

RELATIONSHIP BETWEEN HANDGRIP STRENGTH, FUNCTIONALITY, AND PHYSICAL FRAILTY IN ELDERLY PEOPLE: AN INTEGRATIVE REVIEW

RELAÇÃO ENTRE FORÇA DE PRENSÃO MANUAL, FUNCIONALIDADE E FRAGILIDADE FÍSICA EM PESSOAS IDOSAS: REVISÃO INTEGRATIVA

RELACIÓN ENTRE FUERZA DE AGARRE MANUAL, FUNCIONALIDAD Y FRAGILIDAD FÍSICA EN ANCIANOS: UNA REVISIÓN INTEGRADORA

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ABSTRACT

Objective: to analyze scientific publications on the relationship between handgrip strength, functionality, and physical frailty in the elderly. Method: integrative review carried out in PubMed, CINAHL, Web of Science and VHL Portal databases, in the sample period from January 2010 to November 2021. The Preferred Reporting Items for Systematic Reviews and Meta-analyses flowchart was used to present the selection of studies, and the level of evidence was assessed from the Oxford Center for Evidence-Based Medicine and references managed in EndNote Web. Results: the initial search resulted in 211 studies after applying the eligibility criteria, with 7 studies constituting the integrative review. Handgrip strength proved to be an important indicator of muscle strength and crucial for the functionality of elderly people. When associated with certain clinical occurrences, handgrip strength contributes to the reduction of functionality and dependence in carrying out activities of daily living in the elderly, with greater impairment among those aged 75 years or older, more significantly among women. Conclusion: the relationship between reduced grip strength and decreased functionality determines the condition of physical frailty in elderly people. This reinforces the importance of investment by Nursing professionals in interventions that enable the maintenance of muscle strength and functionality and the reversal of physical frailty in this population segment.

Keywords: Frail Elderly; Hand Strength; Frailty; Primary Health Care; Nursing Care.

RESUMO

Objetivo: analisar as publicações científicas sobre a relação entre força de prensão manual, funcionalidade e fragilidade física em pessoas idosas. Método: revisão integrativa realizada nas bases de dados PubMed, CINAHL, Web of Science e Portal BVS, no período amostral de janeiro de 2010 a novembro de 2021. Empregou-se o fluxograma do Preferred Reporting Items for Systematic Reviews and Meta-analyses para apresentar a seleção dos estudos, e o nível de evidência foi avaliado a partir do Oxford Centre for Evidence-Based Medicine e as referências gerenciadas no EndNote Web. Resultados: a busca inicial resultou em 211 estudos após a aplicação dos critérios de elegibilidade, sendo que 7 estudos constituíram a revisão integrativa. A força de prensão manual se revelou um importante indicador de força muscular e crucial para a funcionalidade das pessoas idosas. Quando associada a determinadas ocorrências clínicas, a força de prensão manual colabora para a redução da funcionalidade e dependência na realização das atividades de vida diária em idosos, com maior prejuízo entre aqueles com 75 anos ou mais, de forma mais significativa entre as mulheres. Conclusão: a relação entre a força de prensão reduzida e a diminuição da funcionalidade determina a condição de fragilidade física em pessoas idosas. Isso reforça a importância do investimento dos profissionais de Enfermagem em intervenções que viabilizem a manutenção da força muscular e da funcionalidade e a reversão da fragilidade física nesse segmento populacional.

Palavras-chave: Idoso Fragilizado; Força da Mão; Fragilidade; Atenção Primária à Saúde; Cuidados de Enfermagem.

RESUMEN

Objetivo: analizar las publicaciones científicas sobre la relación entre la fuerza de agarre manual, la funcionalidad y la fragilidad física en ancianos. Método: revisión integradora realizada en las bases de datos PubMed, CINAHL, Web of Science y Portal BVS, desde enero de 2010 hasta noviembre de 2021. Se utilizó el diagrama de flujo de los Preferred Reporting Items for Systematic Reviews and Meta-analyses para presentar la selección de estudios, se evaluó el nivel de evidencia del Oxford Centre for Evidence-Based Medicine y se gestionaron las referencias en EndNote Web. Resultados: la búsqueda inicial dio lugar a 211 estudios, tras aplicar los criterios de elegibilidad, siete estudios constituyeron la revisión integradora. La fuerza de agarre de la mano resultó ser un indicador importante de la fuerza muscular y crucial para la funcionalidad de los ancianos. Cuando se asocia a determinadas circunstancias clínicas, la fuerza de la presión manual contribuye a la reducción de la funcionalidad y la dependencia en la realización de las actividades de la vida diaria en los individuos, con mayor perjuicio entre los que tienen 75 años o más y de forma más significativa entre las mujeres. Conclusión: la relación entre la fuerza de agarre reducida y la disminución de la funcionalidad determina la condición de fragilidad física en los ancianos. Esto refuerza la importancia de que los profesionales de Enfermería intervengan en intervenciones que permitan mantener la fuerza y la funcionalidad muscular y revertir la fragilidad física en este segmento de la población.

Palabras clave: Anciano Frágil; Fuerza de la Mano; Fragilidad; Atención Primaria de Salud; Atención de Enfermería.

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INTRODUCTION

The Brazilian population is approximately 211 million inhabitants, of which 13% are elderly (≥ 60 years old), who face new challenges related to longevity, social, political, and economic implications. Despite the increase in years lived, there is an expansion of morbidities and disabilities.¹

The health of the elderly transcends the simplistic concept of fighting disease, as a healthy life trajectory is reflected in the notions of capacity, resilience, and functionality. Disease prevention is important, but not enough, given that healthcare interventions must be broadly oriented to support individuals to develop all their physical and mental capacities.¹

The alterations resulting from the aging process can cause functional decline and, therefore, contribute to the development of geriatric syndromes, such as physical frailty, which can predict health problems in elderly people.² This syndrome, proposed by North American authors in 2001, is a predictor of dependence and comorbidities resulting from the decline in resistance, performance, and muscle strength.³

Over the last two decades, the concept has been strengthened from the perspective of physical frailty, defined as “a clinical condition in which there is an increase in the individual’s vulnerability to increased dependency and/or mortality when exposed to a stressor”.⁴ This clinical condition through five markers of Fried’s phenotype: unintentional weight loss; self-report of fatigue/exhaustion; reduced level of physical activity; decrease in gait speed; and decreased handgrip strength.³

In view of the progression of age and the accumulated effects of various health conditions, as well as predisposing factors, the risk of frailty in the elderly increases, with greater harm being done to those who are already frail. Due to the close relationship between physical frailty and muscle function, it is emphasized that the concept of sarcopenia is shown to be a key link between disability and frailty.⁵

Characterized by the gradual and generalized loss of strength and skeletal muscle mass, sarcopenia presents risks of negative health outcomes, such as physical disability, poorer quality of life and even death. In addition, it causes limitations for the elderly, such as reduced independence and functionality.⁶

The reduction in Handgrip Strength (HGS), one of the markers of the physical frailty phenotype, is one of the variables of interest in the present study. Because it is a simple parameter to be used in clinical practice, this marker represents an excellent measure for assessing muscle strength, including as a new vital sign, enabling healthcare professionals to identify elderly people at risk of functional and health decline.⁷

For the elderly, the HGS represents an important measure for carrying out common activities in daily life, such as housework and self-care.⁸ The reduction of this parameter affects the performance of basic and instrumental activities of daily living, which include actions of getting up, walking, and sitting, which reinforces the relevance of HGS for preserving the functionality of elderly people.⁹

In turn, functionality involves the ability of the individual to fully preserve the physical and mental skills developed over the course of life, which are indispensable for a routine with autonomy and independence.¹⁰ It can be assessed by the instrument Functional Independence Measure (FIM), and periodic evaluation is essential to identify functional changes.¹¹

The relationship between and HGS, functionality and physical frailty in the elderly is not yet established in the literature; therefore, this integrative review is necessary and relevant. The selected articles will be able to provide scientific knowledge that will lead to the understanding of the relationship that is established between the variables of interest in this review, as well as contributing to the improvement of gerontological care.

Considering the importance of knowledge on the subject for Nursing professionals, the following objective was elaborated for the integrative literature review: to analyze scientific publications on the relationship between handgrip strength, functionality, and physical frailty in elderly people.

METHOD

An integrative review was carried out through the following methodological steps: identification of the theme and choice of the research question; literature search and selection based on eligibility criteria (inclusion/exclusion); characterization and evaluation of the included articles; interpretation of the results found; synthesis of knowledge; and presentation of the review.¹²

For the first stage, the theme of the relationship between handgrip strength, functionality and physical frailty in the elderly was identified. For the formulation of the research question, the acronym PICO was used, in which the letter “P” corresponded to the population (elderly), “I” to interest (HGS, functionality and physical frailty condition), “C” to comparison (any comparison) and “O” to outcomes/results (relationship). The following research question was chosen: what is the current panorama of scientific production on the relationship between handgrip strength, functionality, and physical frailty in the elderly?

The following databases and data portal were chosen: National Library of Medicine and National Institutes of Health (Pubmed), Web of Science (WOS) and Cumulative Index to Nursing and Allied Health Literature (Cinahl); Virtual Health Library (VHL). To structure the search strategy, the following Health Sciences Descriptors (DeCS), Medical Subject Headings (MeSH) and keywords were used, combined with the support of Boolean operators “AND” and “OR” (Table 1).

In order to normalize and expand the searches in the databases chosen for investigation, a single search strategy in the English language was considered. The EndNote® computer program was used to manage the bibliography found and select articles included in the integrative review.

For the composition of the corpus to be analyzed, the following eligibility/inclusion criteria were established: a) publications in the sample period from January 2010 to November 2021; b) be included as original research studies and/or reviews disclosed in the databases chosen for investigation; c) articles Available from full and directly related to the theme; d) publications in Portuguese, Spanish, English or French. The eligibility/exclusion criteria were a) be published as reviews, editorials, theoretical reflections, experience reports, monographs, dissertations, and theses; b) appear repeated in the databases, with the first version identified being maintained; c) not showing the relationship between handgrip strength, functionality, and physical frailty in the elderly.

Next, a spreadsheet (Microsoft Excel® 2016) was created in order to organize and categorize the included studies. Data on authorship and year of publication, indexed journal, country, study design, sample/number of participants, objective(s), main results, and level of evidence were extracted.

Table 2 presents the classification of the Oxford Center for Evidence-Based Medicine, consisting of five hierarchical levels of evidence based on the type of study. It was used to assess the level of evidence of the studies included in this integrative review.¹³

Table 1 - Search strategy for the integrative review in the databases. Curitiba, Paraná, Brazil, 2020

Search strategy	("Aged" OR "Elderly" OR "Aged, 80 and over" OR "Frail Elderly" OR "Frail Elders" OR "Frail Elder" OR "Functionally-Impaired Elderly" OR "Functionally Impaired Elderly" OR "Frail Older Adults" OR "Frail Older Adult") AND ("Hand Strength" OR "Hand Strengths" OR "Grip" OR "Grips" OR "Grasp" OR "Grasps" OR "Pinch Strength" OR ("Muscle Strength" OR "Muscle Strength Dynamometer") AND "Hand")) AND ("Primary Health Care" OR "Care, Primary Health" OR "Health Care, Primary" OR "Primary Healthcare" OR "Healthcare, Primary" OR "Primary Care" OR "Care, Primary") AND ("International Classification of Functioning, Disability and Health" OR "Functionality" OR "Functioning" OR "Activities of Daily Living" OR "ADL" OR "Daily Living Activities" OR "Daily Living Activity" OR "Chronic Limitation of Activity" OR "Geriatric Assessment" OR "Geriatric Assessments" OR "Frailty" OR "Frailties" OR "Frailness" OR "Debility" OR "Debilities" OR "Muscle Weakness")
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Source: the authors (2021).

Table 2 - Classification of levels of scientific evidence according to the type of study. Curitiba, Paraná, Brazil, 2021

LE	TYPES OF STUDIES
1 a	Systematic Review Studies (with homogeneity) of Controlled and Randomized Clinical Trials
1 b	Randomized Controlled Clinical Trials with narrow confidence intervals (CI)
1 c	“All or Nothing” therapeutic study outcomes. Publications of controlled case series studies
2 a	Systematic Review (with homogeneity) of Cohort Studies
2 b	Individual cohort study with low quality randomization, control or no long-term follow-up, cross-sectional cohort study
2 c	Results of studies (observation of therapeutic results or clinical evolution)
3 a	Systematic Review (with homogeneity) of Case-Control Studies
3 b	Case Studies with Control Group
4	Case reports and series without definition of control case
5	Expert point of view without explicit critical evaluation, physiology studies, bench research and “first principles”. Opinion of reputable authorities or experts. Non-systematic literature review

Source: Oxford Centre Evidence-Based Medicine.¹³

Legend: LE – Level of Evidence; CI – Confidence Interval.

The articles were evaluated based on the analysis and interpretation of the data that emerged from the articles. The presentation of the integrative review took place through descriptive language and the use of a table. The last methodological step corresponds to the synthesis of knowledge.

RESULTS

The initial search identified 211 articles, of which the following were excluded: 16 due to repetition; 150 after reading the title and abstract, demonstrating that they do not correspond to the research question; and 38 after reading it in full, as they did not respond to the objective of the review. Thus, seven studies were included in this integrative literature review and made up the corpus of analysis. Next, the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) was used to illustrate the article selection flowchart and the composition the corpus of the integrative review (Figure 1).¹⁴

Of the articles that constituted the corpus of analysis of the integrative review, two (28.5%) were published in the year 2017, and the publications were between the years 2011 and 2018. There was a preponderance of the English language for four publications (57.2%), followed by Portuguese, French and Spanish, with one publication each (14.3%), respectively. As for the study development locations, two (28.6%) were conducted in the Netherlands, two (28.6%) in Chile and one (14.3%) in Brazil, Switzerland, and France, respectively.

As for the methodology of the studies, all were quantitative, with five cross-sectional studies (71.5%), one (14.3%) longitudinal and one systematic review. With regard to sample size, three (42.9%) studies had > 1,000 and ≤ 6,500 participants, two (33.3%) between 101 and 400 elderly people and one (14.3%) with a sample smaller than 100 individuals. The systematic review included 28 studies, making up a sample of 48,623 participants. Most publications were published in international journals (n=6; 85.7%), and only one article (14.3%) was published in a Brazilian journal.

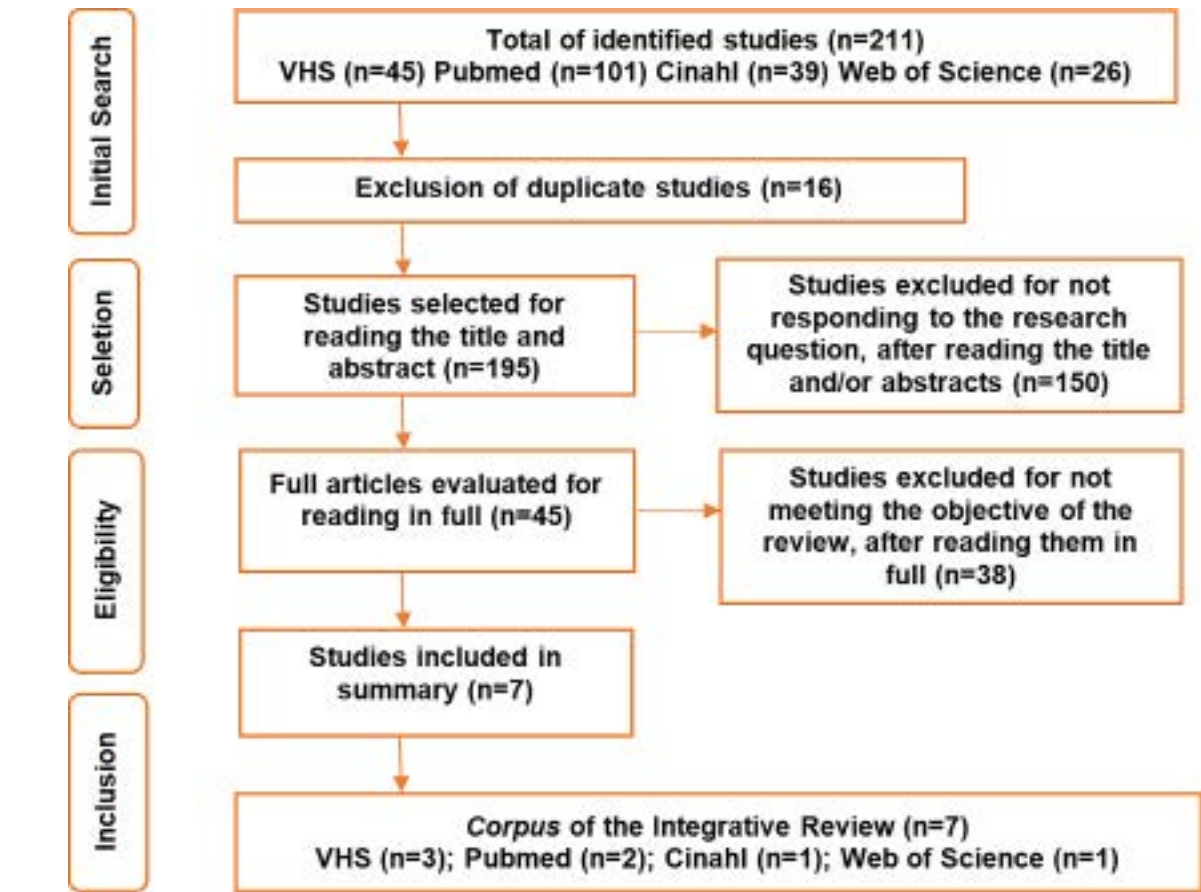


Figure 1 - Flowchart of selection of publications and composition of the corpus of the integrative review. Curitiba, Paraná, Brazil, 2021
Source: the authors (2021).

Regarding the level of evidence of the analyzed studies, there was one (14.3%) systematic review whose level of evidence was 2a; and six (85.8%) studies with level 2c. This gives the articles included in the review scientific credibility and proper design.

With regard to the dynamometer equipment used in the studies, there was a variety of dynamometers used to assess HGS (as a component of physical frailty), with a predominance of the Jamar® device (n=4; 57.2%).

As for the method of evaluating the functionality of elderly people, most studies (n=4; 57.2%) applied the Lawton and Brody Scale, and less frequently, the Katz and Barthel Index in one (14.3%) publication, each.

Table 3 presents the synthesis of the studies included in the corpus of analysis of the integrative review, with information on authorship, year of publication, objective(s), study design, sample (n) and the main results related to the question of research and level of evidence of studies.

Table 3 - Summary of articles included in the integrative review, (n=7). Curitiba, Paraná, Brazil, 2020

Author/Year	Objective(s)	Design	Samples (n)	Main outcomes	LE
Vermeulen, Neyens, van Rossum, Spreeuwenberg, Witte, 2011. ¹⁵	To systematically review the literature on the predictive value of physical frailty indicators in the inability to perform Activities of Daily Living (ADL) in community-dwelling elderly	Systematic Review	48,623	Individual indicators of physical frailty are predictors of future incapacity for ADL in community-dwelling elderly. In the Review, ten studies (35.7%) concluded that grip strength is a significant predictor of disability for ADL. Three studies (10.7%) disagreed on the HGS prediction for ADL disability	2a
Chan, van Houwelingen, Gussekloo, Blom, den Elzen, 2014. ¹⁶	To compare lower limb quadriceps strength with handgrip strength and their association with health outcomes in older adults in primary healthcare	Cross-sectional	2,713	The results showed that quadriceps strength measurements did not show an added value to HGS. However, HGS showed an association with quality of life ($\beta = 0.05$; $p=0.002$) and disability in daily life ($\beta = -0.5$; $p=0.004$), considering the assessment of BADL and IADL. HGS can help identify seniors in primary healthcare with the worst health outcomes	2c
Mancilla, Ramos, Morales, 2016. ¹⁷	To measure handgrip strength in the elderly and relate values to clinical functional assessment	Cross-sectional	1,047	The HGS values obtained were grouped by age, sex and functional condition. The results showed: in women, HGS strength values were 17.4 (± 5.6) Kgf for the left hand and 18.7 (± 5.7) Kgf for the right hand; for men, 30.6 (± 7.8) Kgf and 31.8 (± 8.3) Kgf were observed for the left and right hands, respectively. According to the functional assessment, the HGS was 23.5 (± 9.7) for the elderly who were autonomous, risk of dependence 21.8 (± 9.1) and dependent 19.3 (± 8.2) Kgf, pointing to a relationship between the degrees of functional performance of the elderly and HGS	2c
Gleize, Zmudka, Lefresne, Delforge, Van, Serot, Jouanny, 2015. ¹⁸	To assess the prevalence of frailty according to Fried's criteria in primary care and its evolution and patient outcomes over a one-year period	Longitudinal	64	Of the 64 patients, 55 were reassessed, with 10.9% being frail, 56.4% pre-frail and 32.7% non-frail. The robust elderly who became frail during the study had lower IADL scores ($p=0.004$) and lower grip strength ($p=0.311$), compared to those who remained robust. Grip strength and IADL are a screening tool in clinical practice to allow early treatment and delay progression to addiction	2c
Wearing, Konings, Stokes, Bruin, 2018. ¹⁹	To evaluate handgrip strength in the Swiss-German population aged 75 years or older	Cross-sectional	244	Handgrip strength stratified by sex was significantly lower with advancing age in men and women. HGS was independently associated with age, height, and dependence for ADLs in men and women. Overall, 44% of men and 53% of women had HGS measurements that were below the clinically relevant threshold for mobility limitations.	2c

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Tabela 3 - Síntese dos artigos incluídos na revisão integrativa, (n=7). Curitiba, Paraná, Brasil, 2020

Author/Year	Objective(s)	Design	Samples (n)	Main outcomes	LE
Lera, Albala, Leyton, Márquez, Angel, Saguez, et al, 2018. ²⁰	To establish handgrip strength reference values by age and sex and validate cutoff points for the risk of functional limitation and mortality in elderly Chileans	Cross-sectional	6,426	The validated dynamometry cutoff points allowed the incorporation in the geriatric assessment in PHC of a cheap and easy-to-use indicator to identify elderly people at risk of sarcopenia, frailty, and mobility deficit. In addition, it helps to optimize the evaluation of intervention strategies focused on maintaining functionality. Low HGS was associated with limitations in Instrumental Activities of Daily Living (p = 0.001) and altered physical performance (p = 0.0001)	2c
Cruz, Vieira, Bastos, Leite, 2017. ²¹	To analyze whether demographic, socioeconomic, health and healthcare services factors are associated with frailty in community-dwelling elderly	Cross-sectional	339	Among the frail elderly evaluated according to the Edmonton Scale, 52.9% presented mild frailty, 32.2% moderate frailty and 14.9% severe frailty. Frailty was associated with difficulty walking (p<0.001), the need for an auxiliary device for locomotion (p<0.001), the presence of a caregiver (p<0.001), depressive disorders (p<0.001) and functional dependence to carry out instrumental activities of daily living (p<0.001). The prevalence of frailty among the elderly was 35.7% (95%CI 30.7–40.9); 42.2% were not frail; 22.1% were apparently vulnerable. Among the frail, 52.9% had mild frailty, 32.2% moderate frailty and 14.9% severe frailty.	2c

Source: the authors (2020).
Legend: DLA - Daily Life Activities; BADL - Basic Activities of Daily Living; IADL - Instrumental Activities of Daily Living; PHC - Primary Health Care; HGS - Handgrip strength; LE - Level of Evidence.

DISCUSSION

The analysis of the results of the articles showed that the reduced HGS physical frailty marker is related to functional performance in the elderly.^{2,15,16,17,18,19,20} Both variables are associated with the aging process, since it reproduces physiological, structural, and functional changes in people’s bodies over the course of age.

A cross-sectional study carried out in the city of Juiz de Fora–MG (Brazil), with a sample of 339 elderly aged 60 years or older, identified the relationship between functional performance and physical frailty, which, in turn, was analyzed by the Edmon-ton scale. It was observed that 35.7% of the elderly were frail, a condition that was associated with factors related to mobility (difficulty walking and use of a walking aid device) (p < 0.001) and func-tional performance (having a caregiver, negative or

regular perception of vision, anxiety or depression and history of falls) (p < 0.001). The related vari-ables, intrinsically, can affect the functionality of the elderly, making them dependent for the execu-tion of activities of daily living, especially the instru-mental ones.²¹

In a longitudinal study developed in France, researchers analyzed the prevalence and progres-sion of physical frailty according to the Fried’s phe-notype in 64 elderly individuals aged 75 years or older.^{3,18} For the first assessment, 10 (15.6%) elderly were classified as frail, 34 (53.1%) as pre-frail and 20 (31.3%) as non-frail. After 12 months, 55 of these seniors were reassessed. The results showed that the non-frail elderly who became frail in one year had, in the initial assessment, a lower score for instru-mental activities of daily living (IADL) (p = 0.004) and a reduced HGS (p = 0.0311) compared to those who remained non-frail at follow-up.¹⁸

The aforementioned information points to the association between physical frailty, handgrip strength and functionality, pointing out that both the IADL scores and the reduced HGS data seem to be predictive references of the transition to frailty in non-frail elderly people.¹⁸ Also, in the others result of the studies, other covariables related to function-ality and handgrip strength were verified, such as gender and age.

From this perspective, the Chilean cross-sec-tional study carried out with 1,047 elderly people (≥ 60 years) stands out, with the objective of mea-suring HGS and associating the results presented by the elderly with the clinical functional assess-ment. The research authors found that reduced HGS was associated with advanced age, female sex, and decreased functionality.¹⁷ This relationship can be affirmed as a result of sarcopenia, which progresses over the years and is more frequent, resulting in losses to the maintenance of functionality.²²

We highlight a cross-sectional study, carried out with 244 elderly people aged 75 years or over of Swiss-German origin, which evaluated handgrip strength and correlated dependence data for activities of daily living. When conditioning the analysis stratified by the gender of the participants, the results suggested that the HGS was considerably lower with advanc-ing years (≥ 75 years and ≤ 99 years), both for males (p < 0.01), going from 37.7 (±6.5) Kgf to 25.6 (±7.6) Kgf, as for females (p < 0.01), from 22.2 (±4.0) Kgf to 16.5 (±4.7) Kgf. A significant percentage of par-ticipants (53% of women and 44% of men) had HGS values below the clinically important threshold to identify movement restrictions, which can affect the functionality of these individuals.¹⁹

The association between handgrip strength, functionality and physical frailty was also observed in a systematic review that included 28 longitudi-nal and prospective studies. Researchers analyzed the prediction of frailty indicators on the inability to perform activities of daily living in community-dwelling elderly (≥ 65 years). The outcomes of 10 (35.7%) studies pointed to reduced HGS as an indi-cator of physical frailty and predictive of future disability in the performance of activities of daily living, which reinforces the relationship between the variables under investigation in this integra-tive review.¹⁵

In addition to being a predictor of functional limi-tation, HGS was also identified as a predictor of mor-tality in a study carried out in Chile with 2,193 elderly people (≥ 60 years old). In the research, HGS refer-ence values were established according to age and gender, considering cutoff points for the risk of func-tional limitation and mortality, being ≤ 27 Kgf for men and ≤ 15 Kgf for women. There was an associa-tion between reduced HGS and limitations for ADLs (p = 0.001), and an adjusted mortality risk rate of 1.39 (95% CI: 1.13-1.71) was identified. There is a need for strategies focused on maintaining function-ality, which consider the association of reduced HGS with low functional capacity and mortality, given the negative outcomes related to this association.²⁰

In the Netherlands, in a cross-sectional study car-ried out with 764 elderly people in primary healthcare, researchers compared lower limb quadriceps strength to HGS and associated it with health outcomes. Among the participants, women predominated (n=521; 68.2%) and a weak association was observed between handgrip and quadriceps strength (β = 0.42, 95%CI 0.33-0.50; R² = 0.17). It should be noted, however, that HGS was associated with disability in basic and instrumental activities of daily living (β = –0.5; p = 0.004) and quality of life (β = 0.05; p = 0.002). A lower score in the functionality assessment was obtained by the elderly with reduced HGS when analyzed by the Gron-ingen Activities Restriction Scale (GARS) (for AIVD) (p < 0.001) and by the EuroQol-5D (EQ5D) (for ABVD) (p ≤ 0.044).¹⁶ This research also pointed out that mea-sures of quadriceps strength did not contribute to the prediction of negative health outcomes; however, the combination of handgrip and quadriceps strength mea-surements can help detect older people with the worst health outcomes related to functional performance.¹⁶

CONCLUSION

Seven studies were included in this integrative review, which indicated the relationship between hand-grip strength, functionality, and physical frailty in elderly people in primary healthcare. Handgrip stren-gth proved to be determinant for the functional capa-city and autonomy presented by the elderly. There was evidence of greater progression in the reduction of handgrip strength after 60 years of age, with a greater deficit in women aged 75 years or older.

The results found highlight a significant gap in the literature on handgrip strength in the elderly, particularly in the last decade. Furthermore, as a component of the physical frailty phenotype and its relationship with functionality, HGS needs to be investigated in new studies that contribute to the performance of professionals in the health area, especially in gerontological Nursing.

The outcomes verified among the variables of interest in this integrative review help the Nursing team in the development of interventions, based on evidence, to reverse the reduction in HGS, physical frailty and functional decline, such as encouraging the practice of physical exercises. Actions like this aim to work the musculoskeletal system for the preservation and/or gain of muscle mass and strength, with a view to maintaining independence and autonomy, which reflect on the functionality of the elderly.

REFERENCES

1. Organização Pan-Americana da Saúde. Construindo a saúde no curso de vida: conceitos, implicações e aplicação em saúde pública. Washington, DC: OPAS; 2021[cited 2021 Sept 20]. Available from: <https://iris.paho.org/handle/10665.2/53571>

2. Lee L, Patel T, Hillier LM, Maulkhan N, Slonim K, Costa A. Identifying frailty in primary care: a systematic review. *Geriatr Gerontol Int*. 2017[cited 2021 Oct 18];17(10):1358-77. doi: <https://doi.org/10.1111/ggi.12955>

3. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, et al. Frailty in older adults: Evidence for a phenotype. *J Gerontol A Biol Sci Med Sci*. 2001[cited 2021 Oct 18];56(3):146-56. Available from: <https://doi.org/10.1093/gerona/56.3.M146>

4. Dent E, Morley JE, Cruz-Jentoft AJ, Woodhouse L, Rodríguez-Mañas L, Fried LP, et al. Physical Frailty: ICFSR International Clinical Practice Guidelines for Identification and Management. *J Nutr Health Aging*. 2019[cited 2021 Dec 20];23(9):771-87. Available from: <https://doi.org/10.1007/s12603-019-1273-z>

5. Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyère O, Cederholm T, et al. Sarcopenia: revised European consensus on definition and diagnosis. *Age Ageing*. 2019[cited 2021 Dec 20];48(1):16-31. Available from: <https://doi.org/10.1093/ageing/afy169>

6. Cruz-Jentoft AJ, Sayer AA. Sarcopenia. *Lancet*. 2019[cited 2021 Oct 10]; 393(10191):2636-46. Available from: [https://doi.org/10.1016/S0140-6736\(19\)31138-9](https://doi.org/10.1016/S0140-6736(19)31138-9)

7. Ha J, Park YH. Effects of a Person-Centered Nursing Intervention for Frailty among Prefrail Community-Dwelling Older Adults. *Int J Environ Res Public Health*. 2020[cited 2021 Dec 20];17(18):6660. Available from: <https://doi.org/10.3390/ijerph17186660>

8. Zanin C, Jorge MSG, Knob B, Wibelinger LM, Libero GA. Handgrip strength in elderly: an integrative review. *Pan-Amer J Aging Res*. 2018[cited 2021 Dec 20];6(1):22-8. Available from: <https://doi.org/10.15448/2357-9641.2018.1.29339>

9. Wiecek, ME, Souza CM, Klahr OS, Rosa LHT. Analysis of the association between hand grip strength and functionality in community old people. *Rev Bras Geriatr Gerontol*. 2020[cited 2021 Nov 11];23(3):e200214. Available from: <https://doi.org/10.1590/1981-22562020023.200214>

10. Moraes EM, Pereira AMVB, Azevedo RS, Moraes, FL. Avaliação Multidimensional do Idoso. Curitiba (PR): Secretaria de Estado da Saúde; 2018. 118p.

11. Riberto M, Miyazaki MH, Jucá SSH, Sakamoto H, Pinto PPN, Battistella LR. Validação da Versão Brasileira da Medida de Independência Funcional. *Acta Fisiatr*. 2004[cited 2021 Dec 20];11(2):72-6. Available from: <https://doi.org/10.5935/0104-7795.20040003>

12. Mendes KDS, Silveira RCCP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na Enfermagem. *Texto Contexto Enferm*. 2008[cited 2021 Dec 20];17(4):758-64. Available from: <https://doi.org/10.1590/S0104-07072008000400018>

13. Oxford Centre for evidence-based Medicine Levels of Evidence Grades of Recommendation. Oxford (UK): CEBM; 2009[cited 2021 Sept 30]. Available from: <https://www.cebm.ox.ac.uk/resources/levels-of-evidence/oxford-centre-for-evidence-based-medicine-levels-of-evidence-march-2009>

14. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021[cited 2021 Oct 20];372:71. Available from: <https://doi.org/10.1136/bmj.n71>

15. Vermeulen J, Neyens JC, van Rossum E, Spreeuwenberg MD, Witte LP. Predicting ADL disability in community-dwelling elderly people using physical frailty indicators: a systematic review. *BMC Geriatr*. 2011[cited 2021 Oct 20];11:33. Available from: <https://doi.org/10.1186/1471-2318-11-33>

16. Chan OYA, van Houwelingen AH, Gussekloo J, Blom JW, den Elzen WPJ. Comparison of quadriceps strength and handgrip strength in their association with health outcomes in older adults in primary care. *AGE*. 2014[cited 2021 Oct 10];36:9714. Available from: <https://doi.org/10.1007/s11357-014-9714-4>

17. Mancilla SE, Ramos FS, Morales BP. Fuerza de prensión manual según edad, género y condición funcional en adultos mayores Chilenos entre 60 y 91 años. *Rev Méd Chile*. 2016[cited 2021 Dec 20];144(5):598-603. Available from: <https://dx.doi.org/10.4067/S0034-98872016000500007>

18. Gleize F, Zmudka J, Lefresne Y, Delforge C, Van S, Serot J, et al. [Fragility assessment in primary care: which tools for predicting what?]. *Geriatr Psychol Neuropsychiatr Vieil*. 2015[cited 2021 Dec 20];13(3):289-97. Available from: <https://doi.org/10.1684/pnv.2015.0559>

19. Wearing J, Konings P, Stokes M, Bruin ED. Handgrip strength in old and oldest old Swiss adults: a cross-sectional study. *BMC Geriatr*. 2018[cited 2021 Dec 20];18:266. Available from: <https://doi.org/10.1186/s12877-018-0959-0>

20. Lera L, Albala C, Leyton B, Márquez C, Angel B, Saguez R, et al. Reference values of hand-grip dynamometry and the relationship between low strength and mortality in older Chileans. *Clin Interv Aging*. 2018[cited 2021 Dec 10];13:317-24. Available from: <https://doi.org/10.2147/CIA.S152946>

21. Cruz DT, Vieira MT, Bastos RR, Leite ICG. Factors associated with frailty in a community-dwelling population of older adults. *Rev Saúde Pública*. 2017[cited 2021 Dec 10];51:106. Available from: <https://doi.org/10.11606/S1518-8787.2017051007098>

22. Cipolli GC, Aprahamian I, Borim FSA, Falcão DVS, Cachioni M, Melo RC, et al. Probable sarcopenia is associated with cognitive impairment among community-dwelling older adults: results from the FIBRA study. *Arq Neuro-Psiquiatr*. 2021[cited 2021 Oct 18];79(5):376-83. Available from: <https://doi.org/10.1590/0004-282X-ANP-2020-0186>



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