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Intervention strategies with muscle strengthening exercises to improve walking speed in the older adults

Estratégias de intervenção com exercícios de fortalecimento muscular para melhorar a velocidade de caminhada em idosos

Estrategias de intervención con ejercicios de fortalecimiento muscular para mejorar la velocidad de la marcha en adultos mayores

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Main practical implications:
The aging of the population is a latent problem, the article contributes to the literature and has the potential to contribute to the formulation of public policies.
Originality/value:
The article finds opportunities for specialized literature, focusing on a key topic little explored in the health sciences of the context called the global south.

ABSTRACT

The fact of performing physical activity is of vital importance and if a muscle strengthening exercise program plan is added to this, it is even more beneficial for the health of our body. The aim of this study was to determine if muscle strengthening exercise helps improve walking speed in these people. Information was collected from the main scientific bases such as PubMed, Google Scholar, Scopus, Scielo, Elsevier. For the investigation of the information, the following descriptors of health sciences were used: Gait; Walking speed; Pass test; Exercise techniques with movement; old man; Exercise with therapy. The inclusion criteria were the articles that were within the period 2017-2022, in the English, Portuguese and Spanish languages. 30 articles were incorporated into this review article. In these articles, information was found on the speed of walking and muscle strength exercises in the elderly. With the information collected, it is concluded that the application of a program of muscle strengthening exercises in the lower limb helps to improve the speed of walking in older adults.

Keywords: elderly, exercise movement techniques; walking speed; exercise therapy.

RESUMO

O fato de realizar atividade física é de vital importância e se a isso se somar um plano de programa de exercícios de fortalecimento muscular, é ainda mais benéfico para a saúde do nosso corpo. O objetivo deste estudo foi determinar se o exercício de fortalecimento muscular ajuda a melhorar a velocidade de caminhada nessas pessoas. As informações foram coletadas nas principais bases científicas como PubMed, Google Scholar, Scopus, Scielo, Elsevier. Para a investigação das informações, foram utilizados os seguintes descritores das ciências da saúde: Marcha; Velocidade de caminhada; Teste de passagem; Técnicas de exercícios com movimento; Velhote; Exercício com terapia. Os critérios de inclusão foram os artigos que estivessem no período de 2017-2022, nos idiomas inglês, português e espanhol. 30 artigos foram incorporados a este artigo de revisão. Nesses artigos foram encontradas informações sobre a velocidade de caminhada e exercícios de força muscular em idosos, com as informações coletadas conclui-se que a aplicação de um programa de exercícios de fortalecimento muscular em membro inferior auxilia na melhora da velocidade de caminhada. em adultos mais velhos.

Palavras-chave: idoso; técnicas de exercício e de movimento, velocidade de caminhada; terapia por exercício.

RESUMEN

El hecho de realizar actividad física es de vital importancia y si a esto se le suma un plan de programa de ejercicios de fortalecimiento muscular, es aún más beneficioso para la salud de nuestro organismo. El objetivo de este estudio fue determinar si el ejercicio de fortalecimiento muscular ayuda a mejorar la velocidad al caminar en estas personas. Se recopiló información de las principales bases científicas como PubMed, Google Scholar, Scopus, Scielo, Elsevier. Para la investigación de la información se utilizaron los siguientes descriptores de ciencias de la salud: Marcha; La velocidad al caminar; Pasar el examen; Técnicas de ejercicio con movimiento; anciano; Ejercicio con terapia. Los criterios de inclusión fueron los artículos que se encontraban dentro del período 2017-2022, en los idiomas inglés, portugués y español. Se incorporaron 30 artículos a este artículo de revisión. En estos artículos se encontró información sobre la velocidad de la marcha y los ejercicios de fuerza muscular en personas mayores. Con la información recopilada se concluye que la aplicación de un programa de ejercicios de fortalecimiento muscular en el miembro inferior ayuda a mejorar la velocidad de la marcha. en adultos mayores.

Palabras clave: ancianos, ejercitar técnicas de movimiento; la velocidad al caminar; terapia de ejercicio.

INTRODUCTION

Globally, the number of older adults is growing rapidly. It is projected that by the year 2025 the population of this group will reach 1100 million people worldwide (Villafuerte et al., 2017). By the year 2050 it will reach 2000 million (Cigarroa et al.,2020). In Ecuador the older adult population reports an upward growth rate related to the great longevity in this century and the progressive decrease in fertility as a decision of couples today (Rodriguez et al.,2017). Undoubtedly, in relation to the growing number of older adults in the world, it is essential to expand comprehensive strategies for health. For example, exercise programs that promote quality of life in this age.

Currently, multiple authors have evaluated the living conditions in older adults reporting deterioration in the physical and social spheres. That's the reason why these people experience a feeling of exclusion by society, (Jaimes et al.,2017). It should be noted that within the physical spheres and over time, older adults are decreasing muscle strength. It involves severe limitation in walking, which mainly affects the speed of it (Duran et al., 2020). For this reason, this age group has increased the risk of falls and fractures and consequently its morbidity and mortality. It would imply an adverse effect on the quality of life (Sgaravatti et al., 2018).

The findings in older adults reported in the literature help understand the adverse effects described above. This development project will be carried out in older adults between 60 and 85 years of age who attend the Atahualpa's parish of Ambato. At this place, it is intended to plan the implementation of muscle strengthening exercise programs through the creation of dynamic scenarios, with a motivating environment suitable for older adults. It aims at promoting physical activity and learning about the benefits of it to achieve improved walking speed. (Aranda, 2018).

As explained above, these exercise programs for muscle strengthening seek in older adults to avoid injuries that occur by not doing the exercises in a correct way. It is also important to educate family members and caregivers of these people by teaching them how to properly perform the various muscle strengthening exercises. This is why one of the objectives of this research is to evaluate the intervention strategies with muscle strengthening exercises to improve walking speed in the elderly (Gil P et al., 2012). Consequently, the following hypothesis is proposed, whether or not muscle strengthening exercise significantly influences gait speed in older adults.

THEORETICAL FOUNDATIONS

Review articles

Abreus et al. (2022), Article published in Cuba: Effect of physical exercise program for lower extremity strength in older adults. In order to determine the effect of a physical exercise program to increase the strength of lower limbs in older adults, a clinical, prospective, explanatory and experimental study of the pre-experiment type with pretest and post-test in a single control group was developed. It shows the relationship of the deterioration of physical capacity with the aging process and the positive influence of muscle strengthening exercises. Strategies were created to stop the decline of physical abilities and increase functional capacity. In this study, it was determined that muscle strengthening is effective in improving balance and walking speed.

This research was conducted about Associations between functional fitness and walking speed in older adults. A cross-sectional study had a total number of 242 older adults who completed a 6 m walking speed test at both usual walking speed and maximum walking speed. The physical condition of each patient was assessed using the Senior Fitness Test battery. The results of this research demonstrated positive and moderate correlations between overall functional fitness level and walking speed. In addition, dynamic balance and agility were the only functional fitness parameters that influenced habitual walking speed. Dynamic balance and agility, aerobic endurance and lower body flexibility were the key fitness parameters that influenced maximal walking speed (WuT and Zhao; 2021).

Font et al. (2020) conducted a study on the Effects of Mild Intensity Physical Activity on Physical Fitness in Older Adults. The aim of the study was to evaluate the efficacy of light-intensity exercise interventions on functional health and life quality of these people. A systematic review of databases was conducted. A systematic review was developed and the inclusion criteria included randomized clinical trials. The reviewed literature grouped 290 articles, in which 8 articles were evaluated. Interventions included resistance and aerobic exercises. Five studies evaluated strength and showed that increasing strength also improved balance and gait speed. The results indicate that applying light-intensity physical activity interventions is a guarantee of improvement in functional health and quality of life in the elderly.

This is a randomized controlled trial, with 60 male and female older adults between the ages of 60 and 80 years. The training program will be conducted in 60 minutes, twice a week for 24 weeks. Participants will be randomly assigned to either the intervention group or the control group. The intervention group will perform progressive dual-task training in which participants will progressively undergo dual-task walking and postural balance exercises with variable to fixed priority instructions. The control group will undergo dual-task training with variable priority attention exercises. In conclusion, this training protocol can be widely implemented to improve gait speed and other functional activities and quality of life in older adults. This study may also contribute to future guidelines for the improvement of these clinical and biomechanical aspects in older people (Trombini et al.,2020).

Ortega and Cuartas (2020) published an article entitled: *Effects of strength training speed on various manifestations of strength in older adult women*. The objective of this study was to examine the effects of two types of strength training, one performed at high speed versus one at low speed, and the effect of maximal muscle strength and power in a group of older women. The participants were 86 women between 60 and 81 years old. They were evaluated before and after the intervention with the Senior Fitness Test, where the six-minute walk test is performed. It was concluded that strength training performed at high speed was more effective than that performed at low speed. This helps to improve physical condition, gait speed, and muscle power.

Yamamoto et al. (2019) worked on an original article in Japan named *Relationship between muscle-strengthening activities recommended by physical activity guidelines and knee extensor strength in the elderly*. The aim was to examine the relationship between the practice of muscle-strengthening activities assessed with Japanese and foreign physical activity guidelines and knee extensor strength in the elderly. This research was conducted on 259 elderly people, aged over 60 years old, of which only 223 were included in this study. The participants were classified according to heavy gardening and agricultural work. Those who did not practice this type of muscle strengthening activity had significantly lower levels of physical activity and knee extensor strength than those who performed it. For this reason, these people perform physical activity with less load in contrast to those who performed muscle strengthening exercises. The results showed that sufficient strength training and the heavy work activities of gardening and agriculture help positively with knee extensor strength. Thus, it improves the quality of life of older adults.

Patti et al. (2019) conducted a study where 46 subjects were included, but only 41 were incorporated in the study. The subjects were divided into 2 groups: Pilates group and another group followed a non-specific physical activity program. There were significant differences between the groups after the exercise program, both groups showed an improvement in performance. This study confirmed that physical activity improves both balance and muscle strength.

Henderson et al. (2017) conducted a comparative study in the United States entitled *Gait speed response to aerobic versus resistance exercise training in older adults*. The aim of this study was to compare the effect of aerobics versus resistance training on gait speed. It included overweight and obese sedentary participants aged 65 to 79 years, walking speed at usual pace, walking speed at fast pace and physical performance. Both aerobic and resistance training resulted in clinically significant improvements in walking speed at usual pace. Only aerobic training improved fast walking speed, in resistance training participants. Lower baseline knee strength was associated with less improvement in walking speed at usual pace.

Papa et al. (2017) conducted research in China named *Strength training for activity limitations in older adults with deficits in skeletal muscle function*. It aimed to present the current state of the literature on the effects of strength training on functional mobility outcomes for older adults with deficits in skeletal muscle function. And to provide clinicians with practical guidelines that can be used with older people during resistance exercise, training, or to encourage exercise. Human aging results in a variety of changes in skeletal muscle. Previous research has shown that resistance training can attenuate skeletal muscle function deficits in older adults. However, few articles have focused on the effects of resistance training on functional mobility. The purpose of this systematic review was to provide practical guidelines that can be used with older people during resistance exercise, training, or to encourage exercise. We present evidence that resistance training can attenuate age-related changes in functional mobility. It includes improvements in gait speed, static and dynamic balance, and reduced risk of falls. Older adults should be encouraged to participate in progressive resistance training activities and cautioned to move along continuous exercise from immobility toward recommended daily amounts of activity.

This was a randomized controlled trial in which six rehabilitation sites in California and Florida and the participants' homes were used. It included 408 stroke victims. Participants received 36 sessions 3 times per week for 12 weeks of 90 minutes of locomotor training and strength-and-balance training. Participants at 2 and 6 months after stroke made gains in walking speed and walking endurance after up to 36 treatment sessions. Overall, individuals showed improvements in walking speed and distance traveled with up to 36 sessions of locomotor training and strength and balance exercises at both 2- and 6-months post-stroke (Rose,2017).

METHODS

This article is a descriptive review with documentary design. Bibliographic instruments were used, that were compiled from the main scientific databases such as PubMed, Google Scholar, Scopus, Scielo, Elsevier. For the search of the information, Health Sciences descriptors were used: gait; walking speed; step test; exercises with movement technique; elderly. The inclusion criteria were articles published within the period 2017-2022 (Table 1), which belonged to academic journals and documented in Spanish, English and Portuguese languages. In this search, 30 articles were found (Figure 1), (Margarita et al., 2019).

Figure 1. Systematic Review. Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097.

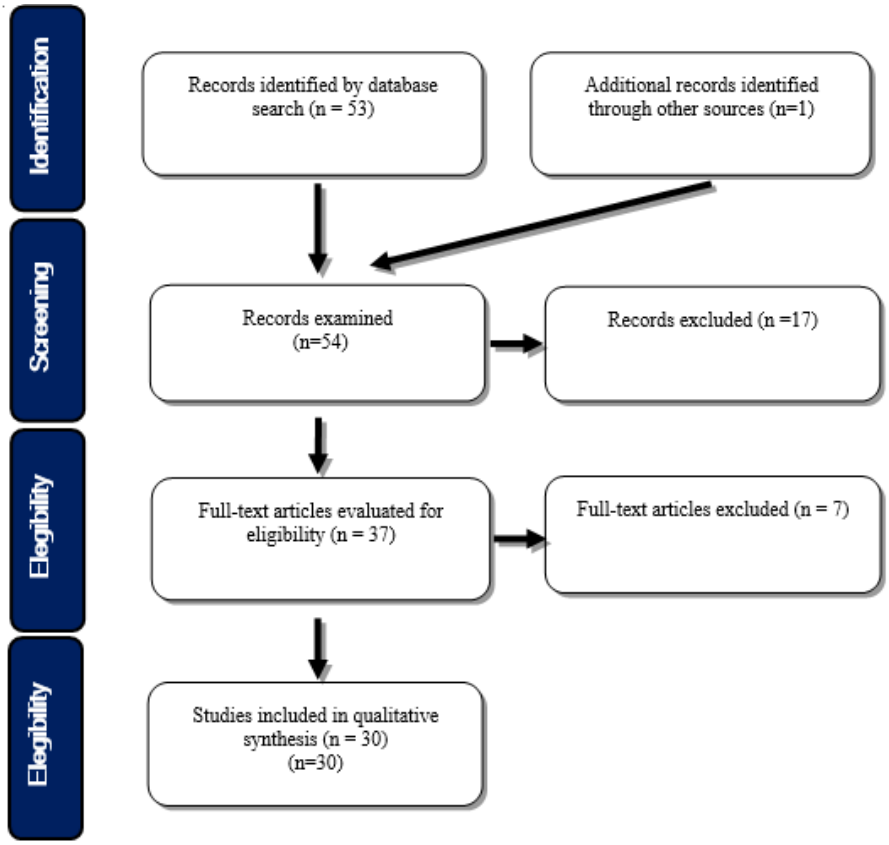

Table 1 Scientific articles selected for review

N°	Authors	Country	Type of article	Article title	Objectives	Results
1	Collyer, T. A., Murray, A. M., Woods, R. L., Storey, E., Chong, T. T., Ryan, J., Orchard, S. G., Brodtmann, A., Srikanth, V. K., Shah, R. C., & Callisaya, M. L	Australia	Essay	Association of Dual Decline in Cognition and Gait Speed with Risk of Dementia in Older Adults	To establish the dementia risk and clinical characteristics of older adults with gait slowing and cognitive impairment.	Out of 19 114 randomized participants, 88.2% had longitudinal gait and cognitive data were available for the patients. The gait speed with the cognitive status of an elderly person may be related because the lower the gait speed of an elderly person, the higher the possibility of alterations. This is an indicator that something is happening in their health. This gait condition may be associated with other pathologies since the gait speed is a great indicator of major geriatric syndromes.
2	Brach, J. S., Perera, S., Shuman, V., Gil, A. B., Kriska, A., Nadkarni, N. K., Rockette-Wagner, B., Cham, R., & VanSwearingen, J. M	Pensilvania	Essay	The effect of Timing and Coordination Training on Mobility and Physical Activity Among Community-Dwelling Older Adults	To determine whether the strength and endurance program, through synchronization and coordination, improves gait speed related to strength and endurance training alone.	This randomized clinical trial included 249 randomized participants, in which exercise sessions of 50 to 60 minutes were applied twice a week for 12 weeks. It was supervised by a therapist and it was performed in two training groups. For gait speed, individuals in the plus standard group had a mean improvement of 0.135 m/s for 12 weeks, and 0.141 for 24 weeks and finally 0.150 m/s for 36 weeks. Individuals in the standard group improved gait speed by 0.124 m/s for 12 weeks, 0.051 0.129 m/s for 24 weeks and 0.065 (0.148) m/s for 36 weeks. Both intervention groups experienced significant improvements in mobility.
3	Monteiro, R. L., Ferreira, J., Silva, É. Q., Cruvinel-Júnior, R. H., Veríssimo, J. L., Bus, S. A., & Sacco.	Brazil	Essay	Foot-ankle therapeutic exercise program can improve gait speed in people with diabetic neuropathy	To determine whether targeted foot and ankle exercises improve quality of life and walking speed in older adults.	In this single-blind randomized controlled trial, 78 volunteers were assigned to two groups: a control group and an intervention group. Therapeutic foot and ankle exercises for 12 weeks significantly improved fast walking speed. At 24 weeks, the intervention group showed better quality of life than the control group. At 1 year, fast walking speed and vibration perception remained higher in the intervention group than in the control group. Overall, the program may be a complementary treatment strategy to improve musculoskeletal and functional deficits related to diabetic peripheral neuropathy.
4	Fukuchi, C. A., Fukuchi, R. K., & Duarte, M.	Brazil	Essay	Effects of walking speed on gait biomechanics in healthy participants	To research the effects of gait speed on spatiotemporal parameters in the elderly.	Out of 19791 articles that were first examined, only 20 studies were included in this review. Most variables were significantly affected by walking speed, with moderate to large effect sizes. In addition, the variables studied had smaller absolute amplitudes of the minimum and maximum values at slower speeds and larger absolute amplitudes at faster speeds. However, the effects of speed on gait biomechanics were not similar in the three groups analyzed. The spatiotemporal parameters of gait were generally affected.
5	Wu, T., & Zhao, Y.	China	Original	Associations between functional fitness and walking speed in older adults	To determine what relationship gait speed has with physical fitness in older adults.	A cross-sectional study with a total number of 242 elderly people completed a 6-m walking speed test at both usual walking speed and maximum walking speed. The physical condition of each patient was assessed using the Senior Fitness Test battery. The results of this research demonstrated positive and moderate correlations between overall functional fitness level and walking speed. In addition, dynamic balance and agility were the only functional fitness parameters that influenced habitual walking speed. Dynamic balance and agility, aerobic endurance and lower body flexibility were the key fitness parameters that influenced maximal walking speed.

6	Sgaravatti A, Santos D, Bermúdez G, Barboza A	Uruguay	Original	Gait speed of the functionally healthy older adult	To study walking speed in a group of healthy older adults, and secondarily to correlate it with their clinical and demographic characteristics.	In this study, 60 people over 65 years of age were evaluated. The average gait speed was 1.10 m/s. But for the group younger than 75 years it was 1.20 m/s. Among people older than 80 years it was 1.0 m/s. It was evidenced that the walking speed decreases with age as the years go by.
7	Cigarroa I, Lasserre-Laso N, Zapata-Lamana R, Leiva-Ordóñez AM, Troncoso-Pantoja C, Martínez-Sanguinetti MA, et a	Barcelona	Original	Association between walking speed and risk of cognitive impairment in community-dwelling elderly	To determine whether slow walking speed is associated with cognitive impairment, and whether this association is modifiable by physical activity levels in older adults.	It was a cross-sectional study in which 1082 participants with an average age of 60 years were included. This research showed that gait speed leads to risk factors for adverse events in the elderly, such as loss of autonomy, institutionalization, risk of falling, mortality and cognitive deficits. Twenty longitudinal systematic review studies were analyzed. The results indicated that slower walking speed may predict cognitive impairment, with gait ability measurements being a good marker for predicting cognitive impairment.
8	Chalapud Narváez LM, Escobar Almario AE	Colombia	Original	Physical activity to improve strength and balance in older adults	To determine the effectiveness of a physical activity program to improve lower limb strength and balance in the elderly.	The sample consisted of 57 people. Most of them were housewives. The different evaluation tests that were applied showed positive changes in balance and in muscle strength after applying the physical activity program. These programs were adapted to each elderly person combined with exercises to improve muscular strength.
9	Abreus J, Valladares B, Jesús F, Carlos U, et al	Cuba	Original	Effect of physical exercise program for lower extremity strength in older adults.	To determine the effect of a physical exercise to increase lower extremity strength in lower extremities in older adults.	It was developed a clinical, prospective, explanatory and experimental study of the pre-experiment type with pretest and post-test in a single control group, with 55 older adults willing to participate in this study. The relationship of the deterioration of physical capacity with the aging process and the positive influence of muscle strengthening exercises was evidenced. The strategies were created to slow the decline of physical abilities and increase functional capacity. In this study it was determined that muscle strengthening is effective to improve balance and walking speed.
10	Ortega JA, Hoyos Cuartas LA	Ecuador	Original	Effects of strength training speed on various manifestations of strength in older adult women.	To examine the effects of two types of strength training: one performed at high speed versus one at low speed. Also on maximal muscular strength and power in a group of older women	A study was carried out to evaluate strength training. The participants were 86 women between 60-81 years old. It was concluded that strength training performed at high speed was more effective than that executed at low speed. This helps in improving fitness, walking speed, and muscle power.
11	Gallardo J, Cristian, Véliz-Campillay Phillip, Cancino-López Jorge	Chile	Original	Effect of high-speed self-loading exercise training on dynamic and static balance in older adult women	To determine if high-speed self-loading exercise training helps older adult women with gait speed.	This study narrates the effects of a self-loading exercise training in which 35 elderly women between 65 and 80 years old participated. They participated 3 times a week for 12 weeks, and were assigned to a group with self-loading exercises at high speed and another group with normal speed. It was concluded that the self-loading exercises performed at high speed improve performance and walking speed. It was relevant since they only used their own body weight, without the use of sophisticated machines.
12	Rodríguez G, Burga-Cisneros D, Cipriano G, Ortiz PJ, Tello T, Casas P, et al	Peru	Original	Factors associated with slow walking speed in older adults of a district in Lima	To determine the factors associated with slow walking speed in older adults.	It is a cross-sectional study with a population of 416 adults over 60 years of age, where the walking speed was determined by the time required by the participant to walk at usual walking speed for a distance of 8 m out of a total distance of 10 m without considering the first and the last meter walked on a flat surface. The fastest time of two measurements in a row was chosen as the final value and a slow walking speed will be considered at values less than 1 m/s. In this study, lower means and higher proportions of slow walking speed were found in older adults of the female sex. It is concluded that the factors associated with a slow walking speed in older adults in the community serve in primary care to identify a risk profile in the older adult population and thus direct the application of interventions to improve it.
13	Font-Jutglà C, Mur Gimeno E, Bort Roig J, Gomes da Silva M, Milà Villarroel R	Spain	Original	Effects of mild intensity physical activity on the physical condition of older adults	To evaluate the efficacy of performing light intensity exercise in older adults and how it affects their quality of life.	A systematic review was carried out in the databases A systematic review was developed and the inclusion criteria were randomized clinical trials. The reviewed literature grouped 290 articles, in which 8 articles were evaluated. Interventions included resistance, aerobic and vibration exercises. Five studies evaluated strength and showed that increasing strength also improved balance and gait speed. The results indicate that applying light-intensity physical activity interventions is a guarantee of improvement in functional health and quality of life in the elderly.
14	Patti A, Zangla D, Sahin FN, Cataldi S, Lavanco G, Palma A, et al	Turkey	Essay	Physical exercise and prevention of falls. Effects of a Pilates training method compared with a general physical activity program	To determine the effects of the Pilates training method compared to a general physical activity program.	46 subjects were enrolled in this study, but only 41 were included in the study. The subjects were divided into 2 groups: Pilates group and another group followed a non-specific physical activity program. There were significant differences between the groups after the exercise program. Both groups showed an improvement in performance. This study confirmed that physical activity improves both balance and strength.
15	Pires, I. M., Denysyuk, H. V., Villasana, M. V., Sá, J., Marques, D. L., Morgado, J. F., Albuquerque, C., & Zdravevski, E.	Portugal	Essay	Development of Technologies for Monitoring the Six-Minute Walk Test: A Systematic Review.	To analyze the monitoring of the 6-minute walk in relation to the effect of some diseases.	This article presents a systematic review of the use of sensors to calculate physical parameters during the application of the six-minute walk test, focusing on various diseases. It was carried out using the PRISMA methodology, where the search was performed in different databases, including IEEE Xplore, ACM Digital Library, ScienceDirect and PubMed. After filtering the articles related to the six-minute test, 31 articles were selected and analyzed in more detail. This systematic review determined that six-minute gait measurements are mainly performed with inertial and magnetic sensors. Also, most of the research studies related to this test focus on multiple sclerosis and pulmonary diseases.
16	Papp, M. E., Grahn-Kronhed, A. C., Rauch Lundin, H., & Salminen, H.	Sweden	Original	Changes in physical activity levels and relationship to balance performance, gait speed, and self-rated health in older Swedish women	To explore the change in physical activity levels and the performance of functional tests. As well as dynamic and static, what the capacity of balance is, walking speed and also how these people evaluate themselves.	Out of the 937 eligible women, 351 women aged 69 to 79 years agreed to participate in the research. It was evaluated through a questionnaire and clinical tests. It focused on balance, gait speed, and their self-assessment at the beginning of the study. The population was divided into two groups: a group with a lot of exercise and another group with little exercise. In this study it was observed that increased physical activity is very beneficial for health, especially if sedentary time is replaced with light intensity physical activity. Physical activity is an important predictor for maintaining physical function and decreasing disease.
17	Papa, E. V., Dong, X., & Hassan, M	Unites States of America China	Review	Resistance training for activity limitations in older adults with skeletal muscle function deficits	To present the current state of the literature on the effects of strength training on functional mobility outcomes for older adults with deficits in skeletal muscle function. Also to provide clinicians with practical guidelines that can be used with older adults during resistance exercise, training, or to encourage exercise.	Previous research has shown that resistance training can attenuate skeletal muscle function deficits in older adults. However, few articles have focused on the effects of resistance training on functional mobility. The purpose of this systematic review was to provide practical guidelines that can be used with older people during resistance exercise, training, or to encourage exercise. We present evidence that resistance training can attenuate age-related changes in functional mobility. It includes improvements in gait speed, static and dynamic balance, and reduced risk of falls. Older adults should be encouraged to participate in progressive resistance training activities and be advised to work on continuous exercise, from immobility toward the recommended daily amounts of activity.
18	Henderson, R. M., Leng, X. I., Chmelo, E. A., Brinkley, T. E., Lyles, M. F., Marsh, A. P., & Nicklas, B. J.	United States of America	Comparative study	Gait speed response to aerobic versus resistance exercise training in older adults	To compare the effect of aerobic versus resistance training on gait speed.	They included sedentary 65–79-year-old overweight and obese participants. They assessed walking speed at usual pace, walking speed at fast pace and physical performance. Both aerobic training and resistance training resulted in clinically significant improvements in walking speed at usual pace. Only aerobic training improved fast walking speed in resistance training participants. Lower baseline knee

						strength was associated with less improvement in walking speed at usual pace.
19	Martínez Aldaoa, Martínez Lemosb, Penedo Vázqueza y Ayán Pérez	Spain	Original	Effect of a physical exercise program on fall risk, balance and gait speed in elderly people with intellectual disabilities	To determine a physical exercise program designed to increase the level of balance and reduce the risk of falls in a group of elderly people with Intellectual Disabilities.	This research was carried out on people over 50 years of age, with mild to moderate disability, from the disability care center located in southern Galicia. In the intervention, it was designed a physical exercise program of 12 weeks duration, based on the realization of a weekly session of 80 minutes aimed at improving balance. Exercises aimed at muscle strengthening were programmed. It was observed that the multidisciplinary training programs, which combined exercises aimed at improving strength and endurance, had a great result in a decrease in the risk of falls.
20	Navarro-Peternella, F. M., Teston, E. F., Dos Santos Santiago Ribeiro, B. M., & Marcon, S. S.	Brazil	Essay	Plantar Cutaneous Sensory Stimulation Improves Foot Sensibility and Gait Speed in Older Adults With Diabetes	To determine the effect of an ankle muscle strengthening intervention and foot sensory stimuli to improve gait speed and balance in older adults with type 2 diabetes mellitus.	In this trial, 290 older adults over 60 years of age with type II diabetes were enrolled. They were physically independent. The intervention was performed twice a week for 12 weeks for 50 minutes. Plantiflexor and dorsiflexor muscle strengthening exercises were performed with resistance bands, proprioceptive exercises on balance boards and buoy. The results included muscle strength, gait speed and balance. This study demonstrated that plantar cutaneous sensory stimulation can improve foot sensitivity and increase gait speed in older adults with type II diabetes.
21	Naczk, M., Marszalek, S., & Naczk, A	Poland	Essay	Inertial Training Improves Strength, Balance, and Gait Speed in Elderly Nursing Home Residents	To evaluate the influence of inertial training on their independence, balance, speed and gait quality.	A group of 68 elderly residents of a nursing home attended an initial meeting and 34 agreed to participate in the study. Inertial training was performed twice a week for 6 weeks. Each training session included 12 sets of exercises involving the elbow and knee flexor and extensor muscles. The training loads were 10 and 20 kg for the upper and lower extremities, respectively. Before and after training, the maximal strength of the trained muscles was assessed under training conditions. The results of our study indicate that inertial training is highly effective despite their age. The participants increased the flexor and extensor muscles of the elbow and knee strength significantly. It reduces the risk of falls and increase the safety and independence of the elderly.
22	Trombini-Souza, F., de Maio Nascimento, M., da Silva, T., de Araújo, R. C., Perracini, M. R., & Sacco, I.	Brazil	Original	Dual-task training with progression from variable- to fixed-priority instructions versus dual-task training with variable-priority on gait speed in community-dwelling older adults: A protocol for a randomized controlled trial : Variable- and fixed-priority dual-task for older adults	To compare dual-task training with variable to fixed priority instruction progression versus dual-task training with variable priority on gait speed in older adults	This is a randomized controlled trial, with 60 male and female older adults between the ages of 60 and 80 years. The training program will be conducted in 60 minutes, twice a week for 24 weeks. Participants will be randomly assigned to either the intervention group or the control group. The intervention group will perform progressive dual-task training in which participants will progressively undergo dual-task walking and postural balance exercises with variable to fixed priority instructions. The control group will undergo dual-task training with variable priority attention exercises. In conclusion, this training protocol can be widely implemented to improve gait speed and other functional activities such as quality of life in older adults. This study may also contribute to future guidelines for the improvement of these clinical and biomechanical aspects in older people.
23	Yamamoto, N., Kawakami, T., Hongu, N., Asai, H., & Hagi, Y	United States of America Japan	Original	Relationship between muscle-strengthening activities recommended by physical activity guidelines and knee extensor strength in the elderly	To examine the relationship between the practice of muscle strengthening activities assessed with Japanese and foreign physical activity guidelines and knee extensor strength in the elderly.	This research was conducted on 259 elderly people, aged over 60 years, of which only 223 were included in this study. The participants were classified according to the heavy gardening and agricultural work. Those who did not practice this type of muscle strengthening activity had significantly lower levels of physical activity and knee extensor strength than those who performed it. For this reason, these people perform physical activity with less load as opposed to those who performed muscle strengthening exercises. The results demonstrated that sufficient strength training and the heavy work activities of gardening and agriculture help positively with knee extensor strength. Thus, it improves the quality of life of older adults.
24	Kidokoro, T., Peterson, S. J., Reimer, H. K., & Tomkinson, G. R	Japan United States of America Australia	Original	Walking speed and balance both improved in older Japanese adults between 1998 and 2018	To estimate temporal trends in balance and gait speed in Japanese older adults aged 65 to 79 years.	Older adults were recruited from the 47 prefectures of Japan by local boards of education. The aim of this study was to estimate temporal trends in balance and gait speed for Japanese older adults aged 65 to 79 years between 1998 and 2018. The main findings were improvements in balance and walking speed. It improved in all gender and age groups, with small gender-related changes and insignificant age-related temporal differences. And variability in both balance and walking speed decreased substantially in all gender and age groups, with the exception of walking speed in men. Our current finding of improved functional balance and speed, complemented by our previous findings of functional improvement endurance and strength. They collectively indicate that the physical function of Japanese older adults is better today than at the beginning of the century. This may be significant for public health given that poor physical function is a major risk factor for a variety of adverse health outcomes. However, this is also evidence of corresponding improvements in healthy life expectancy among older Japanese.
25	Fujita, K., Umegaki, H., Makino, T., Uemura, K., Hayashi, T., Inoue, A., Uno, C., Kitada, T., Huang, C. H., Shimada, H., & Kuzuya, M.	Japan China	Essay	Short- and long-term effects of different exercise programs on gait performance of older adults with subjective cognitive decline: A randomized controlled trial.	To compare the short- and long-term effects of aerobic training, strength training, and combined training on the gait performance of older adults with cognitive impairment.	This research was conducted on 388 older adults with an average age of 72 years. Participants attended an exercise or education class twice a week for 26 weeks. Each session consisted of a 50-minute exercise program and a 5-minute pre- and post-exercise medical check-up. The exercise program included a 10-minute warm-up, followed by a 30-minute core workout and a 10-minute cool-down part at the end. The trainers took appropriate intervals in each session and paid attention to the participants' fatigue. The intensity of the program was gradually increased according to each patient's need. All exercise interventions induced an improvement in gait speed, stride time, cadence, stride length and double support time. In conclusion, all the exercise programs examined had a positive short-term effect on the spatiotemporal parameters of gait in older adults with cognitive impairment.
26	Fell, B. L., Hanekom, S., & Heine, M	South Africa	Review	Variations of the six-minute walk test protocol in low-resource settings: a scoping review.	Identify applications of the six-minute walk test to American Thoracic Society guidelines that have been described in low-resource settings.	The main databases that were searched: Cochrane Library, AfricaWide, Cumulative Index of Nursing and Health-Related Literature, Medline, PubMed, Scopus and Web of Science. The review included studies where the six-minute walk test was applied in low-resource settings. A total of 24 studies were included. Most of the studies were conducted in lower middle-income countries. Eight studies provided a rationale for application of the 6-minute walk test. The most common reason for the application of the 6-minute walk test was space restriction. The nature of the test, its importance in clinical decisions, and its association with important outcomes such as hospitalization and mortality are compelling arguments for including the six-minute walk test as a primary key to the care of older adults.
27	Valdés Labrador, Yaneisis, Calderón Villa, Yeney, Carmenate Figueredo, Yorisel	Cuba	Review	Functional fitness in hypertensive older adults.	To diagnose physical fitness through the 6-minute walk test in older adults.	Labrador V.et al.,2020, conducted a research in Cuba about the functional physical condition in hypertensive older adults. A bibliographic review was carried out where the 6-minute walk test was highlighted. It is a practical and simple mobility test, It allows predicting adverse events, frailty and disability in older adults. Gait speed >1.1 m/s is considered normal and < 0.8 m/s predicts falls, and also the progressive loss of functional capacities. For this reason the practice of physical activity is fundamental in the elderly.
28	Grgic, J., Garofolini, A., Orazem, J., Sabol, F., Schoenfeld, B. J., & Pedisic, Z.	Australia United States of America Croacia	Essay	Effects of Resistance Training on Muscle Size and Strength in Very Elderly Adults: A Systematic Review and Meta-Analysis of Randomized Controlled Trials	To examine the effects of resistance training on muscle size and strength in very old people.	Randomized controlled studies that explored the effects of resistance training in very old people on muscle strength, hand grip strength, whole muscle hypertrophy were included in the review. The intervention lasted from 8 to 18 weeks. The frequency of training was 1 to 3 days per week.11 studies used isometric strength, 4 used isotonic strength tests and 3 used isokinetic tests. Two studies used tests on upper body exercises, while the remaining studies used lower body exercises. This systematic review and meta-analysis found that the elderly can increase their muscle strength and size by participating in resistance training programs. In addition, resistance training was found to be an effective way to improve muscle strength even among the older ones.
29	Santos, L., Ribeiro, A. S., Schoenfeld, B. J., Nascimento, M. A., Tomeleri, C. M., Souza, M. F., Pina, F. L., & Cyrino, E. S.	Brazil United States of America	Original	The improvement in walking speed induced by resistance training is associated with increased muscular strength but not skeletal muscle mass in older women	To analyze whether improvements in fast walking speed induced by resistance training are associated with changes in body composition, muscle quality and muscle strength in older women.	In this research, 26 healthy older women participated in an 8-week resistance training program. 8 whole body exercises were performed, a maximum of 3 sets of 10-15 repetitions, 3 times per week. The 10-meter walk test was performed before and after the intervention. It was concluded that the 8 weeks of resistance training helped improve the 10-meter gait test after an 8-week resistance training program. It is associated with increases in lower extremity muscle strength and muscle quality, but not with changes in muscle mass or body fat in older women.
30	Rose, D. K., Nadeau, S.	California	Original	Locomotor Training	To determine the	This was a randomized controlled trial in which six rehabilitation sites in California

	E., Wu, S. S., Tilson, J. K., Dobkin, B. H., Pei, Q., & Duncan, P. W.			and Strength and Balance Exercises for Walking Recovery Post Stroke: Response to Number of Training Sessions	training sessions of 2 interventions: locomotor training and strength, and balance exercises on gait recovery after stroke.	and Florida and the participants' homes were used. It included 408 stroke victims. The participants received 36 sessions of locomotor training and strength and balance training, 3 times per week, for 12 weeks of 90 minutes. Participants at 2 and 6 months after stroke made gains in walking speed and walking endurance after up to 36 treatment sessions. Overall, people showed improvements in walking speed and traveled distance with up to 36 sessions of locomotor training and strength and balance exercises at both 2 and 6 months post stroke

RESULTS AND DISCUSSION

Gait speed and balance

Gait speed and balance over the years decreases with age. It was shown that in people younger than 75 years the gait speed is 1.20 m / s, and among people over 80 is 1.0 m / s. (Sgaravatti et al.,2018). Declining gait speed is a risk indicator factor for older adults (Rodriguez et al.,2017). Moreover, Papp et al. (2022), evaluated the participants by means of a questionnaire and clinical tests on balance, gait speed, and their self-assessment at the beginning of the study. The population was divided into two groups: a group with a lot of exercise and another group with little exercise. In this study, it was observed that increased physical activity is very beneficial to health, especially if sedentary time is replaced with physical activity of mild intensity.

A study conducted by Navarro et al. (2019), reported that plantar cutaneous sensory stimulation can improve foot sensitivity and increase gait speed in older adults. 290 older adults over 60 years of age with type 2 diabetes were enrolled in this trial. These people were physically independent, and the intervention included plantar flexor and dorsal flexor muscle strengthening exercises with resistance bands, and proprioceptive exercises on balance boards and buoy. The results included muscle strength, gait speed and balance.

In the study by Kidokoro et al. (2021) a national sample of Japanese older adults between 1998 and 2018 about functional balance and gait speed was used. The main findings of this study were that there were improvements in balance and walking speed. Also, there was improvement in all gender and age groups, with small gender-related changes and insignificant age-related differences. The change in both balance and walking speed decreased in all gender and age groups, with the exception of walking speed in men. It is important to know when there is poor physical function. This is an important risk factor for the health status of older adults.

Gait speed and cognitive impairment

The relationship between gait speed and cognitive impairment is related (Martinez et al., 2020), because the lower the gait speed of an elderly person, the greater the possibility of alterations (Collyer et al., 2020). These alterations include cognitive deficit. This gait speed impairment is an indicator of major geriatric syndromes (Cigarroa et al., 2020). For this reason, an exercise program has been determined with medical review to patients over 72 years old. The intensity of the program was gradually increased according to the need of each patient. All exercise interventions induced an improvement in gait speed, stride time, cadence, stride length and double support time. The exercise programs had a short-term positive effect on gait parameters in older adults with cognitive impairment. (Fujita et al.,2021)

Lower limb training program

The program was of a 12-week exercise training (Brach et al.,2022) with an interval of 2 to 3 times per week, with an estimated time of 60 minutes (Monteiro et al.,2022), where muscle strengthening exercises are performed in lower limbs. It has been demonstrated an improvement in gait speed in older adults. (Gallardo et al.,2019), We can say that performing physical activity is an important predictor for the maintenance of physical function and decrease of diseases.

Santos et al. 2017, performed a resistance training program with increases in muscle strength of the lower extremities. In addition, the gait test was performed before and after the intervention. This determines that performing resistance exercises promote the improvement in the gait test after a training program. In a systematic randomized study, it was found that people over 75 years of age can perform lower body strength exercises. As a result, we found that older adults can increase their muscle strength and size by participating in resistance training programs. We also found that resistance training results in muscle hypertrophy at the whole muscle level in very old people (Grgic et al.,2020).

6-minute gait test

A literature review was conducted where the 6-minute walk test was highlighted. This is a practical and simple mobility test, which allows predicting adverse events, frailty and disability in older adults. Gait speed >1.1 m/s is considered normal and < 0.8 m/s predicts falls (Labrador et al., 2020). Also, most of the research studies related to this test are focused on multiple sclerosis and pulmonary diseases, diabetes, arterial hypertension, etc., (Pires et al., 2022).

A total of 24 studies demonstrated that the six-minute walk test can be applied in low-income settings. Most of the studies were conducted in low- and middle-income countries. Eight studies provided a rationale for the application of the six-

minute walk test. The most common reason for the application of the six-minute walk test was space restriction. This six-minute walk test is very valuable in clinical decisions, and its association with important outcomes such as hospitalization and mortality. These are compelling arguments for including the six-minute walk test as a primary key to the care of older adults (Fell et al.,2021).

CONCLUSION

The results of this review article showed that the application of a muscle strengthening exercise program in the lower limb helps to improve walking speed in older adults. For this reason, it is proposed to apply strategies of muscle strengthening exercise programs in a meeting space where the environment is adequate and that it motivates older adults to perform the exercises. To accomplish this, it is necessary that they feel important and included. With the foregoing in mind, we can say that physical activity that includes muscle strengthening exercises improves functional health, walking speed, and also helps significantly in their quality of life.

REFERENCES

Abreus J, Julio E, Valladares B, Jesús F, Carlos U, et al.2022.Effect of a Physical Exercise Program for Lower Extremity Strength in Older Adults. *Revista Finlay,*1-10. Disponible en: http://www.revfinlay.sld.cu/index.php/finlay/article/view/1032

Aranda R.2018. Actividad física y calidad de vida en el adulto mayor.*Revista Habanera de Ciencias Médicas,17*(5)813-825.Disponible en http://www.revhabanera.sld.cu/index.php/rhab/article/view/2418

Brach JS, Perera S, Shuman V, Gil AB, Kriska A, Nadkarni NK, et al.2022.Effect of Timing and Coordination Training on Mobility and Physical Activity Among Community-Dwelling Older Adults. *JAMA Network Open,5*(5):1-15. doi: 10.1001/jamanetworkopen.2022.12921.

Cigarroa I, Lasserre-Laso N, Zapata-Lamana R, Leiva-Ordóñez AM, Troncoso-Pantoja C, Martínez-Sanguinetti MA, et al.2020.Asociación entre la velocidad de marcha y el riesgo de deterioro cognitivo en personas mayores que viven en la comunidad. *Gerokomos,31*(4):204-10.=

Chalapud Narváez LM, Escobar Almario AE.2017. Actividad física para mejorar fuerza y equilibrio en el adulto mayor. *Univ y Salud,19*(1):94.DOI: http://dx.doi.org/10.22267/rus.171901.73

Collyer TA, Murray AM, Woods RL, Storey E, Chong TT, Ryan J.2022.Association of Dual Decline in Cognition and Gait Speed With Risk of Dementia in Older Adults. *JAMA Network Open Geriatrics,5(*5),1-13. doi: 10.1001/jamanetworkopen.2022.14647

Duran T, Salazar-Barajas ME, Hernández-Cortés PL, Guevara-Valtier MC, Gutiérrez-Sánchez G.2020.Función sensorial y dependencia en adultos mayores con enfermedad crónica. *Sanus*,(15),1-11.DOI: 10.36789/sanus.vi15.178 www.sanus.unison.mx

Fell, B. L., Hanekom, S., & Heine, M. (2021). Six-minute walk test protocol variations in low-resource settings - A scoping review. *The South African journal of physiotherapy, 77*(1), 1549. https://doi.org/10.4102/sajp.v77i1.1549

Fujita K, Umegaki H, Makino T, Uemura K, Hayashi T, Inoue A, et al.2021. Short- and long-term effects of different exercise programs on the gait performance of older adults with subjective cognitive decline. *Exp Gerontol,156*:111590. Disponible en: https://doi.org/10.1016/j.exger.2021.111590

Fukuchi CA, Fukuchi RK, Duarte M.2019.Effects of walking speed on gait biomechanics in healthy participants.*Neuroscience and Cognition and Biomedical Engineering Programs, Federal University of ABC,8(*1):1-11. Disponible en:https://doi.org/10.1186/s13643-019-1063-z

Font-Jutglà C, Mur Gimeno E, Bort Roig J, Gomes da Silva M, Milà Villarroel R.2020.Effects of mild intensity physical activity on the physical condition of older adults.*Rev Esp Geriatr Gerontol,55*(2):98-106. Disponible en: https://doi.org/10.1016/j.regg.2019.10.007

Gallardo C, Véliz-Campillay P, Cancino-López J.2019. Efecto de un entrenamiento con ejercicios de autocarga a alta velocidad en el equilibrio dinámico y estático en mujeres adultas mayores. *Rev Med Chil,147*(9):1136-43.=

Gil P, Ramos Cordero P, Marín Carmona JM, López Trigo JA.2012. Guía de ejercicio físico para mayores.59 p. Disponible en: https://www.segg.es/media/descargas/GUÍA DE EJERCICIO FÍSICO PARA MAYORES.pdf

Grgic J, Garofolini A, Orazem J, Sabol F, Schoenfeld BJ, Pedisic Z.2020. Effects of Resistance Training on Muscle Size and Strength in Very Elderly Adults. *Sport Med,50*(11):1983-99. Disponible en: https://doi.org/10.1007/s40279-020-01331-7

Henderson, R. M., Leng, X. I., Chmelo, E. A., Brinkley, T. E., Lyles, M. F., Marsh, A. P., & Nicklas, B. J. 2017. Gait speed response to aerobic versus resistance exercise training in older adults. *Aging clinical and experimental research,29*(5), 969–976. https://doi.org/10.1007/s40520-016-0632-4.

Jaimes EL, Camargo K, Torregroza EC,Carbonell M. 2017.Funcionalidad y grado de dependencia en los adultos mayores institucionalizados en centros de bienestar. *Gerokomos,28*(3): 135-41.doi =

Kidokoro T, Peterson SJ, Reimer HK, Tomkinson GR.2018. Walking speed and balance both improved in older Japanese adults between 1998 and 2018. *J Exerc Sci Fit,19*(3):204-8. Disponible en: https://doi.org/10.1016/j.jesf.2021.06.001

Margarita, G., Romero, O., Santiesteban, V. S., Felic, G., Rodr, E., Santiesteban, B. S., Coello, M. G., Docente, G., & Ilich,V. (2019). *Introducción,23*(2), 206–218.

Martínez Aldao D, Martínez Lemos RI, Penedo Vázquez S, Ayán Pérez CL.2020. Effects of a physical exercise programme on the risk of falls, balance, and walking speed in older people with intellectual disabilities. *Rehabilitacion,54*(1):19-24. Disponible en: https://doi.org/10.1016/j.rh.2019.09.003

Monteiro RL, Ferreira JSSP, Silva ÉQ, Cruvinel-Júnior RH, Veríssimo JL, Bus SA, et al.2022 Foot-ankle therapeutic exercise program can improve gait speed in people with diabetic neuropathy.*Scientific reports,12*(1):7561. Disponible en: http://www.ncbi.nlm.nih.gov/pubmed/35534614%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC9082985

Navarro-Peternella FM, Teston EF, Dos Santos Santiago Ribeiro BM, Marcon SS.2019. Plantar Cutaneous Sensory Stimulation Improves Foot Sensibility and Gait Speed in Older Adults with Diabetes. *Adv Ski Wound Care,32*(12):568-73.

Naczk M, Marszalek S, Naczk A.2020.Inertial training improves strength, balance, and gait speed in elderly nursing home residents. *Clin Interv Aging,15*:177-84. doi: 10.2147/CIA.S234299.

Ortega JA, Hoyos Cuartas LA.2020.Effect of the velocity resistance training on various manifestations of resistance in older women. Retos,38:325-32.=

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group (2010). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *International journal of surgery (London, England), 8*(5), 336–341. https://doi.org/10.1016/j.ijsu.2010.02.007

Papp ME, Grahn-Kronhed AC, Rauch Lundin H, Salminen H.2021.Changes in physical activity levels and relationship to balance performance, gait speed, and self-rated health in older Swedish women. *Aging Clin Exp Res,34*(4):775-83. Disponible en: https://doi.org/10.1007/s40520-021-02016-5.

Papa E V., Dong X, Hassan M.2017.Resistance training for activity limitations in older adults with skeletal muscle function deficits*. Clin Interv Aging,12*:955-61. doi: 10.2147/CIA.S104674.

Patti A, Zangla D, Sahin FN, Cataldi S, Lavanco G, Palma A, et al.2021. Physical exercise and prevention of falls. Effects of a Pilates training method compared with a general physical activity program. *Medicine,100*(13):1-7. doi: 10.1097/MD.0000000000025289.

Pires, I. M., Denysyuk, H. V., Villasana, M. V., Sá, J., Marques, D. L., Morgado, J. F., Albuquerque, C., & Zdravevski, E. (2022). Development Technologies for the Monitoring of Six-Minute Walk Test. *Sensors (Basel, Switzerland), 22*(2), 581. https://doi.org/10.3390/s22020581

Rodríguez G, Burga-Cisneros D, Cipriano G, Ortiz PJ, Tello T, Casas P, et al.2017. Factors associated with slow walking speed in older adults of a district in Lima, Peru. *Rev Peru Med Exp Salud Publica,34*(4):619-26.Doi =

Rodríguez T,Ayala M,Ortiz M,Ordoñes M,Fabelo J,Moré S.2017. Caracterización de las condiciones de salud de los adultos mayores en Centros Geriátricos de la ciudad de Loja. *Rev Habanera Ciencias Médicas,6*(5):1-15. Disponible en: http://scielo.sld.cu/scielo.php?pid=S1729-519X2008000300003&script=sci_arttext.

Rose DK, Nadeau SE, Wu SS, Tilson JK, Dobkin BH, Pei Q, et al.2017. Locomotor training and strength and balance exercises for walking recovery after stroke. *Phys Ther,97*(11):1066-74 doi: 10.1093/ptj/pzx079.

Santos, L., Ribeiro, A. S., Schoenfeld, B. J., Nascimento, M. A., Tomeleri, C. M., Souza, M. F., Pina, F. L., & Cyrino, E. S. 2017. The improvement in walking speed induced by resistance training is associated with increased muscular strength but not skeletal muscle mass in older women. *European journal of sport science, 17*(4), 488–494.

Sgaravatti A, Santos D, Bermúdez G, Barboza A.2018. Gait Speed in Functionally and Healthy Elder People. *An Fac Med,5*(2):93-101. Disponible en: http://dx.doi.org/10.25184/anfamed2018v5n2a8.

Thomson D, Liston M, Gupta A.2019. Is the 10 metre walk test on sloped surfaces associated with age and physical activity in healthy adults.*Eur Rev Aging Phys Act,16*(1):1-9. doi: 10.1016/j.exger.2021.111590

Trombini-Souza F, De Maio Nascimento M, Da Silva TFA, De Araújo RC, Perracini MR, Sacco ICN.2020. Dual-task training with progression from variable- To fixed-priority instructions versus dual-task training with variable-priority on gait speed in community-dwelling older adults. *BMC Geriatr,20*(1):1-12. Disponible en https://doi.org/10.1186/s12877-020-1479-2

Valdés Labrador, Yaneisis, Calderón Villa, Yeney, Carmenate Figueredo, Yorisel, Tejera Concepción, Juan Francisco, & Bermúdez Chaviano, Maitte. (2020). Condición física funcional en adultos mayores hipertensos. Conrado, 16(77), 451-460.Disponible en http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1990864420200006004 51&lng=es&tlng=es

Villafuerte J, Yenny A.Abatt A,Yisel Y, Alcaide Y, Isis M,Betancourt L.Arteaga Y.2017.El bienestar y calidad de vida del adulto mayor, un reto para la acción intersectorial. *MediSur,15*(1),85-92.doi:http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1727-897X2017000100012&lng=es&nrm=iso&tlng=es%0Ahttp://scielo.sld.cu/pdf/ms/v15n1/ms12115.pdf.

Wu T, Zhao Y.2021.Associations between functional fitness and walking speed in older adults.*Geriatr Nurs,42*(2),540-3. Disponible en: https://doi.org/10.1016/j.gerinurse.2020.10.003.

Yamamoto N, Kawakami T, Hongu N, Asai H, Hagi Y.2019. Relationship between muscle-strengthening activities recommended by physical activity guidelines and knee extensor strength in the elderly. *J Phys Ther Sci,31*(6):482-7. Disponible en doi: 10.1589/jpts.31.482

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B. data research and statistical analysis:	20%	20%	20%	20%	20%
C. elaboration of figures and tables:	20%	20%	20%	20%	20%
D. drafting, reviewing and writing of the text:	20%	20%	20%	20%	20%
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