30 - HANDGRIP STRENGTH MEASUREMENT IN INSTITUTIONALIZED AND NOT INSTITUTIONALIZED ELDERLY PEOPLE IN CASCAVEL - PR

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INTRODUCTION

Several incapacitating physical conditions can be provoked by hand function deficiency, once this is a functional extremity of the superior members and its movements are precise, fine and highly coordinated (MAGEE, 2005).

This precise biomechanics characteristic makes small functional alterations act in a negative way over the hand movement. By this concept, the mensuration of handgrip strength has been highly used on the evaluation of several clinical conditions and on the rehabilitation of the superior member follow-up (MCANIFF and BOHANNON, 2002).

For this evaluation it is used hand dynamometry that constitutes a method of fast mensuration, easy application, low cost and good reprodutibility. The handgrip strength development varies depending on the age and it is different between genders, once the male individuals present better performances than the female of any age group. The normative values for the grip strength were defined by Mathiowetz et al. (1985), and they confirmed the differences between genders and the decrease of the test fulfillment with the aging (individuals between 20 and 94 years old were evaluated, organized in 12 groups with a gap difference of 5 years each group).

For Brazilian population, Caporrino et al. (1998) evaluated individuals from 20 to 59 years old, from both genders, and found out similar results to the population study of Mathiowetz et al. (1985), in other words, there is a decrease on handgrip strength with aging and superiority of performance on the male.

Regarding the population over 60 years, the functional data follow up, as handgrip strength, is important in order to adopt prevention methods and/or incapacities minimization, that end up happening because of the advanced age (BARBOSA et al., 2005). From the data described, it is considered appropriate to evaluate the handgrip strength starting from the sixth decade of life, using the dynamometry in elderly people from Cascavel - PR.

MATERIAL AND METHODS

Volunteer individuals over 60 years old, institutionalized and not institutionalized and from both genders were evaluated. The exclusion criteria were: neurological, rheumatic and/or osteomuscle diseases or implication, or traumas that could interfere direct or indirectly in the handgrip strength test fulfillment, and cognitive deficits.

The dynamometry was made on the dominant superior member of volunteers using a Baseline® hydraulic hand dynamometer, adjusted on the second position, in a standardized way (as made Caporrino et al., 1998): the individuals were positioned sit on a chair with total back support; hips and knees flexed in 90° and feet based on the floor; shoulder from the evaluated side in a neutral position, elbow flexed in 90° without any support, forearm in neutral position between the pronation and supineness, and fist varying position between 0 and 30° of extension and between 0 and 15° ulnar deflection. Three consecutives mensuration were done, with gaps between them of at least one minute. Instructions about the test fulfillment and individual explanations were given before the test was performed. Other explanations or clarifications that could work as an incentive for the evaluated person were not given during the test. The results in kilogram-force (kgf.) were registered and the best of the three tests was considered as the handgrip strength of each individual.

After the test, the individuals were divided in groups accordingly to their age (gaps of 10 years for each group), the results of grip strength mensuration were organized in charts using Microsoft Excel® program and, after that, they were statistically analyzed using GMC 2002 program. After the verification that the sample didn't adhere the normal curve of probabilities, the data was submitted to a Kruskall-Wallis non parametric test.

RESULTS

In this study 71 individual were evaluated, 35 female and 36 male, with age range from 61 and 92 years, being 42 of them residents of an elderly condominium (from these, 21 women and 21 man) and 29 from an elderly home care center (from these, 14 women and 15 men).

The results of the dynamometry were divided by the participants' gender, age range and residency and they are presented on the following table:

	Men		Women	
	Condominium	Elderly home	Condominium	Elderly home
60-69 years old	36,8 (± 6,2)	34,2 (± 2,9)	30,6 (± 4,9)	34,2 (± 0,3)
70-79 years old	40 (± 7,1)	29,7 (± 13)	28,7 (± 4,8)	19,7 (± 3,8)
80-89 years old	34,5 (± 4,8)	31,5 (± 9)	26,6 (± 2,4)	19,3 (± 4,2)

Table 1. Results of handgrip strength in Kgf., following the standard deviation, based on the age group and gender.
Simple lines: averages with differences statistically significant.

For male residents in the condominium, between 60 and 69 years of age, the results in the dynamometry varied between 27 and 45 kgf. (with average of 36,8 ± 6,2 kgf.).Between 70 and 79 years, the rates varied from 30 and 49 kgf. (with average of 40 ± 7,1 kgf.). In the volunteer group, individuals over 80 years, it was registered an average of 34,5 ± 4,8kgf. (varying between 29 and 39 kgf.).

Still for the men, but now those residents in one institution, the individuals between 60 and 69 years presented a dynamometry performance varying between 32 and 36 Kgf. (average 34,2 ± 2,9 Kgf.). Between 70 and 79 years, the rates varied between 15 and 46 Kgf. (average 29,7 ± 13). In the group with individuals 80 years or more, the rates varied between 20 and 39 Kgf. (average 31,5 ± 9 Kgf.)

In the female group, the volunteers between 60 and 69 years, and residents of the condominium, had average score of 30,6 ± 4,9 kgf. (varying between 23 and 37 kgf.). Between 70 and 79 years, the strength varied between 20 and 35 kgf., with average of 28,7 ± 4,8 kgf. In the group of females over 80 years, the strength varied between 24 and 30 kgf. (average of 26,6 ± 2,4 kgf.).

Still for the women, but now those residents in an elderly home, the volunteers with age between 60-69, obtained the

handgrip strength varying between 34 and 34,5 Kgf. (average 34,2 ± 0,3 Kgf.). Considering the age group of 70 - 79 years, the rates varied between 14 and 24 Kgf. (average 19,7 ± 3,8 Kgf.). For the volunteers with 80 years or more, the values varied between 14 and 24 Kgf. (average 19,3 ± 4,2 Kgf.).

Statistically significant differences were observed between the condominium group and the elderly home care center for both men and women, in the age group between 70-79 years, being it represented by the line on the table described above. Besides that, it was noticeable the statistically significant difference in the group of women aging 60-69 years and 70-79 years, evidencing decrease on the rates, what is shown by the line on the table previously described.

DISCUSSION

Currently, considering the populational aging and the importance of health actions, especially in the prevention area, the follow up of elderly capacities becomes imperious in order to allow premature approaches. Actually there are many measurement instruments to check out general capacity of elderly individuals, however, the best of them has not been defined yet.

Hand dynamometry by the handgrip strength measurement is a simple source, with low cost, and that has been used to evaluate the function of superior extreme, specially the hand one, in several situations. Once the had function is characterized biomechanically by precise, fine and highly coordinated movements, little functional alterations generated by general and/or systemic dysfunctions can reflect negatively over the hand performance (MAGEE, 2005). Considering this principle, the handgrip strength mensuration has been highly used in the evaluation of several clinical conditions and in the follow up of superior members rehabilitation process (MCANIFF and BOHANNON, 2002). In this sense, it seemed to be appropriate to evaluate general functional integrity during aging by hand dynamometry, besides allowing reproductive and comparable data with those normative in the national and international scientific literature.

In order to conduct this study, it was used a Baseline® hand dynamometer. That equipment is equivalent to Jamar® dynamometer, which is highly used in research, recommended by the American Society of Hand Therapists (ASHT) and recognized as a reliable and reproductable measurement way (CAPORRINO et al., 1998). This allowed us to analyze with security the obtained data in this study and compare them with those found in the scientific literature.

The obtained results in this study demonstrated a decrease on the values of handgrip strength when they were compared between the age groups of 60 - 69 years and > 80 years, for both men and women, although they are not statistically significant in all the groups. Besides that, the average rates of handgrip strength gotten by the sample studied (37,4 Kgf. for men and 29 Kgf. for women residents in the condominium; and 30,9 Kgf. for men and 21, 6 Kgf for women residents in an elderly home) are inferior to those found by Caporrino et al. (1998) in population of several age groups up to 59 years, that were about 44,2 Kgf. for men and 31,6 Kgf. for women, what brings to evidence that there is a decrease on the handgrip strength with aging, maintaining the men-women proportion. Corroborating to this finding, Barbosa et al. (2005), during the handgrip strength evaluation process in elderly people from São Paulo city, found out average results for men and women to be of 30,28 Kgf. and 19,01 Kgf. respectively, both smaller from those discovered in this study, but it also maintained the smaller values for women in relation to men and brought to evidence the reduction of rates with aging. International studies also show similar results, as the one from Young et al. (1995), that figured out in their study similar handgrip strength values to the ones in our study, being the general average rates, found out by them as 32,6 Kgf. for people 70-74 years, 29 Kgf. for those 75-79 years and 27,3 Kgf. for those 80-84 years.

The handgrip strength values decrease with aging can be associated to a progressive degradation of elderly people general functionality that can be generated by the presence of chronic degenerative diseases or even by intrinsic factors to the biological process during aging, as muscle mass loss, that can be reflected on the handgrip strength (SAMSOM et al., 2000; LANDERS et al., 2001).

Besides the decrease on handgrip strength values with aging, it was possible to be observed in this study differences between the test results of elders who lived in a condominium for independent elders and those residents of an elderly home care, once these ones presented inferior rates, specially in the age group of 70-79 years, for both men and women, being this difference statistically significant. This fact suggests that the institutionalized elders present a hand function decrease, what may be relevant to conduct the Activities of Daily Living (ADL) as nourishing and personal hygiene, interfering negatively on the independency and functionality of them. Also, according to Silva et al. (2004), the independency functional limitation generated by the difficulty of ADL accomplishment is an important factor of maintenance of these elders in home cares, and the inclusion of physical activity practice for this group minimizes or prevents the physical alterations related to elder dependency.

It is possible to note, therefore, that the decrease on handgrip strength in elderly is a reality and this could be considered predictive for the decrease of elders general functionality and, as a consequence, of their independency to accomplish daily activities. That way, handgrip strength measurement by dynamometry is presented as a great source in the identification of elder functionality, besides being it a fast, low cost and reproductive approach, that should be, then, part of the evaluative weapons of physical therapists in order to follow up the integrity of elders general functionality, enabling preventing actions or precocious therapies to guarantee those a healthy aging with a better life style.

CONCLUSION

Based on the results of the present study, it is possible to conclude that in the tested volunteers the handgrip strength presented a decrease in relation to their age, for both men and women, and this decrease is bigger in institutionalized elders.

Key-words: Aging, Hand Strength, Physical Therapy

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HANDGRIP STRENGTH MEASUREMENT IN INSTITUTIONALIZED AND NOT INSTITUTIONALIZED ELDERLY PEOPLE IN CASCAVEL - PR

ABSTRACT:

The handgrip strength measurement by hand dynamometer has been used as a way to evaluate the general functionality in healthy or unhealthy individuals of several age ranges. This study had the objective to evaluate the handgrip strength from the sixth decade of life, using hand dynamometry in elders from Cascavel - PR. Volunteers older than 60 years old, from both genders, were selected from a non institutionalized elder condominium and from an elderly home care, that were stratified by age groups (10 years range for each group). The volunteers were evaluated by hand dynamometer realized on a standardized position, and the obtained results demonstrated a decrease on the handgrip strength values when these are compared between the groups of 60 - 69 years and > 80 years, for both men and women, and also smaller rates for those elders that were institutionalized. That way, it was possible to conclude that, on the evaluated volunteers, the handgrip strength presented a decrease related to age, for both men and women, and this decrease was also bigger for those institutionalized.

KEY-WORDS: Aging, Hand Strength, Physical Therapy.

MENSURATION DE LA FORCE DE TENUE PALMAR DANS DES PERSONNES ÂGÉES INSTITUTIONNALISÉES ET NON INSTITUTIONNALISÉES DANS CASCAVEL-PR

RÉSUMÉ:

La mensuration de la force de tenue palmar au moyen de dynamométrie de main vient en étant utilisée mange forme d'évaluer la fonctionalité générale de personnes saines ou non, dans de diverses bandes étaires. Ce travail a eu objectif évaluer la force de tenue palmar à partir de sixième décennie de vie, en utilisant dynamométrie de main dans des personnes âgées de la ville de Cascavel-PR. Ont été sélectionnés des volontaires au-dessus de 60 ans d'âge, des tous les deux les sexes, d'un condominium de personnes âgées non institutionnalisées et d'une institution d'asilamento, qui ont été des estratificados par bande étaire (intervalles de 10 ans pour chaque groupe). Les volontaires ont été évalués au moyen de dynamométrie de main réalisée dans position standardisée, et les résultats obtenus nous ont démontrés à chute valeurs de force de tenue palmar quand comparée les bandes étaires 60 - 69 ans et > 80 ans, tant pour d'hommes que pour femmes, et aussi valeurs moindres de force de tenue palmar dans des personnes âgées admises dans un asile. Ainsi, ce a été possible de conclure que, nous volontaires montrés, la force de tenue palmar a présenté baisse rapportée à l'âge, de telle façon pour des hommes combien pour des femmes, et cette réduction a aussi été plus grand dans des personnes âgées institutionnalisées.

MOTS CLÉS: Vieillissement, Force de main, Physiothérapie.

MEDICIÓN DE LA FUERZA PRENSIL PALMAR EN MAYORES INSTITUCIONALIZADOS Y NO INSTITUCIONALIZADOS EN CASCAVEL - PR

RESUMEN:

La medición de la fuerza prensil palmar a través de dinamometría se viene utilizando como forma de evaluar la funcionalidad general de personas sanas o no, en diversos grupos de edad. Este trabajo tiene por objetivo evaluar la fuerza prensil palmar a partir de la sexta década de vida, utilizando dinamometría de mano en mayores en la ciudad de Cascavel - PR. Se han seleccionado voluntarios por sobre los 60 años de edad, de ambos sexos, de una urbanización de mayores no institucionalizados y de un geriátrico que se han estratificado por edad (a intervalos de 10 años para cada grupo). Los voluntarios han sido evaluados a través de la dinamometría de mano realizada en posición estandarizada, y los resultados obtenidos demuestran una caída en los valores de fuerza prensil palmar cuando comparadas a grupos de edades de 60-69 años y 80 años, tanto para hombres como para mujeres y también valores menores de fuerza prensil palmar en mayores del geriátrico. Así se concluye que, en los voluntarios de la muestra, la fuerza prensil palmar presentó un declive tanto para hombres como para mujeres, y esa reducción también fue más grande en mayores institucionalizados.

PALABRAS CLAVE: Envejecimiento, Fuerza de la mano, Fisioterapia.

MENSURAÇÃO DA FORÇA DE PREENSÃO PALMAR EM IDOSOS INSTITUCIONALIZADOS E NÃO INSTITUCIONALIZADOS EM CASCAVEL - PR

RESUMO:

A mensuração da força de preensão palmar por meio de dinamometria de mão vem sendo utilizada como forma de avaliar a funcionalidade geral de indivíduos saudáveis ou não, em diversas faixas etárias. Este trabalho teve por objetivo avaliar a força de preensão palmar a partir da sexta década de vida, utilizando dinamometria de mão em idosos da cidade de Cascavel - PR. Foram selecionados voluntários acima de 60 anos de idade, de ambos os sexos, de um condomínio de idosos não institucionalizados e de uma instituição de asilamento, que foram estratificados por faixa etária (intervalos de 10 anos para cada grupo). Os voluntários foram avaliados por meio de dinamometria de mão realizada em posição padronizada, e os resultados obtidos demonstraram queda nos valores de força de preensão palmar quando comparadas as faixas etárias 60 - 69 anos e > 80 anos, tanto para homens como para mulheres, e também valores menores de força de preensão palmar em idosos asilados. Assim, foi possível concluir que, nos voluntários amostrados, a força de preensão palmar apresentou declínio relacionado à idade, tanto para homens quanto para mulheres, e essa redução também foi maior em idosos institucionalizados.

PALAVRAS-CHAVE: Envelhecimento, Força da mão, Fisioterapia.