



SCIENTIFIC LETTER

The association between muscular fitness and COVID-19 severity in older adults: A cross-sectional study in Bogotá, Colombia

La asociación entre la aptitud muscular y la gravedad del COVID-19 en adultos mayores: un estudio transversal en Bogotá, Colombia

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Since the onset of the COVID-19 pandemic, more than 776 million cases and over 7 million deaths have been reported worldwide, with Colombia being one of the affected countries, recording over 139,000 deaths as of January 2025. Containment measures such as lockdowns and social distancing, while effective in reducing transmission, had indirect consequences including increased physical inactivity and mental health disorders. Moreover, the emergence of "post-COVID syndrome" or "long COVID," characterized by persistent symptoms such as fatigue, shortness of breath, and reduced functional capacity, has especially affected individuals who required intensive care.

Scientific efforts have focused on identifying risk factors that predispose individuals to severe disease progression. Factors such as advanced age, male sex, non-communicable diseases like hypertension and diabetes, and altered body composition have been consistently associated with hospitalization and mortality. Older adults are particularly

vulnerable due to physiological changes such as sarcopenia and dynapenia, which weaken the immune system and increase susceptibility to poor outcomes. Recently, physical fitness components such as muscular strength and cardiorespiratory endurance have been proposed as independent protective factors. For example, an analysis from the UK Biobank showed that individuals who reported faster walking speeds had a lower risk of developing severe COVID-19, regardless of body mass index.¹

Physical activity improves immune response and reduces systemic inflammation, while also helping prevent chronic diseases that worsen COVID-19 outcomes. Additionally, grip strength has emerged as a relevant clinical indicator, with evidence suggesting it mediates the protective effect of physical activity against COVID-19 hospitalization in adults over 50.² Despite the growing international literature, studies in Latin America, particularly Colombia, remain scarce. This lack of data hinders the development of context-specific public health strategies. Therefore, this study aimed to examine the relationship between grip strength, muscle mass, and COVID-19 hospitalization duration in older adults in Bogotá.

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Table 1 Correlations between the proposed variables.

Characteristic	Muscle	Fat	Maximum grip	Days hospitalized	Days in ICU
Muscle	1	$r = -0.642$ $p = 0.001^a$ $d = 1.231^b$	$r = 0.822$ $p = 0.001^a$ $d = 1.421^b$	$r = -0.543$ $p = 0.044^a$ $d = 0.739$	$r = -0.454$ $p = 0.067$ $d = 0.132$
Fat	$r = -0.642$ $p = \leq 0.001^a$ $d = 1.231^b$	1	$r = -0.752$ $p = \leq 0.001^a$ $d = 1.321^b$	$r = 0.244$ $p = 0.435$ $d = 0.213$	$r = 0.335$ $p = 0.546$ $d = 0.313$
Maximum grip	$r = 0.822$ $p = 0.001^a$ $d = 1.421^b$	$r = -0.752$ $p = \leq 0.001^a$ $d = 1.321^b$	1	$r = -0.434$ $p = 0.034^a$ $d = 0.634$	$r = 0.323$ $p = 0.074$ $d = 0.329$
Days hospitalized	$r = -0.543$ $p = 0.044^a$ $d = 0.739$	$r = 0.244$ $p = 0.435$ $d = 0.213$	$r = -0.434$ $p = 0.034^a$ $d = 0.634$	1	$r = 0.752$ $p = 0.001^a$ $d = 1.439^b$
Days in ICU	$r = -0.454$ $p = 0.067$ $d = 0.132$	$r = 0.335$ $p = 0.546$ $d = 0.313$	$r = 0.323$ $p = 0.074$ $d = 0.329$	$r = 0.752$ $p = 0.001^a$ $d = 1.439^b$	1

The data are expressed as mean and standard deviation.

^a Significant differences between groups for the Student's *t*-test.

^b Large effect sizes.

A cross-sectional study was conducted in 2022 with 120 older adults between 60 and 80 years old, selected through convenience sampling. Only individuals without diagnosed chronic diseases and with the ability to sign informed consent were included. Grip strength was assessed using a dynamometer, body composition was measured via bioelectrical impedance analysis, and hospitalization days were self-reported through questionnaires and verified with medical records. Statistical analyses included *t*-tests, Pearson's correlation, and effect size calculations.

Men had higher values for muscle mass, body weight, and grip strength compared to women, who had higher body fat percentages. There were no significant differences between sexes in terms of total hospitalization days. An inverse association was found between hospitalization length and both grip strength and muscle mass, suggesting that lower values in these physical fitness markers are linked to longer hospital stays (Table 1). No significant relationship was found between these variables and days spent in intensive care, indicating that muscular conditions may be more predictive of general hospitalization duration.

These findings align with previous studies showing that low grip strength and muscle mass are associated with longer hospitalizations, clinical complications, and increased need for intensive care.³ In clinical settings, these measures are practical, low-cost, and non-invasive, making them suitable as screening tools upon hospital admission. Exercise science professionals can play a key role in administering and interpreting these assessments and developing physical interventions during hospitalization. Notably, previous research in Colombian older adults has also validated the clinical utility of grip strength as a marker of cardiovascular and functional health.⁴

Early mobilization and exercise programs have been shown to reduce recovery time and improve physical function in hospitalized patients. At the population level, promoting active aging, community-based exercise, and resistance training can reduce the long-term burden of

COVID-19 in older adults. While this study has limitations such as a small sample size, cross-sectional design, and reliance on self-reported data, it is the first in Colombia to explore this relationship. The findings support the clinical value of muscle strength and mass as predictors of adverse outcomes and highlight the importance of integrating them into hospital protocols.

Ethical responsibilities

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (World Medical Association, 2013) and complied with the regulatory framework established by the Colombian Ministry of Health's Resolution 008430/1993, which governs research involving human subjects. Prior to their participation, all individuals were thoroughly informed about the study's objectives, procedures, potential risks, and benefits, after which they provided written informed consent.

Furthermore, the research protocol was reviewed and approved by the Ethics Committee of Fundación Universitaria del Área Andina, as documented in Minutes No. 04, dated April 20, 2022. The researchers ensured that participants' rights, dignity, and well-being were safeguarded throughout the study. All procedures were designed to minimize risks and adhered to the highest ethical standards in human research.

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Conflict of interest

The authors declare that they have no conflicts of interest related to this study. They have no financial, personal,

or institutional relationships that could have influenced the research, its results, or its interpretation. Additionally, no external funding sources had any role in the study design, data collection, analysis, or manuscript preparation. The authors affirm their commitment to transparency and integrity in scientific research.

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