

RESEARCH ARTICLE

RELACION ENTRE FUERZA PRENSIL EN LA FUNCIONALIDAD Y CAPACIDAD FÍSICA EN ADULTOS MAYORES

RELATIONSHIP BETWEEN GRIP STRENGTH AND PHYSICAL CAPACITY IN OLDER ADULTS

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RESUMEN

Introducción: La fuerza prensil se ha establecido como un indicador clave de la funcionalidad general en adultos mayores, y se ha relacionado con la movilidad, la independencia y la salud general. El SPPB, por su parte, es una herramienta ampliamente utilizada para evaluar el equilibrio, la marcha y la fuerza de las extremidades inferiores en esta población. La investigación se basa en la teoría de la sarcopenia y el envejecimiento activo, donde la pérdida de fuerza y la función física afectan la calidad de vida de los adultos mayores. El presente estudio tiene como objetivo analizar la relación entre la fuerza prensil y la capacidad funcional medida a través del Short Physical Performance Battery (SPPB) en adultos mayores no institucionalizados que asisten a la E.S.E. Hospital San Juan de Dios de Pamplona. **Materiales y métodos:** Este estudio de tipo cuantitativo, descriptivo y correlacional utiliza la dinamometría para medir la fuerza prensil y el SPPB para evaluar la capacidad funcional de los participantes. Se seleccionó una muestra de

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50 adultos mayores no institucionalizados de Pamplona, y los datos fueron analizados mediante el coeficiente de correlación de Pearson para determinar la relación entre ambas variables. **Resultados:** El promedio de fuerza prensil fue de 18 kg en la mano dominante, que principalmente fue la derecha. Se encontraron buenos registros respecto a la capacidad funcional de los adultos mayores evaluados, específicamente en lo relacionado con el equilibrio estático, dinámico, control postural y velocidad de marcha. Existe una correlación significativa entre la fuerza prensil y los puntajes del Short Physical Performance Battery. **Conclusión:** Los resultados obtenidos resaltan la importancia de la fuerza manual como predictor del estado funcional en adultos mayores.

PALABRAS CLAVE: Fuerza prensil, capacidad funcional, adultos mayores, Short Physical Performance Battery.

ABSTRACT

Introduction: Grip strength has been established as a key indicator of general functionality in older adults and has been linked to mobility, independence, and overall health. The Short Physical Performance Battery (SPPB) is a widely used tool to assess balance, gait, and lower extremity strength in this population. This research is based on the theory of sarcopenia and active aging, where the loss of strength and physical function affects the quality of life of older adults. The present study aims to analyze the relationship between grip strength and functional capacity measured through the Short Physical Performance Battery (SPPB) in non-institutionalized older adults attending the E.S.E. Hospital San Juan de Dios in Pamplona. **Materials and methods:** This quantitative, descriptive, and correlational study uses dynamometry to measure grip strength and the SPPB to assess the functional capacity of the participants. A sample of fifty non-institutionalized older adults from Pamplona was selected, and the data were analyzed using Pearson's correlation coefficient to determine the relationship between both variables. **Results:** The average grip strength was 18 kg in the dominant hand, which was primarily the right. Good scores were found regarding the functional capacity of the older adults evaluated, specifically related to static and dynamic balance, postural control, and gait speed. There is a significant correlation between grip strength and Short Physical Performance Battery scores. **Conclusion:** The results obtained highlight the importance of hand strength as a predictor of functional status in older adults.

KEYWORDS: Grip strength, functional capacity, older adults, Short Physical Performance Battery

INTRODUCTION

Aging is a natural and inevitable biological process characterized by progressive physiological changes

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that can impact the functional capacity of individuals. These changes affect multiple organ systems, potentially leading to a decline in physical and cognitive performance, increased vulnerability to disease, and reduced resilience to stressors.

In particular, the loss of muscle mass and strength referred to as sarcopenia is a critical determinant of reduced independence and diminished quality of life in older adults. Sarcopenia is closely linked to physical weakness, impaired mobility, and a heightened risk of falls, hospitalization, and mortality. In Colombia, a considerable proportion of the elderly population is estimated to be affected by this condition, underscoring the importance of early identification and intervention strategies to mitigate its impact and enhance the overall well-being of older individuals (Cruz-Jentoft et al., 2019).

A key instrument for evaluating functional capacity in older adults is the Short Physical Performance Battery (SPPB), a standardized set of tests designed to assess balance, gait

speed, and lower limb strength. The SPPB is widely recognized for its reliability and predictive value in identifying individuals at risk of disability, falls, and other adverse health outcomes, making it a fundamental component of geriatric assessment protocols.

This assessment provides a comprehensive view of physical functionality, enabling the early identification of individuals at risk of frailty (Guralnik et al., 1994). Functional capacity may decline progressively as a result of reduced physical activity, leading to physical deconditioning and diminished robustness in older adults (Studenski et al., 2011). This decline often manifests first as a state of pre-frailty potentially reversible in some cases which may progress to frailty, considered a precursor to disability or the need for assistance with Activities of Daily Living (ADLs). Furthermore, the frailty state can be exacerbated by prolonged physical inactivity, accelerating functional deterioration

and increasing vulnerability (Vargas-Del-Valle et al., 2021).

Grip strength is widely recognized as a valid and reliable indicator of overall functional status in older adults, being directly associated with mobility, independence, and general health (Concha-Cisternas et al., 2022; Bohannon, 2019; Dodds et al., 2014). Beyond its role in assessing health status, grip strength also correlates with multiple domains of intrinsic capacity, including balance, gait speed, and physical endurance, making it a valuable marker for evaluating functional aging and predicting adverse outcomes (Comella et al., 2007; Lera et al., 2018).

Despite the importance of these assessment tools, no studies to date have explored the relationship between grip strength and functional capacity as measured by the Short Physical Performance Battery (SPPB) in non-institutionalized older adults in the region of Pamplona, Norte de Santander. This knowledge gap hinders the development of targeted interventions aimed at preserving

autonomy and improving the quality of life in this population.

METODOLOGY

Quantitative, descriptive, and correlational study that aims to analyze the relationship between grip strength and functional capacity measured by the Short Physical Performance Battery (SPPB) in non-institutionalized older adults..

Participants: The target population consisted of non-institutionalized adults over 60 years of age who attend the E.S.E. Hospital San Juan de Dios in Pamplona. A convenience sample of 50 older adults over the age of 60 was selected, ensuring that all individuals were evaluated for both functional capacity and grip strength. Individuals with severe neurological diseases, amputations, or any condition that prevented the measurement of grip strength or the performance of SPPB tests were excluded.

Grip strength was measured with participants seated, the arm supported at wrist level, the wrist in a neutral position, and without any additional

movement during the test. A Lafayette hand dynamometer (model 78010) was used to obtain an accurate measurement of grip strength. Participants performed three measurements with each hand, and the highest value obtained for each hand was recorded. Functional capacity was assessed using the Short Physical Performance Battery (SPPB), a test battery that evaluates balance, gait speed, and lower limb strength. The SPPB includes three subtests: static balance, gait speed, and the chair stand test. Each subtest was scored on a scale from 0 to 4, with 0 indicating the poorest performance and 4 the best. The total score, ranging from 0 to 12, was obtained by summing the scores of the three subtests. Once grip strength and functional capacity data were collected, they were recorded in a database and analyzed using the Pearson correlation coefficient to determine the relationship between both variables, employing the SPSS statistical software (version 25). A p-value of <

0.05 was considered statistically significant.

El presente estudio tuvo en cuenta los lineamientos de la Resolución 8430 por la cual se establecen las normas científicas, técnicas y administrativas para la investigación en salud, clasificada en la categoría investigación con riesgo mínimo según artículo 11 (Ministerio de Salud de Colombia, 1993) y la declaración de Helsinki (WMA., 2017). Fue aprobado por la E.S.E. Hospital San Juan de Dios de Pamplona. Todos los participantes firmaron un consentimiento informado antes de participar en el estudio, asegurando que comprendieron los objetivos, procedimientos y posibles riesgos asociados con la investigación.

RESULTS

57.1% of the participants were female and 42.9% were male. The participants' ages ranged from 60 to 80 years, with a mean age of 71.67 years. The most prevalent age group was 71 to 75 years (32%), followed by 60 to 65 years (26%).

Regarding marital status, 40.8% of participants were married, followed by single (28.6%) and widowed individuals (18.4%). 73.5% of the participants were affiliated with the contributory health insurance system, while 26.5% were enrolled in the subsidized system. Most of the sample (38.8%) belonged

to the "low" socioeconomic stratum, followed by "very low" (36.7%). In terms of educational level, 49% of participants had primary education, while 16.3% had no formal education. 34.7% of participants did not have a defined employment situation, 28.6% were employed or self-employed, and 28.6% worked in the home (Table 1).

Table 1. Socio-demographic description

Variable	Category	Frequency (n)	Percentage (%)
Gender	Men	21	42.9
	Women	28	57.1
Age Group	60 – 65 years	13	26.0
	71 – 75 years	16	32.0
Marital Status	Married	20	40.8
	Single	14	28.6
	Widowed	9	18.4
Health Insurance Regime	Contributory	36	73.5
	Subsidized	13	26.5
Socioeconomic Stratum	Low	19	38.8
	Very Low	18	36.7
Educational Level	Primary	24	49.0
	No formal education	8	16.3
Employment Status	Undefined	17	34.7

	Employed/Self-employed	14	28.6
	Homemaker	14	28.6

Own source, 2025

Regarding the results of functional capacity, in the balance test with feet together, 98% of participants were able to maintain the position for at least 10 seconds, reflecting a good level of static balance. In the semi-tandem position, 95.9% of participants sustained the position for 10 seconds, suggesting adequate postural control. Meanwhile, in the tandem position, 65.3% of participants achieved the maximum time of 10 seconds, indicating an acceptable level of dynamic balance.

Regarding gait speed, the average time was 5.67 seconds, suggesting an adequate functional gait in most participants. However, there were some outliers, such as one participant who required 24 seconds, which may represent a particular case requiring further evaluation.

The results obtained from the handgrip strength assessment in the dominant

hand indicate that 95.9% of participants demonstrated right-hand dominance, while only 4.1% used their left hand. The average handgrip strength among the evaluated older adults was 18 kg in their dominant hand. However, the distribution of grip strength revealed some outliers on the upper end, with most participants clustered around the mean.

After performing the correlation analysis between handgrip strength and functional capacity, the Pearson correlation coefficient between dominant hand grip strength and the overall SPPB score was 0.311 ($p = 0.029$), indicating a weak but statistically significant positive correlation. This suggests that, although there is a relationship between the two variables, it is not strong; however, it is relevant for understanding the physical functionality of the participants.

DISCUSSION

The objective of this study was to analyze the relationship between handgrip strength and functional capacity in older adults attending the E.S.E. Hospital San Juan de Dios in Pamplona. Considering that handgrip strength is a recognized indicator of physical function and biological health in older adults (Fountotos et al., 2021), and that epidemiological studies have demonstrated an association between lower handgrip strength and increased risk of mortality and cardiovascular events, its evaluation is of great importance in geriatric clinical follow-up (Leong et al., 2016).

Health services at all levels that provide care for older adults should incorporate handgrip strength measurement into routine clinical practice—not only as a viable indicator of functional capacity in geriatric patients, but also as a reliable tool for the early detection of sarcopenia. According to previous studies, sarcopenia is a syndrome characterized by the progressive loss of muscle mass and strength (Cruz-

Jentoft et al., 2010). Moreover, it has been identified that handgrip strength declines with age, providing data that reveal significant changes in musculoskeletal function in older adults (Dodds et al., 2014). Therefore, performing this assessment may offer key insights into the musculoskeletal condition of the patient, enabling the implementation of preventive or therapeutic strategies that mitigate its impact on quality of life.

The results of this study show an average handgrip strength of 18 kg in the dominant hand, which was primarily the right hand. This finding is consistent with a study conducted on Colombian older adults, which reported an average grip strength of 18 kg for men aged 85 and 12 kg for women of the same age (Cagua et al., 2023). That study also reported that the greatest decline in grip strength occurs after the age of 70, regardless of gender.

Additional findings from previous research have confirmed that age, gender, and upper limb dominance influence handgrip strength. Men tend

to have higher grip strength levels than women and exhibit a more pronounced decline in grip strength with age (Rojas et al., 2015).

On the other hand, to measure functional capacity, the Short Physical Performance Battery (SPPB) was used. Studies have shown that better overall physical function, as assessed by the total SPPB score, is associated with the preservation of mobility, the ability to perform activities of daily living (ADLs), and a lower risk of falls (Western & Malkowski, 2022).

A meta-analysis demonstrated that the SPPB is not only a valid tool for determining functional capacity in older adults, but also a significant predictor of mortality. Therefore, incorporating this assessment into clinical practice is ideal for the early identification of geriatric patients at risk of functional decline (Pavasini et al., 2016).

In this regard, men have been shown to perform better in functional assessments compared to women, although performance tends to decline

with age (Cabrero-García et al., 2012). In the present study, encouraging results were found regarding the functional capacity of the evaluated older adults, particularly in terms of static and dynamic balance, postural control, and gait speed.

The correlation analysis reveals a weak relationship between handgrip strength and functional capacity among the participants in the sample. It is worth noting that an outlier was identified in the gait speed test (24 seconds), which may have affected the standard deviation and the mean, thereby potentially influencing the observed relationship between grip strength and functionality. A more detailed analysis of these extreme cases could provide greater accuracy in interpreting the results. Regardless of this observation, it has been reported that reduced handgrip strength is associated with functional dependence and poor physical performance in adults over 80 years of age (Runzer et al., 2023). Furthermore, decreased grip strength is closely linked to higher levels of

disability in activities of daily living among older adults with chronic diseases (McGrath et al., 2017).

CONCLUSIONS

The present study revealed relevant findings among non-institutionalized older adults in Pamplona, with a mean handgrip strength of 18 kg in the dominant arm and a weak but statistically significant correlation with the SPPB score ($r = 0.311$, $p = 0.029$). Participants demonstrated good static and dynamic balance, while gait speed results suggested a generally adequate functional gait in most individuals.

Handgrip dynamometry proved to be an effective and low-cost tool for detecting functional decline in older adults. Its implementation in geriatric assessment procedures would allow for the early identification of risks before they compromise independence.

It is recommended that future studies explore the longitudinal relationship between handgrip strength and functional capacity in order to predict

outcomes such as falls, hospitalization, and dependency. Additionally, it would be relevant to determine whether strengthening handgrip improves performance on the SPPB. Stratifying by age groups, especially individuals over 80 years old, could reveal more stable associations.

This research reaffirms the need for objective assessments of strength and functional capacity in geriatric evaluation, as well as the implementation of preventive strategies to promote healthy aging.

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