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Original Scientific Article

The Correlation Between Handgrip Strength and Adductor Muscles with Muscle Mass, Fat Mass in the Elderly

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Abstract

Background. As you age, body composition will also change, with muscle mass decreasing and fat mass increasing. Handgrip strength and adductor muscle strength have been identified as indicators of older people's health used to represent overall strength and muscle mass.

Objectives. This study aimed to investigate the relationship between handgrip strength and adductor muscle strength with muscle mass and fat mass in older people.

Materiarls and methods. The present study used a cross-sectional research method. The subjects consisted of thirty-two older women with the following characteristics: age 64.65 ± 7.18 years, height 148.65 ± 5.38 cm, body mass 60.43 ± 9.32 kg, BMI 27.40 ± 4.47 kg/m2. The body composition test used the Inbody 270. Meanwhile, the handgrip strength test used the Handgrip device, and the adductor muscle strength test used the ForceFrame system. The analysis was conducted using SPSS version 27 software, with the data normality test being performed using the one-sample Kolmogorov-Smirnov test method (p-value > 0.05). Pearson correlation was employed to analyse the relationship between two variables (p-value < 0.05).

Results. Based on the data obtained, it was found that there was a substantial correlation between right and left handgrip strength and right (p-value: 0.026, r-value: 0.392) and left (p-value: 0.021, r-value: 0.408) arm muscle mass. Additionally, a significant correlation was observed between right adductor muscle strength and right leg muscle mass (p-value: 0.034, r-value: 0.375), but left adductor muscle strength was not correlated with left leg muscle mass. Meanwhile, handgrip and adductor muscle strength were not found to be correlated with fat mass.

Conclusions. This study proves that right and left handgrip strength, as well as right adductor muscle strength, are associated with muscle mass in the elderly. The greater the muscle mass, the higher the handgrip strength and adductor muscle strength. However, due to the limited number of subjects, further research with a larger sample size is needed.
Keywords: strength, muscle mass, handgrip, adductors, elderly.

Introduction

As you age, walking and moving will become slower, with shorter stride lengths due to reduced muscle mass and weakened muscle strength called sarcopenia (Dong et al., 2024; Stotz et al., 2023). The European Working Group on Sarcopenia in Older People (EWGSOP) proposed the diagnosis and main contributors against sarcopenia criteria using body composition, muscle mass and strength, and low walking speed (Schaap et al., 2018; Prokopidis et al., 2022). Some research has analyzed the relationship between walking performance and lower extremity strength and muscle mass, which is positively related to muscle strength

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(Barrea et al., 2022; Krolikowska et al., 2023). Sarcopenia is a significant global public health problem in the elderly due to physical problems with changes in body composition where muscle mass decreases and fat mass increases (Bian et al., 2020; Moncada-Jiménez et al., 2023). Reduced strength and muscle mass have a severe impact on many chronic diseases and aging; this causes reduced motor functional abilities, metabolic and hormonal disruption, physiological changes, and decreased nutritional status in the elderly (Valente et al., 2019; Pacheco et al., 2021; Li et al., 2022). Sarcopenia in the elderly is a serious problem that is being highlighted globally because it can increase the risk of falls, imbalance, physical problems, and death (Park et al., 2022; Marini et al., 2024). However, knowledge about sarcopenia is still low among health professionals, which has a protocol for diagnosing and treating sarcopenia. Therefore, sarcopenia is a significant health problem for healthcare systems worldwide (Li et al., 2022; Zanker et al., 2023).

Asia has an elderly population over sixty-five years old; Korea is one of the countries with a faster aging rate, reaching 19 million (40% of the entire population); the prevalence of sarcopenia is estimated at 4.1-11.5% in the elderly population in Asia according to the Asian Working Group on Sarcopenia (AWGS) criteria. It increases with age, ranging from five to thirteen degrees at age sixty to seventy years to eleven to fifty degrees at age eighty years and over (Bian et al., 2020; Hwang & Park, 2022; Shen et al., 2023). With the increasing population of older adults experiencing sarcopenia, the risk of falls and bone fractures is increasing; one-third of older adults fall at least once a year, and an average of 4.1% experience a fracture (Yeung et al., 2019; Wen et al., 2023). Muscle mass accounts for the majority of body composition, around 42% of body mass in adult humans, but decreases to around 27% in the elderly, which will be visible when they reach the age of fifty. Muscle mass also plays a vital role in many physiological processes, such as physical function and metabolism (Lee et al., 2017; Bilski et al., 2022). Age-related reduction in muscle mass in the lower extremities can be much more significant than in the upper extremities due to social-psychological factors, physiology, and nutritional deficits or malnutrition in the elderly (Santiago et al., 2021; Nishi et al., 2022). Body fat mass (BFM) is one of the risk factors for falls and fractures that influences reduced walking performance in older adults over the age of sixty years (Moayyeri et al., 2012; Stotz et al., 2023). Handgrip and ForceFrame are tools for determining muscle strength in the elderly that are easy to use, cost-effective, simple, and practical. Both tools strongly correlate with muscle measurements of the upper and lower extremities (Oliveira & Frangella, 2010; Ren et al., 2023; Wen et al., 2023b; Ferguson et al., 2024).

Handgrip strength (HGS) and measuring adductor muscle strength are indicators of the health of the elderly and are used to represent overall muscle strength. A thorough examination of body composition and muscle strength is needed to prevent the elderly from experiencing health problems (Valente et al., 2019; Barrea et al., 2022; Nishi et al., 2022). Free fat mass (FFM) is more important for the elderly because the reduced free fat mass (FFM), accompanied by increased body fat mass (BFM), will hurt health conditions and is associated with the risk of detrimental metabolic diseases (Lee et al., 2017). Resistance training (RE) is the leading natural anabolic stimulus for muscle mass growth, with moderate to vigorous intensity for two to three days/week. This exercise is effective in returning the body from weak to fit, maintaining muscle mass, and reducing the risk of death and musculoskeletal dysfunction in the elderly (Abe et al., 2019; Nilsson et al., 2020). Exercising regularly and moving actively is a way to maintain muscle mass in the elderly; the active elderly have a reduced risk of falls, fractures, and disruption of daily activities (Nishi et al., 2022). Proper nutrition is essential to reduce the development of sarcopenia and maintain health in aging, but excessive calorie intake and dietary fat composition can also increase the development of sarcopenia. In addition, protein and vitamin D also influence muscle mass and strength in the elderly (Santiago et al., 2021; Bilski et al., 2022).

Based on all this information, this research aims to determine the correlation or relationship between handgrip strength (HGS) and adductor muscle strength with muscle mass and fat mass in the elderly. In this study, researchers also attempted to examine how strong the relationship is between handgrip strength (HGS) and muscle mass and fat mass of the upper extremities, as well as the relationship between adductor muscle strength and muscle mass and fat mass of the lower extremities. This study hypothesizes that adductor and handgrip muscle strength is correlated with muscle mass but not with fat mass in the elderly. Because the more significant the muscle mass you have, the higher the handgrip strength (HGS) and adductor muscle strength in the elderly. The research has the benefit of increasing knowledge about sarcopenia among professionals and healthcare systems worldwide that have protocols for diagnosing and treating sarcopenia.

Materials and Methods

Study Participants

This research uses a cross-sectional study method. The research subjects consisted of thirty-two older women with characteristics (age 64.65 ± 7.18 years, height 148.65 ± 5.38 cm, body mass 60.43 ± 9.32 kg, BMI 27.40 ± 4.47 kg/m^2). All seniors were provided information about the study's aims, procedures, and protocols. This research has several criteria that can influence the subjects in the research or limit performance when collecting research data. There are inclusion criteria, namely: 1) All subjects meet the criteria and conditions for collecting research data; 2) In good health 3) Aged more than or equal to 50 years; 4) Female; 5) Do not experience health problems or muscle injuries at the time of data collection. Apart from that, this research also has exclusion criteria, namely: 1) Has not or does not meet the criteria and conditions for conducting research; 2) In an unhealthy condition and not having the immune system to carry out the test; 3) Age less than 50 years; 4) Male; 5) Currently experiencing health problems and muscle injuries at the time of data collection. This research has received ethical permission 0034/UN.38III.1/DL.01.02/2024.

InBody 270 Body Composition Test

In this study, body composition was measured, which is very important. A proper assessment is a more valid

assessment through multifrequency anthropometric and bioelectrical impedance analysis (BIA) devices using InBody 270. This device provides more accurate results than other single-frequency bioelectrical impedance analysis (BIA) devices (Czartoryski et al., 2020; Elvira et al., 2022). InBody 270 is a unique medical device used to measure body composition using quantitative methods, based on muscle tissue's ability to conduct electricity (Bukowska et al., 2021). Measure muscle mass and fat mass of the upper and lower extremities using InBody type 270 (Seoul, South Korea). Subjects were instructed to remove footwear and metal or iron accessories during measurements. The first step is to measure body weight and adjust the position of the feet with electrodes or sensors. After the weight data is entered, the subject enters their identity using the user ID to determine the body composition results. Then, when the body composition test begins, the subject pulls the handle and places his thumb on the electrode or sensor. Keep your elbows straight and away from the body and look forward, remaining still until the test process is complete. Each subject will experiment until the body composition results appear on the screen.

Handgrip Strength Test

In this study, handgrip strength (HGS) measured arm muscle strength. Handgrip strength (HGS) is an initial method for diagnosing sarcopenia in older women based on guidelines (EWGSOP). This method has proven to be an excellent, low-cost muscle mass index that will add precision to the measurement of body composition of an older adult (Cruz-Jentoft et al., 2019; Moncada-Jiménez et al., 2023). Handgrip strength (HGS) measurements were carried out using Takei Brand handgrips (Tokyo, Japan). Before carrying out the test, the subject does stretching in the form of gymnastics to stretch the muscles. During measurement, subjects were instructed to stand with their eyes looking forward and elbows straight, relaxed, and in an extended position. After that, the Handgrip was attached to the subject's hand, and then the subject grasped the Handgrip with as much force as possible. Each subject did this on the right and left hand three times each. The handgrip strength results will appear on the available screen.

Adductor Muscle Strength Test

Measuring adductor muscle strength is an integral part of this research. ForceFrame is a tool that has proven its reliability by having very high validity and reliability when used to measure adductor muscle strength (O'Brien et al., 2019; Couch, Sayers & Pizzari, 2021). Force Frame is practical, cost-effective, and easy to use. ForceFrame is not limited by the tester's skills and experience in a more time-efficient manner (Ferguson et al., 2024). Adductor muscle strength was measured using a Vald Performance Brand ForceFrame (Brisbane, Australia). Before the test begins, the subject does stretching in the form of gymnastics to stretch the muscles. After that, the subject was instructed to remove his footwear and sit on a chair with his knees at ninety degrees. Next, both subjects' legs were inserted into the ForceFrame, with both hands next to the body to maintain balance. Once the body of the lower extremities is ready, the legs are pushed to the side as much as possible to get the adductor muscle strength test results. After approximately fifteen seconds of pushing the legs to the maximum, relax the legs to stretch the muscles of the lower extremities. The measurement results will appear and be input on a laptop connected to a tool used to measure adductor muscle strength.

Data Collection

Data collection in this study began with a body composition test using the InBody 270 to determine muscle and body fat mass in the subjects' upper extremities (right and left arms) and lower extremities (right and left legs). Then, the handgrip strength (HGS) test is carried out on the right and left hands to determine the maximum hand grip strength. After that, an adductor muscle strength test is carried out to determine the maximum strength of the right and left adductor muscles. Raw data was collected and entered in Microsoft Excel.

Statistical Analysis

The test results data from the subject's measurements were analyzed using SPSS version 27 software. After selecting the maximum value of handgrip strength and knowing the value of adductor muscle strength, as well as knowing the percentage of muscle mass and fat mass in the arms and legs, a data normality test was carried out using the one-sample Kolmogorov-Smirnov test method (> 0.05). Then, Pearson correlation analysis was used to analyze the relationship between handgrip strength (HGS) and adductor muscle strength, as well as muscle mass and fat mass. With p-value as a significant value to determine whether or not there is a relationship between two variables (< 0.05) and r-value as the correlation coefficient value to determine how strong the relationship is between variables (coefficient interval: 0.00-0.199 = very low; 0.20-0.399 = low; 0.40-0.599 = moderate; 0.60-0.799 = high; 0.80-1.000 = very high).

Results

Subject Characteristic

This chapter presents the results of the characteristics of the subjects used in this research. Table 1 shows the age range of the subjects (64.65 ± 7.18 years), which shows that the data is usually distributed after carrying out the normality test. Then height (148.65 ± 5.38 cm), body mass (60.43 ± 9.32 kg), and BMI (60.43 ± 9.32 kg/m2) also showed typically distributed data. Apart from that, there is also right arm FFM (1.79 ± 0.32 kg), right arm BFM (1.83 ± 0.82 kg), left arm FFM (1.75 ± 0.33 kg), left arm BFM (1.87 ± 0.79 kg), which after carrying out the normality test shows that the data usually distributed. Furthermore, right leg FFM (4.81 ± 0.77 kg), right leg BFM (3.35 ± 1.08 kg), left leg FFM (4.77 ± 0.79 kg), left leg BFM (3.33 ± 1.06 kg) also showed normal distribution of data.

Results of the Handgrip Strength

Table 2 shows the handgrip strength (HGS) of the subjects. The right (17.59 ± 3.04 kg) and left (16.06 ± 3.50 kg)

Table 1. Normality Test Results of the Subject Characteristics

Variables	Female (n = 32) Mean ± SD	p
Age (years)	64.65 ± 7.18	0.200
Height (cm)	148.65 ± 5.38	0.200
Weight (kg)	60.43 ± 9.32	0.200
BMI (kg/m2)	27.40 ± 4.47	0.200
Right Arm FFM (kg)	1.79 ± 0.32	0.200
Right Arm BFM (kg)	1.83 ± 0.82	0.200
Left Arm FFM (kg)	1.75 ± 0.33	0.200
Left Arm BFM (kg)	1.87 ± 0.79	0.118
Right Leg FFM (kg)	4.81 ± 0.77	0.085
Right Leg BFM (kg)	3.35 ± 1.08	0.200
Left Leg FFM (kg)	4.77 ± 0.79	0.200
Left Leg BFM (kg)	3.33 ± 1.06	0.200

Note. BMI = Body Mass Index; FFM = Free Fat Mass; BFM = Body Fat Mass

handgrip strength (HGS) after the normality test showed that the data were normally distributed.

Table 2. Normality Test Results of the Handgrip Strength

Variables	Female (n=32) Mean ± SD	p
Right HGS (kg)	17.59 ± 3.04	0.200
Left HGS (kg)	16.06 ± 3.50	0.128

Note. HGS = Handgrip Strength

Results of the Adductor Muscle Strength

Table 3 shows the subjects' adductor muscle strength. After the normality test, the strength of the right (161.83 ± 42.42 N) and left (167.38 ± 44.07 N) adductor muscles showed that the data were normally distributed.

Table 3. Normality Test Results of the Adductor Muscle Strength

Variables	Female (n=32) Mean ± SD	p
Right ADD MS (N)	161.83 ± 42.42	0.200
Left ADD MS (N)	167.38 ± 44.07	0.076

Note. ADD MS = Adductor Muscle Strength

Correlation Test Results

Table 4 shows the correlation test results between handgrip strength (HGS) and adductor muscle strength with muscle mass and fat mass. Right handgrip strength (HGS) (17.59 ± 3.04 kg) with right arm FFM (1.79 ± 0.32 kg) produced a p-value of 0.026 and an r-value of 0.392, indicating that there was a significant relationship between the two. Right handgrip strength (HGS) (17.59 ± 3.04 kg) with right arm BFM (1.83 ± 0.82 kg) produced a p-value of 0.598 and an r-value of 0.097, indicating that there was no significant relationship between the two. Left handgrip strength (HGS) (16.06 ± 3.50 kg) with left arm FFM (1.75 ± 0.33 kg) produced a p-value of 0.021 and an r-value of 0.408, indicating that there was a significant relationship between the two. Left handgrip strength (HGS) (16.06 ± 3.50 kg) with left arm BFM (1.87 ± 0.79 kg) produced a p-value of 0.106 and an r-value of 0.291, indicating that there was no significant relationship between the two. Right adductor

Table 4. Statistics of the Correlation Test Results

Variables	Mean ± SD	p	r	Correlation Interval	Positive/Negative Correlation
Right HGS (kg)	17.59 ± 3.04	0.026	0.392	Low	Positive
Right Arm FFM (kg)	1.79 ± 0.32				
Right HGS (kg)	17.59 ± 3.04	0.598	0.097	-	-
Right Arm BFM (kg)	1.83 ± 0.82				
Left HGS (kg)	16.06 ± 3.50	0.021	0.408	Medium	Positive
Left Arm FFM (kg)	1.75 ± 0.33				
Left HGS (kg)	16.06 ± 3.50	0.106	0.291	-	-
Left Arm BFM (kg)	1.87 ± 0.79				
Right ADD MS (N)	161.83 ± 42.42	0.034	0.375	Low	Positive
Right Leg FFM (kg)	4.81 ± 0.77				
Right ADD MS (N)	161.83 ± 42.42	0.260	0.250	-	-
Right Leg BFM (kg)	3.35 ± 1.08				
Left ADD MS (N)	167.38 ± 44.07	0.053	0.345	-	-
Left Leg FFM (kg)	4.77 ± 0.79				
Left ADD MS (N)	167.38 ± 44.07	0.249	0.210	-	-
Left Leg BFM (kg)	3.33 ± 1.06				

Note. HGS = Handgrip Strength; ADD MS = Adductor Muscle Strength

muscle strength (161.83 ± 42.42 N) with right leg FFM (4.81 ± 0.77 kg) produced a p-value of 0.034 and r-value of 0.375, indicating a significant relationship between the two. Right adductor muscle strength (161.83 ± 42.42 N) with right leg BFM (3.35 ± 1.08 kg) produced a p-value of 0.260 and an r-value of 0.250, indicating no significant relationship between the two. Left adductor muscle strength (167.38 ± 44.07 N) with left leg FFM (4.77 ± 0.79 kg) produced a p-value of 0.053 and r-value of 0.345, indicating no significant relationship between the two. Left adductor muscle strength (167.38 ± 44.07 N) with left leg BFM (3.33 ± 1.06 kg) produced a p-value of 0.249 and an r-value of 0.210, indicating no significant relationship between the two.

Discussion

The main findings of our study showed that muscle mass correlated with both right and left handgrip strength (HGS) and right adductor muscle strength but did not correlate with left adductor muscle strength. This could happen because the muscle mass in the left leg was lower than the right leg in 20 subjects, and the muscle strength of the left adductor was higher than the right adductor in 31 subjects. With lower muscle mass and higher strength, left leg muscle mass does not correlate with left adductor strength. Our findings differ slightly from previous studies in elderly groups. The study found a relationship between muscle mass and muscle strength in the upper extremities, indicating that muscle strength will increase as muscle mass increases. However, no relationship was found between muscle mass and muscle strength in the lower extremities, indicating that increasing muscle mass does not increase muscle strength (Nishi et al., 2022). In addition, the results of our study are inversely proportional to previous studies, which stated that the right adductor muscle (dominant leg) was significantly more substantial than the left adductor muscle (non-dominant leg) (Krolikowska et al., 2023). Therefore, we think the dominant adductor muscle contributes more to movement in the elderly than the nondominant adductor muscles, which causes muscle strength imbalances and asymmetric loading. Research we conducted on older adults with imbalances in adductor muscle strength confirmed differences in adductor muscle strength in the lower extremities among subjects, which causes the results of our study to differ from those obtained in previous studies. The differences in the results of this study are partly due to the different number of subjects and differences in methodology when collecting adductor muscle strength data.

In our subjects, there was a prevalence of lower muscle mass than fat mass, especially in the upper extremities in fifteen subjects with an average BMI of 27.40 ± 4.47 in the overweight category (underweight = 1; regular = 9; overweight = 12; obesity = 10), higher fat mass is associated with slower walking speed. The same statement was also shown in previous studies, which showed that body fat mass (BFM) in all parts of the body is higher than free fat mass (FFM) (Merchant et al., 2021; Bozkurt et al., 2024; Dong et al., 2024b; Marini et al., 2024). The free fat mass (FFM) in our subjects is relatively small compared to their overall body weight, and a higher body fat mass (BFM) will reduce the ability to walk and carry out more strenuous activities. In our research, we prioritize maintaining muscle mass rather than muscle strength. Previous research design also allows us to prefer maintaining muscle mass over strength. However, according to the latest EWGSOP definition, muscle strength precedes muscle quantity in diagnosing sarcopenia (Cortez et al., 2020; Rezaei et al., 2024). In our subjects, older women had higher muscle strength demands to achieve speed and balance when walking, with loss of muscle strength occurring more rapidly than muscle mass. In line with this, previous research shows that loss of muscle strength predicts decreased muscle quality and defines poor balance with greater fat mass and lower handgrip strength (HGS) in older women (Khanal et al., 2021; Stotz et al., 2023; Attaway et al., 2024).

In our research, the relationship between muscle mass and handgrip strength (HGS) is known, with the loss of muscle strength with increasing age causing older adults to have low handgrip strength (HGS). Lower handgrip strength (HGS) and higher body fat mass (BFM) are associated with lower upper extremity muscle mass. In our subjects, the strength of the dominant hand was, on average, 10% better than that of the nondominant hand dominant; previous research generally supports our findings (Valente et al., 2019; Khanal et al., 2021). In the elderly, they reduced handgrip strength (HGS) faster than muscle mass loss. Maximum handgrip strength (HGS) and lower free fat mass (FFM) result in lower muscle strength and physical performance. The results regarding lower muscle strength and physical performance align with several previous studies (Zembura et al., 2023; Huang & Ko, 2024). Previous studies have shown that low handgrip strength (HGS) and reduced muscle mass can be associated with greater disease severity and show that the risk of falls will also be higher (Pagano et al., 2018; Khanal et al., 2021; Simó-Servat et al., 2023).

The results of our research show that there are many ways to maintain muscle mass and muscle strength in the elderly. The reduction in muscle mass occurs progressively because daily activities are reduced significantly; older adults who experience sarcopenia will have difficulty maintaining muscle mass. Apart from exercising, maintaining nutrition is also a way to keep muscle mass from decreasing quickly. Several studies support that handgrip strength (HGS) and adductor muscle strength are positively related to nutritional status and muscle mass (Oliveira & Frangella, 2010). As in existing research, it has been stated that nutritional supplementation can increase muscle mass and handgrip strength (HGS). The leading cause of the rapid decline in muscle mass and strength is excessive protein breakdown and decreased protein synthesis. Consuming protein can maintain muscle mass and improve muscle function in the elderly (Rezaei et al., 2024; Shen et al., 2024). Protein intake has been proven to prevent protein breakdown and stimulate muscle protein synthesis in the elderly. Combining exercise and higher protein intake is a very effective strategy for maintaining muscle mass (Takae et al., 2019; Huang & Ko, 2024).

Our research has advantages over previous research; we used a feasible test procedure to make it easier for older adults to carry out the test, and no special training is required. Handgrip strength (HGS), which we applied, showed more solid results in sarcopenia assessment and could predict mortality. With height, weight, age, and gender, the main factor is the value of handgrip strength (HGS). Given the

high reliability in data collection and low subject variability of our study, we are confident in the accuracy of this study. The research that we have done also has several limitations, the main one being our low number of subjects (n = 32), resulting in a lower amount of data recorded than in previous research. Due to this study's relatively low sample size, future research is necessary. It should be conducted to investigate various elements of reliability with a more significant number of subjects to refine the study that we have done. In addition, validity studies on different aspects should be carried out; validity studies should primarily focus on assessing whether there is a relationship between handgrip strength (HGS) and adductor muscle strength with muscle mass and fat mass.

Conclusion

This research proves a correlation between right and left handgrip strength (HGS) and right and left arm muscle mass. In addition, the strength of the right adductor muscle was correlated with the muscle mass of the right leg. However, the strength of the left adductor muscle was not significantly correlated with the muscle mass of the left leg. Because the more significant the muscle mass you have, the higher the handgrip strength (HGS) and adductor muscle strength. Meanwhile, handgrip strength (HGS) and proper or left adductor muscle strength did not correlate with arm and leg fat mass. Dominant muscle strength plays a more significant role in the movement of the elderly, and variations in subjects and methodology cause differences in the results of previous studies. This research also emphasizes the importance of maintaining muscle mass so that muscle strength is not easily lost by changing the lifestyle of the elderly through regular exercise. Apart from that, increasing protein intake and nutritional supplementation can also prevent muscle mass loss. Due to the limited number of subjects, future research with more significant subjects is needed.

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Conflict of Interest

There are no conflict of interest in this research.

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Кореляція між силою хвату кисті та м'язами-аддукторами з м'язовою масою та жировою масою у осіб похилого віку

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Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 9 с., 4 табл., 47 джерел.

Історія питання. Із віком композиція тіла також змінюється: кількість м'язової маси зменшується, а жирової — збільшується. Сила хвату кисті та сила привідних м'язів визначаються як показники здоров'я літніх осіб, що використовуються для оцінки загальної сили та м'язової маси.

Мета дослідження. Мета цього дослідження полягала у вивченні взаємозв'язку між силою хвату кисті і силою привідних м'язів з м'язовою масою та жировою масою у осіб похилого віку.

Матеріали та методи. У цьому дослідженні використовувався поперечний дослідницький метод. Група досліджуваних складалася з тридцяти двох жінок похилого віку з наступними характеристиками: вік 64.65 ± 7.18 років, зріст 148.65 ± 5.38 см, маса тіла 60.43 ± 9.32 кг, ІМТ 27.40 ± 4.47 кг/м^2. Для тестування складу тіла використовувався прилад Inbody 270. Тест на визначення сили хвату кисті проведено за допомогою ручного динамометра, тоді як для тесту на визначення сили привідних м'язів застосовувалась система ForceFrame. Аналіз проводився із використанням програмного забезпечення SPSS версії 27, а перевірку нормальності даних здійснено за допомогою одновибіркового критерію узгодженості Колмогорова-Смирнова (p-значення > 0.05). Для аналізу взаємозв'язку між двома змінними використовувалась кореляція Пірсона (p-значення < 0.05).

Результати. На основі отриманих даних встановлено суттєву кореляцію між силою хвату правої та лівої кистей та м'язовою масою правої (p-значення: 0.026, r-значення: 0.392) та лівої (p-значення: 0.021, r-значення: 0.408) рук. Крім того, спостерігалася значна кореляція між силою правого привідного м'яза та м'язовою масою правої ноги (p-значення: 0.034, r-значення: 0.375), однак сила лівого привідного м'яза не корелювала з м'язовою масою лівої ноги. Водночас не було виявлено кореляції між силою хвату кисті та силою привідних м'язів із жировою масою.

Висновки. Це дослідження доводить, що сила хвату правої та лівої кистей, а також сила правого привідного м'яза пов'язані з м'язовою масою у літніх осіб. Чим більша м'язова маса, тим вища сила хвату кисті та сила привідного м'яза. Втім, через обмежену кількість досліджуваних осіб, необхідно провести подальші дослідження з залученням більшої вибірки учасників.

Ключові слова: сила, м'язова маса, хват кисті, аддуктори, особи похилого віку.

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