. Gerontol*. Rio de Janeiro, 16, 805-811.
- Miranda, G. M. D., Mendes, A. C. G e Silva, A. L. A. 2016. Population aging in Brazil: current and future social challenges and consequences. *Rev. Bras. Geriatr. Gerontol*, 19, 507-519.
- Prato, S. C. F., Andrade, S. M., Cabrera, M. A. S., Dip, R. M., Santos, H. G., Dellaroza, M. S. G e Mesas, A. E. 2017. Frequência e fatores associados a quedas em adultos com 55 anos e mais. *Rev Saúde Pública*, 37-51.
- Silva, N. A., Menezes, T. N., Melo, R. L. P e Pedraza, D. F. 2013. Handgrip strength and flexibility and their association with anthropometric variables in the elderly. *Rev Assoc Med Bras*, 59, 128–135.
- Silveira, T., Pegorari, M. S., Castro, S. S., Ruas, G., Novais-Shimano, S. G e Patrizzi, L. G. 2015. Association of falls, fear of falling, handgrip strength and gait speed with frailty levels in the community elderly. *Medicina*, 48, 549-556.
- Tavares, G. M. S., Muller, D. V. K., Fão, R. N., Manfredini, V e Piccoli, J. C. E. 2016. Análise da força de preensão palmar e ocorrência de quedas em idosos. *Rev. bras. Ci. e Mov*, 24, 19-25.
- Virtuoso, J. F., Balbé, G. P., Hermes, J. M., Junior, E. E. A., Fortunato, A. R e Mazo, G. Z. 2014. Grip strength and physical fitness: a predictive study with active elderly. *Rev. Bras. Geriatr. Gerontol*, 17, 775-784.
- Wagner, P. R., Ascenço, S e Wibelinger, L. M. 2014. Hand grip strength in the elderly with upper limbs pain*. *Rev Dor*, 15 (5), 182.
