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Body composition and functional performance of community-dwelling older adults across age groups

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ABSTRACT

Introduction: Ageing is natural and progressive. This process can involve the presence of comorbidities, changes in body composition, and other limitations such as frailty and decline in functionality. **Objective:** To analyze the difference in body composition, level of physical activity, nutritional index, and functional performance in older adults of different age groups treated in primary health care. and to evaluate with a regression analysis whether the age factor, body mass index, palm dynamometry classification, and physical activity practice are predictors of the classification of functional tests. **Methods:** A cross-sectional study of older adults in Family Health Centers in Goiânia. 539 older adults were divided into 3 groups by age: group 1: 60-69 years, group 2: 70-79 years, and group 3: over 80 years. Body composition, performance, and functional independence were assessed using validated questionnaires and tests. **Results:** A lower body mass index was found in the age groups over 70, and 53% of the sample was considered sedentary, in addition to poor performance in the functional tests and low levels of functional independence, indicating functional risks, especially in the elderly over 80. In the regression analysis, age, body mass index, palm dynamometry score, and physical activity were predictors of low scores in the functional tests. **Conclusion:** As age advances, there is a gradual change in body composition, levels of functional performance, and functional independence.

Keywords: aged; age groups; anthropometry; sedentary behavior; physical functional performance.

INTRODUCTION

Aging is a natural and progressive phenomenon that can lead to physiological changes that are influenced by lifestyle and the environment in which the individual lives. The World Health Organization (WHO) defines an older person as an individual who is 65 years of age or older in developed countries¹. In Brazil, a developing country, individuals aged 60 years or older are considered older adults. This population is often characterized by chronic diseases and high rates of comorbidity and mortality. In recent years, the Brazilian population has been aging at a faster rate, reaching 14% of the country's total population².

An aging population requires specific care for its members. A lack of adequate support for older adults can lead to health problems, causing frailty, decreased functionality, and greater risks to the overall health of older adults². The global population aged over 60 is expected to double by 2050, reaching around 2.1 billion people, a factor that is accompanied by an increase in physical disabilities¹.

This population can be divided by age group, as each decade brings specific changes and unique challenges. Younger older people, aged 60 to 69, tend to be more active, while older adults, aged 70 to 79, may be more frail. For individuals aged ≥ 80 years, it is understood that physical and mental decline is greater than in other age groups³.

Conditions such as falls and low muscle strength, which limit independence and quality of life, are associated with comorbidities. In countries with developed healthcare systems, the focus is on creating policies for rehabilitation and palliative care, while in developing countries, such as Brazil, the challenge is to ensure universal access to high-quality specialized healthcare².

Body composition is the ratio of lean mass to fat mass in the human body, and it is a factor that changes over the course of the aging process. With advancing age, changes occur in

the distribution of these tissues, which can lead to a decrease in muscle mass and an increase in body fat tissue⁴.

Physical activity can be a strategy for changing body composition. It is defined as bodily movement through skeletal muscles that generates energy expenditure⁵. Physical activity improves the performance of older adults with physiological changes resulting from aging, generating positive consequences in functional and nutritional aspects⁶.

The level of physical activity influences aspects such as physical, cognitive, and emotional health. Regular physical activity is associated with improved cardiorespiratory function, bone and muscle health, functional capacity, and quality of life in older adults. However, many older adults face specific challenges that can limit their ability to remain active, such as chronic diseases, joint pain, decreased mobility, and fear of falling⁷.

When considering the challenges faced by this population, such as changes in metabolism, decreased food intake, and increased frailty, the nutritional index becomes a fundamental research tool. Poor nutrition leads to functional decline, increased susceptibility to disease, decreased cognitive function, and malnutrition, which will affect overall bodily functioning⁸.

Changes in body composition, physical activity level, and nutritional status directly influence the functional capacity (FC) of an older person⁶. FC refers to an individual's ability to perform daily activities independently and effectively, and plays a crucial role in the quality of life and autonomy of older adults⁹.

Functional independence levels refer to an individual's ability to perform everyday activities such as combing their hair, using the bathroom, or using a cell phone independently and effectively, without relying excessively on others for basic care or assistance. Maintaining functional independence is essential for the quality of life and well-being of the elderly population. The ability to perform daily tasks independently not only promotes a sense of

dignity and self-esteem but also contributes to physical and mental health, in addition to allowing greater autonomy. Understanding the physical and functional context of older adults allows us to investigate the reality of this population and adapt care to the individual in a way that is centered on the context in which they find themselves¹⁰. Given this, we evaluated through regression analysis whether age, body mass index, hand grip strength (HGS) test classification, and physical activity are predictors of functional test classification.

Therefore, the objective of this study is to analyze the difference in body composition, physical activity level, nutritional index, and functional capacity in older adults of different age groups treated in primary health care.

METHODS

Study design

An analytical cross-sectional study was conducted with older adults at Family Health Centers (FHC) in Goiânia, Goiás. Study conducted in accordance with the Guidelines and Regulatory Standards for Research Involving Human Subjects (Resolution 466/2012, of the National Health Council), approved by the Research Ethics Committee of the Universidade Federal de Goiás, under opinion number 4,617,086, and by the Research Ethics Committee of the Hospital e Maternidade Dona Iris (no. 4,680,770).

Participants

Older adults of both sexes, aged 60 years or older, residing in Goiânia, in the state of Goiás. Data collection took place between August 2021 and December 2023, with older adults attending Family Health Centers (FHCs). The FHCs were selected to represent the health districts of Goiânia.

The inclusion criteria for the study were older adults over 60 years of age of both sexes who agreed to participate in the research. Older adults who used walking aids were excluded.

The sample size was calculated using GPower 3.1.2® software for a comparison analysis between groups, considering a minimum effect size of 0.5%, test power of 80%, and significance index of 5%. The sample size obtained was 252 older adults, with a minimum of 53 participants in each group. The sample was divided into three groups according to age range.

A total of 563 older adults were evaluated for data collection and functional testing. After applying the exclusion criteria, the participation of older adults in the gait speed, hand grip strength (HGS) test, Time Up and Go, Five Times Sit-to-Stand Test, and maximum and minimum inspiratory pressure tests is shown in figure 1.

Variables and Instruments

The age group of participants was the independent variable that divided the sample into three groups: group 1 (G1) with older adults aged 60–69 years, group 2 (G2) with older adults aged 70–79 years, and group 3 (G3) with older adults aged 80 years or older³.

The following covariates were investigated to characterize the participants: gender and age. The dependent variables were: body composition, nutritional index, physical activity level, HR, muscle strength, respiratory muscle strength, and functional independence.

For body composition, body mass (G-Tech® digital scale) and height (measuring tape stabilized on the wall) were measured, requesting that the subject stand barefoot on the scale with their body upright, measuring weight and height, and body mass index (BMI) classified according to Lishpshitz¹¹, which considers: ≤ 22 kg/m² (underweight); 22.0–27.0 eutrophy and >27 overweight.

The Skeletal Muscle Mass Index (SMI) is a very important factor in understanding muscle and nutritional health, as it represents the calculation of metabolically active tissue,

accounting for a large part of the fat-free mass of the human body. It is calculated using the following formula: $\text{SMI (kg)} = \text{height in meters} * (0.244 * \text{body mass}) + (7.8 * \text{height}) + (6.6 * \text{gender}) - (0.098 * \text{age}) + (\text{ethnicity} - 3.3)$; gender is considered 0 for female and 1 for male, and ethnicity is considered 0 for Caucasians, 1.2 for Asians, and 1.4 for African Americans. Values considered inadequate, indicating a reduction in SMI in older adults, are $\leq 8.90 \text{ kg/m}^2$ for men and $\leq 6.37 \text{ kg/m}^2$ for women¹².

Anthropometric assessment was performed by measuring calf circumference using a tape measure, based on the largest calf muscle volume and adopting the classification proposed by the World Health Organization (WHO), which indicates muscle mass reduction when the value is less than 31 cm¹³. A complementary measurement to BMI was performed, the A Body Shape Index (ABSI) or New Body Shape Index, which is related to a substantial risk factor for premature mortality when it presents values ≥ 1.34 , evaluating the waist circumference measurement, performed at the umbilical line height. Its calculation is based on the division of waist circumference by adjusted weight and height¹⁴.

The nutritional index was measured using the Mini Nutritional Assessment questionnaire (short version). The questionnaire has a maximum score of 14 points, with 0-7 considered malnourished, 8-11 at risk of malnutrition, and 1-14 normal nutritional status¹⁵.

Regular physical activity was considered to be at least ≥ 150 minutes per week of moderate-intensity physical activity, with 'yes' for active and 'no' for sedentary behavior, and if 'yes', how many minutes were spent per activity¹⁶.

FC was assessed using three different tests. The 4-Meter Walk Test (4MWT) consists of the patient rising from a seated position and walking a distance of 4 meters, with the speed at which the test is performed being assessed, considering $> 8 \text{ m/s}$ (meters per second) as a functional risk¹⁷. The Five Times Sit-to-Stand Test (TSL) consists of sitting and standing up five times, timing the time in seconds, considering 10-12 as good performance, 13-15 as regular

performance, and >16 as poor performance¹⁸. The Timed Up And Go (TUG) test consists of getting up from a chair, walking 3 meters, turning around, walking back, and sitting down again. A test time of more than 12 seconds indicates functional risk¹⁹.

Muscle strength was assessed by measuring handgrip strength using a hydraulic dynamometer in kilograms/force (Kgf), considering low muscle strength to be <16 Kg for women and <27 Kg for men²⁰.

To assess respiratory muscle strength, the values obtained in the maximum inspiratory pressure (MIP) and maximum expiratory pressure (MEP) tests collected through manovacuometry were established. For these measurements, a manovacuometer with a scale of -120 to +120 cmH₂O was used. For MIP, muscle weakness was defined as results below 80 cmH₂O for men and below 60 cmH₂O for women, while for MEP, muscle weakness was defined as values below 60 cmH₂O for men and 40 cmH₂O for women²¹.

Functional independence levels were assessed using two questionnaires: the Barthel scale and the Lawton and Brody scale. The Barthel scale is an instrument that assesses performance in daily activities, with scores ranging from 0 to 100 points, as follows: <25 total dependence; 26-50 severe dependence; 51-75 moderate dependence; 76-99 mild dependence; 100 independent²². The Lawton and Brody scale, which assesses instrumental activities of daily living, has a score ranging from 0 to 21 points, with <5 indicating total dependence; 5-20 partial dependence; 21 independent²³.

Statistical Analysis

Statistical analysis was performed using G.Power version 3.1 software for sample calculation and Statistical Package for Social Sciences (SPSS; version 22.0) software for other analyses. Descriptive statistics were presented as relative frequencies. The normality of the variable distributions was verified using the Kolmogorov-Smirnov test. For variables with

normal distribution, mean and standard deviation were adopted as measures of central tendency and variability, and for analysis of the comparison between groups, one-way ANOVA with Tukey's post hoc test was used. For variables with non-normal distribution, median and interquartile range as measures of central tendency and variability, and Kruskal-Wallis with Dunn's post hoc test were used to analyze the comparison between groups. The effect size was calculated to complement the values found through the tests comparing the groups. The η^2 was calculated according to the formula proposed by Cohen²⁴ which classifies the effect size as: <0.01 (negligible), between 0.01 and 0.06 (small), between 0.06 and 0.14 (medium), and >0.14 (large).

For comparison between groups of categorical variables, the Chi-square test and the adjusted residual value were used together with the corrected Alpha value as post hoc for the Chi-square test, data shown in frequency and percentage. In all analyses, the level of significance adopted was 0.05. For the regression analysis, binary logistic regression was used, using the dichotomous dependent variables: Five Times Sit-to-Stand Test (above 15 seconds = decreased physical capacity; below 14 seconds = preserved physical capacity) and the walking speed test and meters/second (less than 8m/s = preserved capacity; above 8 m/s = decreased capacity), with the following independent variables: age, body mass index, hand grip strength (HGS) test classification, and physical activity to assess whether they are predictors of functional test classification (dependent variables).

RESULTS

A total of 563 individuals were evaluated, and 24 older adults were excluded due to the use of walking aids. The final sample consisted of 539 older adults aged 60 to 92 years (69.25 ± 6.82 years), with a total of 348 women (64.6%) and 191 males (35.4%).

The total sample was divided into three groups: 308 older adults belonged to G1, 176 older adults to G2, and 55 older adults to G3. Of these older adults, 253 (46.5%) reported that they engage in physical activity, and 285 (53.1%) do not exercise.

Body composition was different when comparing the groups ($p < 0.001$), and the level of physical activity did not differ significantly, but sedentary prevalence was high across all groups. Table 1 shows the data on body composition, nutritional index, and level of physical activity by group, divided by age group, and compared between groups.

Regarding the comparison of FC and functional independence levels between groups, significant differences ($p < 0.001$) were found in relation to functional tests (4MWT and TUG) and functional independence indices (Lawton and Barthel; $p < 0.001$). Table 2 presents the comparison data by age group in functional capacity and functional independence levels.

The HR variables (VM, TSL) that obtained significant values in the comparison analysis between the groups ($p < 0.05$) were included in the multiple binary logistic regression analysis to verify whether age, body mass index, hand grip strength (HGS) test classification, and physical activity practice are predictors of functional test classifications.

According to the multiple binary logistic regression analysis, the model containing age, body mass index, handgrip strength, and physical activity was significant for the walking speed variable ($p < 0.05$; Odds Ratio = 1.580; 95% Confidence Interval = 1.091–2.316). For the Five Times Sit-to-Stand Test variable, the same model was also significant ($p < 0.001$; Odds Ratio = 1.874; 95% Confidence Interval = 1.286–2.729).

In the walking speed test and the Five Times Sit-to-Stand Test, the older the age, the higher the BMI, the lower the hand grip strength (HGS) test score, and the less physical activity practiced, the lower the chances of belonging to the group with good functional capacity.

DISCUSSION

According to our results, differences were detected between the groups of older adults in relation to BMI, SMI, calf circumference, functional tests, and functional independence indices, which presented lower values as the groups were older.

The distribution of groups by age showed differences, which was expected due to the separation of groups by age group. The higher number of older adults in the groups aged up to 79 years can be explained by the average life expectancy of Brazilians. In the latest available survey, referring to the period of 2019, life expectancy in Brazil was approximately 76.6 years²⁵.

The results showed a higher prevalence of females in groups with older adults up to 79 years of age, with a similar ratio in the group over 80 years of age. This difference can be explained by the fact that in Brazil, women's life expectancy is higher than that of men for biological, environmental, and/or social reasons. Another reason is the fact that there is a greater demand among females for primary health care²⁶. The age balance in terms of gender in the over-80 age group is related to the equal mortality rate of the general population after the age of 80. The male mortality rate is higher in younger age groups due to smoking habits and risky behaviors such as alcoholism, which lead to a higher incidence of accidents and comorbidities. Therefore, in older adults over the age of 80, there is a more balanced ratio between men and women²⁷.

Regarding body composition, we noted that height did not differ among the three groups, but body mass decreased over the decades. There was a noticeable loss of body mass and possible loss of muscle mass, especially when comparing group 1 with group 3. The decline in body mass is an indicator of sarcopenia, a factor characterized by frailty and functional deficit in the elderly population²⁸.

BMI differed between groups due to the progressive decline in body mass. The greatest difference was found when comparing the group of older adults up to 69 years of age with the

group of older adults over 80 years of age, who had a lower index. Another index that showed a reduction in the older age groups was the SMI, an index that can detect body decline and changes in body composition. In addition to body composition conditions, metabolic changes and concomitant diseases also influence low BMI levels, and this is reflected in the SMI. These factors trigger a series of complications such as functional decline and loss of quality of life²⁹.

Calf circumference (CC) is an important indicator of muscle health and is used for musculoskeletal marking and as a parameter for sarcopenia³⁰. In the results of the present study, CC decreased over the decades and differed between all groups. Like BMI and SMI, CC also tends to decrease progressively with age. Bezerra's study³¹ reported that in his sample, older adults over 70 years of age showed greater functional and musculoskeletal risk when compared to younger older adults, and that CC decreased with advancing age. Considered a risk factor and contributor to the development of diseases such as sarcopenia and chronic pain, older individuals diagnosed with low weight and low CC are up to three times more susceptible to such diseases³².

The nutritional index showed no difference between the groups, and no significant reduction in this index was observed. One factor we can take into consideration is the region of the study, since according to the Ministry of Health, in the latest survey in 2020, the Midwest region has the second lowest percentage of thinness at the national level (2.4%), characterized as a region where nutritional education is successfully promoted and where there is easy access to a wide variety of foods³³.

Fifty-three percent of older adults were considered sedentary, a result similar to epidemiological studies conducted in other Brazilian states, where the lack of regular physical activity was greater than 50% of the sample population³⁴. This finding in our results reports a public health problem that is evident: physical inactivity refers to a lifestyle characterized by a

lack of regular physical activity or insufficient participation in physical activities that promote health and well-being⁵.

Factors such as lack of access to safe and adequate spaces for physical activity, specific physical activity programs for older adults, lack of information and encouragement, and fear of injury, together with lack of confidence in their physical abilities, can act as barriers to older adults engaging in physical activity³⁵.

Social limitations can make it difficult to access physical activity, and this can potentially affect our data in general, as older adults in decentralized regions tend to have difficulty accessing environments where they can practice physical activity.

Handgrip strength and FC measured by functional tests (TSL, TUG, VM) showed significant results when compared between age groups, showing a gradual decline in muscle and functional performance, especially when comparing older adults in the group with older adults over 80 years of age. In his study, Ikegami³⁶, reported in a longitudinal study that, over two years, the older adults who made up the sample showed a decrease in functional capacity due to low physical activity and higher age group, corroborating our findings, as our older adults performed worse in functional tests and muscle strength tests.

Regarding the cut-off points for functional tests and the MIP and MEP values, all those that differed between groups were below expectations, especially in the older group, where the data showed a higher functional risk according to the test results. Low levels of muscle strength and respiratory muscle strength cause significant losses in the daily life of an older person, reducing the effectiveness of routine activities such as walking, personal hygiene, and leisure activities³⁷.

Functional independence indices showed functional decline over the decades, evidencing poor progression, with older adults tending to have greater functional dependence.

International findings corroborate our results, showing that these factors are of paramount importance for understanding the reality of older adults in the community at a global level.

A study conducted in Spain reported that half of its sample (119 older adults) over the age of 70 were at risk of malnutrition, physical inactivity, and functional dependence³⁸. Another study in Japan showed that in a population where there is an aging program with specialized medical care, regular physical activity programs, and policies focused on biopsychosocial health, there can be improvements in healthy aging and quality of life³⁹. Studies show that aging is a global issue and that problems are similar internationally. However, these findings highlight areas that need to be addressed in future intervention studies, with preventive actions to improve support for older adults.

The regression model proved to be significant: the older the age, the higher the BMI, the lower the hand grip strength (HGS) test score, and the less physical activity practiced, the lower the chances of belonging to the group with good functional capacity, which means that when these factors are low, the older person's functional capacity is worse. This finding corroborates a national study, which found that in its regression model, older adults with low hand grip strength, number of falls, and frailty are predictors of poor performance in functional tests⁴⁰.

Our findings reveal a gap in functional limitations, which can be addressed through intervention studies that focus on physical and functional aspects, but with multidisciplinary collaboration involving nutrition, psychology, and physical education professionals, thereby implementing comprehensive interventions.

Conclusion

There is a difference between older adults of different age groups in terms of body composition, functional capacity, and functional independence, especially when comparing younger older adults with older adults over 80 years of age.

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Figure 1: Flowchart of data referring to strength intensity, Five Times Sit-to-Stand Test (TSL), Timed Up And Go (TUG) test, maximum inspiratory pressure (MIP), and maximum expiratory pressure (MEP) of older adults of different age groups treated in primary health care.

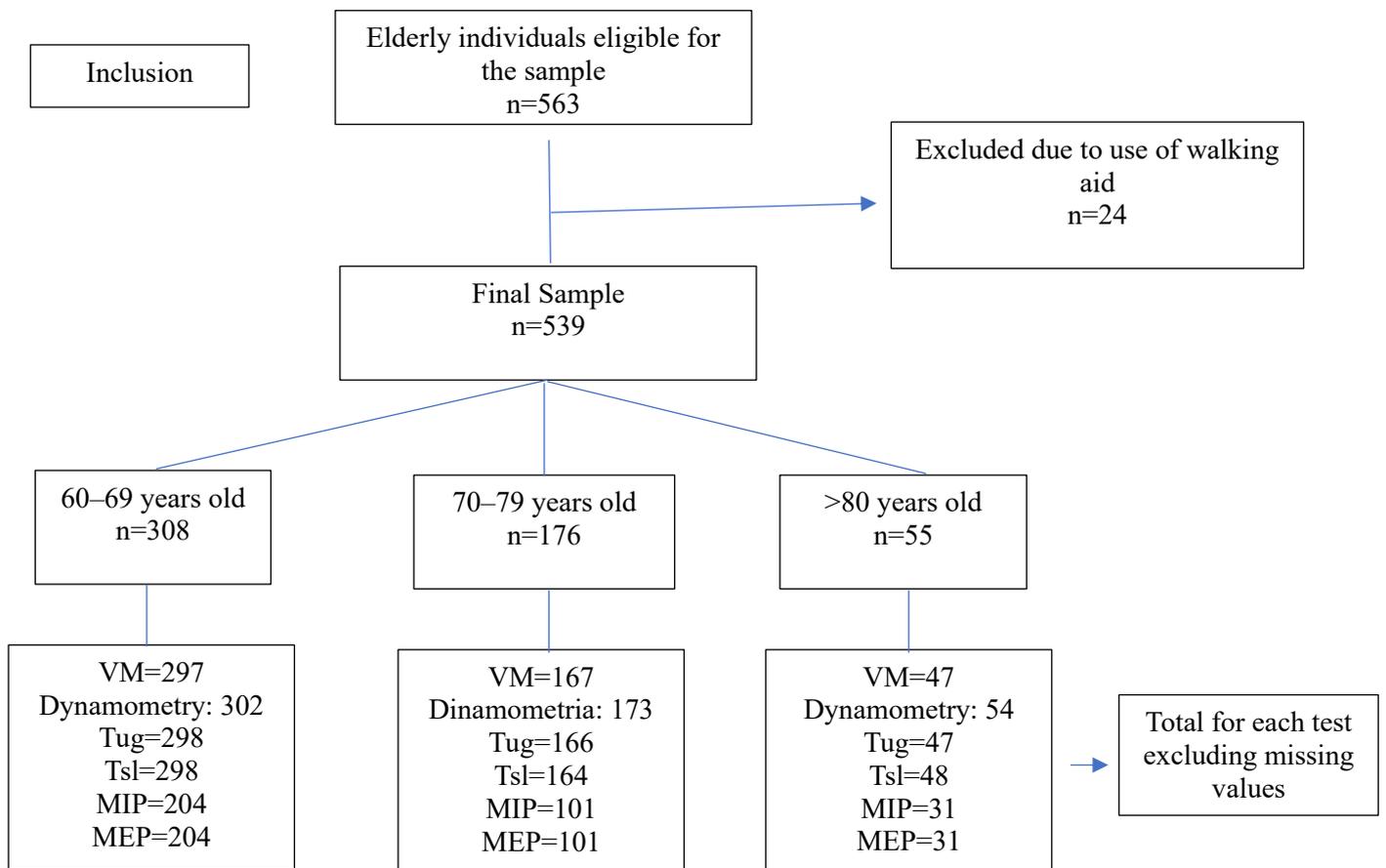


Table 1: Sociodemographic data, body composition, nutritional index, and physical activity level represented in groups by age group and compared between groups divided by age group.

Variables	Total sample (n= 539)	G1 60-69 years old (n= 308)	G2 70-79 years (n=176)	G3 >80 years old (n= 55)	p-value	G1/G2 p-value	G2/G3 p-value	G1/G3 p-value	Effect size
Age ¹ ** (years)	69.25±6.82	64.50±2.89	73.19±2.80	83.67±3.33	<0.001**	<0.001**	<0.001**	<0.001**	0.827
Sex: Female/Male*	348 (64.6) 191 (35.4)	216 (70.3) 92 (29.6)	106 (60.3) 70 (39.6)	26 (49.1) 29 (50.8)	0.002*	<0.001	0.109	0.006	-
Weight ¹ ** (kg)	68.25±13.26	70.97±13.30	66.20±13.03	61.73±11.41	<0.001**	0.05*	0.05*	<0.001**	0.043
Height ¹ (meters)	1.58 ± 0.09	1.58±0.8	1.57±0.9	1.59±0.10	0.186	-	-	-	
BMI ¹ **	27.21±4.91	28.15±5.18	26.76±4.22	24.45±4.64	<0.001**	0.05*	0.023*	<0.001**	0.037
SMI ¹ **	8.75±1.61	9.08±1.49	8.47±1.66	8.00±1.67	<0.001**	0.004*	<0.005*	<0.001**	0.034
Waist circumference ² *	93.99±12.24	95.10±13.22	93.86±10.58	91.69±13.04	0.005*	0.095	0.072	0.004*	0.010
Calf Circumference ² ** (Centimeters)	34.00 [25.88]	35 [15.48]	33 [19.78]	32 [23.12]	<0.001**	0.001**	0.003*	<0.001**	0.060
A Body Shape Index (ABSI) ou New Body Shape Index ¹	0.08±0.19	0.08±0.01	0.09±0.01	0.08±0.01	0.515	-	-	-	
Nutritional index ²	11.00 [6.38]	11 [6.46]	11 [6.07]	11 [6.05]	0.615	-	-	-	
Practice of physical activity ³ YES/NO	253 (47.0) 285 (53.0)	150 (48.7) 158 (51.29)	79 (44.8) 97 (55.1)	24 (43.6) 31 (56.3)	0.066	-	-	-	
Time in min of Physical Activity ² (Minutes)	0.00 [12083]	30 [15059]	30 [11866]	0 [5262]	0.259	-	-	-	

Legend: 1 - Means ± standard deviation compared using one-way ANOVA.

2- Medians [Variance] compared using the Kruskal-Wallis test.

3- Frequency (%) compared using the chi-square test (post hoc with adjusted alpha: *p<0.083). BMI, body mass index; ASMI, appendicular muscle mass index;

4- Pairwise comparison between groups: 60-69 (G1) /70-79 (G2); 70-79 (G2) />80 (G3); 60-69 (G1) />80 (G3)

*p<0.005; **p<0.001; effect size <0.01 (negligible), between 0.01 and 0.06 (small), between 0.06 and 0.14 (medium), and >0.14 (large).

Table 2: Functional capacity and levels of functional independence represented in groups by age range and compared between groups divided by age range.

Variables	Total sample (n= 539)	G1 60-69 years old (n= 308)	G2 70-79 years old (n=184)	G3 >80 years old (n= 59)	p-value	G1/G2 p-value	G2/G3 p-value	G1/G3 p-value	Effect size
Dynamometry ¹	25.57±8.98	26.11±8.23	25.60±9.00	22.20±7.16	0.004*	0.090	0.067	0.003*	0.009
Gait speed ^{1**} (Meters/Second)	0.91±0.29	0.94±0.30	0.91±0.29	0.73±0.26	<0.001**	0.545	<0.001*	<0.001**	0.040
Five Times Sit-to-Stand Test ^{2*} (Seconds)	13.77 [71.93]	13.12 [46.19]	13.63[63.64]	14.91[67.12]	0.05*	0.358	0.656	0.05*	0.008
Timed Up and Go ^{2 **} (Seconds)	10.15 [21.69]	9.68[13.72]	10.03 [16.92]	12.53 [29.29]	<0.001**	0.080	0.001*	<0.001**	0.049
MIP ^{2 **} (Centímetros / H2O)	57.50 [827]	60.0 [951]	55.0 [670]	50.0 [502]	0.001*	0.282	0.471	0.003*	0.024
MEP ² (Inches / H2O)	65.0 [953]	70.0 [993]	60.0 [911]	50.0 [652]	0.026*	1.000	0.132	0.002*	0.016
Barthel ^{2 **}	100 [64.42]	100 [31.5]	100 [129.9]	95 [38.62]	<0.001**	1.000	<0.001**	<0.001**	0.020
Lawnton ^{2 **}	21 [6.70]	21 [3.14]	20 [5.39]	19 [7.21]	<0.001**	0.002*	0.003*	<0.001**	0.051

Legend: 1 - Means ± standard deviation compared using one-way ANOVA.

2- Medians [Variance] compared using the Kruskal-Wallis test.; MIP, maximum inspiratory pressure; MEP, maximum expiratory pressure.

3 - Pairwise comparison between groups: 60-69 (G1) /70-79 (G2); 70-79 (G2) />80 (G3); 60-69 (G1) />80 (G3)

*p<0.005; **p<0.001; effect size <0.01 (negligible), between 0.01 and 0.06 (small), between 0.06 and 0.14 (medium), and >0.14 (large).