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Original article

Muscular strength work in the care of sarcopenia in older adults

El trabajo de fuerza muscular en la atención a adultos mayores con sarcopenia

Trabalho de força muscular no cuidado de idosos com sarcopenia

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ABSTRACT

The aging process is marked by a sedentary lifestyle and little physical activity, which is associated with the rapid and continuous decline in functional capacities, dependency and fragility. The objective of the work is aimed at assessing, through the test of maximum repetitions with non-extreme weights, the effect of the application of exercises with weights for the care of sarcopenia. Methods from the theoretical and empirical levels such as synthetic analytical, inductive-deductive, documentary review, documentary analysis, observation, survey and interview were applied. As a working instrument, a set of strength endurance and aerobic physical exercises was applied that allowed the measurement

method to be used in seven older adults with sarcopenia, treated at the Center for Physical Activity and Health of the University of Sciences. of Physical Culture and Sports ¨Manuel Fajardo¨. The muscular strength work was evaluated using the aforementioned test, which made it possible to identify the real weight of the physical load with which they must train and, on that basis, the set of exercises with weights was developed. In the preliminary results recorded, through the application of the test, it was confirmed that the integration of weight work and aerobic work favorably influences strength gain in the older adults.

Keywords: load, aerobic exercises, aging, physical effort

RESUMEN

El proceso de envejecimiento está marcado por el sedentarismo y la escasa actividad física, lo que se asocia a la disminución rápida y continua de las capacidades funcionales, la dependencia y la fragilidad. El objetivo del trabajo se orienta a valorar, mediante el test de repeticiones máximas con pesos no extremos, el efecto de la aplicación de ejercicios con pesas para la atención de la sarcopenia. Se aplicaron métodos de los niveles teóricos y empíricos como el analítico sintético, inductivo deductivo, revisión documental, análisis documental, observación, encuesta y entrevista. Se aplicó, como instrumento de trabajo, una batería de ejercicios físicos de resistencia a la fuerza, y aeróbicos que permitieron utilizar el método de medición en siete adultos mayores con sarcopenia, atendidos en el Centro de Actividad Física y Salud de la Universidad de las Ciencias de la Cultura Física y Deportes ¨Manuel Fajardo¨. Se evaluó el trabajo de fuerza muscular mediante el test mencionado, lo que permitió identificar el peso real de la carga física con la que deben entrenar y, sobre esa base, se elaboró la batería de ejercicios con pesas. En los resultados preliminares registrados, mediante la aplicación del test, se constató que la integración del trabajo con pesas y el aeróbico influyen de manera favorable en la ganancia de fuerza en el adulto mayor.

Palabras clave: carga, ejercicios aerobios, envejecimiento, esfuerzo físico

RESUMO

O processo de envelhecimento é marcado por um estilo de vida sedentário e pouca atividade física, o que está associado ao declínio rápido e contínuo das capacidades funcionais, à dependência e à fragilidade. O objetivo do trabalho visa avaliar, por meio do teste de repetições máximas com pesos não extremos, o efeito da aplicação de exercícios com carga no tratamento da sarcopenia. Foram aplicados métodos dos níveis teórico e empírico como analítico sintético, indutivo-dedutivo, revisão documental, análise documental, observação, levantamento e entrevista. Como instrumento de trabalho foi aplicada uma bateria de exercícios físicos resistidos de força e aeróbios que permitiu a utilização do método de mensuração em sete idosos com sarcopenia atendidos no Centro de Atividade Física e Saúde da Universidade de Ciências da Cultura Física e. Esportes ¨Manuel Fajardo¨. O trabalho de força muscular foi avaliado por meio do referido teste, que possibilitou identificar o real peso da carga física com a qual devem treinar e, com base nisso, foi desenvolvida a bateria de exercícios com pesos. Nos resultados preliminares registrados, por meio da aplicação do teste, foi confirmado que a integração do trabalho com pesos e do trabalho aeróbio influencia favoravelmente o ganho de força em idosos.

Palavras-chave: carga, exercícios aeróbicos, envelhecimento, esforço físico

INTRODUCTION

The increase in life expectancy, which worldwide exceeds 75 years, is accompanied by population aging. According to the Ministry of Public Health (MINSAP, 2020), Cuba currently has a population of 2,307,647 people over 60 years of age, which represents 20.8% of the Cuban population, and a life expectancy at birth of 78.45 years.

Hernandez et al. (2019) report that Cuba has presented a clear trend toward population aging in recent years. When analyzing demographic trends, they clearly show that the country is facing an unprecedented situation, which considerably impacts the health sector,

which requires the development of strategies such as intersectorality that contribute to confronting this phenomenon.

Darraz et al. (2021) consider that it is possible to classify aging into primary and secondary. Primary aging is the process or group of processes responsible for the set of changes observed with age in individuals of a species and not related to the presence of disease. Their research focuses on the genetic, molecular and cellular mechanisms involved in the aging process. The most important structural changes are:

- Atrophy of tissues and organs that develop slowly and ultimately lead to death.
- Amyloid and lipofuscinoid degeneration.
- Internal and external cellular dehydration (the total volume of body fluids is reduced from 60% of body weight in young and old people to about 45% in the elderly).
- Increase in fat and reduction in muscle tissue.

Non-pathological aging is based on morphological and functional alterations from the cell to the organs and systems with less cellular replication, which results in a slowdown of functions, and the reduction of the functional reserve that places older people in conditions of vulnerability to acute illnesses and the appearance of debilitating chronic diseases.

Secondary aging refers to what occurs in living beings when they are subjected to the action of random and selective phenomena. The most relevant are those related to the disease and its relationship with lifestyle habits, physical exercise, diet, interaction with social elements and stress level, among others.

In relation to age-related morphological changes, the aforementioned authors add:

- In the cardiovascular system there is an increase in the collagen matrix in the tunica media, loss of elastin fibers and a decrease in cardiomyocytes.
- In terms of functionality, there is greater endothelial dysfunction and risks of arrhythmias.

- In the renal system there is a thinning of the renal cortex, sclerosis in the glomerular arteries and thickening of its basement membrane, there is also a lower capacity to concentrate urine, lower levels of renin and aldosterone.
- The nervous system decreases brain mass, there is less focus of activity, slower processing speed and less motor skill.
- Regarding metabolism, there is an increase in visceral fat, fatty infiltration of tissues and greater insulin endurance.

Aging not only includes the inevitable biological and physiological effects caused by molecular and cellular damage, but also the gradual adaptation to new roles and social positions, life transitions and psychological growth itself, with heterogeneous manifestations from one person to another.

One of the changes that accompanies the aging process associated with physical deterioration, and that represents an important point of interest, is the progressive decrease in muscle mass and strength, called sarcopenia, a term derived from the Greek sarx (flesh) and penia (loss), which is linked to a high risk of negative consequences such as physical disability, poor quality of life and death (Cruz et al., 2019).

Authors such as Barreto (2022); Bermudez (2019); Cruz, González & Prado (2023); Hernández & Domínguez (2019) link sarcopenia with aging. As the years go by, there is a progressive loss of muscle mass that compromises people's functionality. In the absence of pathologies, between the ages of 30 and 70, there may be a decrease in muscle mass of up to 8% per decade; After age 70, this loss doubles, and compromises people's ability to function satisfactorily in their daily lives.

The cited authors report that muscle strength gradually decreases from age 30 to around age 50; in the sixth decade of life, an accelerated, non-linear decrease of up to 15% is observed, which can reach 30% in the eighth decade. The result translates into functional losses and uncertainty in balance capacity and the risk of serious problems, due to falls and recurrent chronic injuries, as well as an increase in degenerative diseases.

Ciudin et al., 2020 and Cruz et al., 2019 explain that among the contributing mechanisms of sarcopenia are endocrine processes, neurovegetative diseases, inadequate nutrition, physical inactivity and cachexia. The risk of disability is reported to be approximately four times greater in patients with sarcopenia. Its clinical diagnosis is made based on different criteria, but one of the most used in the clinical and research field is the one that meets five fundamental criteria: involuntary weight loss, slow gait, exhaustion and weakness, the changes typical of aging and low physical activity, all of which come together to end up presenting risks of fragility (Hernández & Domínguez, 2019).

In 2019, it was published an update of the European Consensus by the so-called European Working Group on Sarcopenia in Older People 2 (EWGSOP 2), in this document it is stated that muscle strength and mass are decreased, while physical performance remains as a measure to know the severity of the pathology when sarcopenia has been identified (Cruz et al., 2019).

When establishing treatments for the disease, the practice of systematic physical exercises is recognized internationally as important, as it is not accompanied by side effects and prevents, or delays, the appearance of many of the diseases acquired over the years.

According to Barreto's criteria (2022) and Ciudin et al. (2020) the use of strength endurance exercises accompanied by aerobic work plays a fundamental role since it has been proven that their prescription is useful in any healthy project, since these capacities are of vital importance in daily life. Its use should contribute to achieving good physical condition and the prevention of associated diseases throughout life.

The importance of providing experiences in the use of physical exercise as a means of prevention and treatment of sarcopenia motivated the authors to carry out the research with the aim of assessing the effect of applying weight-bearing exercises for the care of sarcopenia.

MATERIAL AND METHODS

The research was carried out with seven older adults (five females and two male), between 66 and 79 years of age, all practicing physical activity, in this case tai chi, in the Las Cañas popular council, in the Cerro municipality, in Havana.

To carry out the diagnosis, official documents were reviewed and analyzed, classes for the older adults were observed and interviews and surveys were carried out with specialists who work in the care of the older adults, which are listed below.

The review of medical records allowed to carry out a study of comorbidities in the patients and thus be able to verify which of them are risk factors for sarcopenia. This work was carried out with the collaboration of primary health care doctors who care for the people participating in the research. The results obtained showed that 100% of the total sample to be studied presented chronic non-communicable diseases, among which type 1 diabetes mellitus, high blood pressure and obesity stand out, and others that are present to a lesser extent such as cardiovascular diseases, arthritis and osteoarthritis which, in their entirety, constitute risk factors for the development of the disease.

The observation. 45 observations were made of classes for the older adult, both in grandparents' circles and in grandparents' homes and nursing homes, to a total of 15 Community Physical Activity teachers from the municipality of Cerro and 10 de Octubre, which allowed to explore the behavior of attention to subjects of this age group with sarcopenia. The observed activities were taught by teachers from the Sports Complexes of the aforementioned municipalities, with experience in working with older adults. A total of three professionals with experience in this type of activity participated in the observation of each class and were trained to apply the established guide.

RESULTS AND DISCUSSION

In the observations carried out, it was evident that, in 100% of the classes visited, teachers guide the objectives based on attention to the physical condition of the older adult; however, differentiated care for those with sarcopenia, chronic non-communicable diseases, among others, is inadequate, despite keeping records of their condition.

In 100% of the classes (45) the objectives are not oriented towards the care of older adults with a diagnosis of sarcopenia, because they do not have adequate mastery of this syndrome, although there are practitioners diagnosed with the same.

In 82.2% of the classes (37) the teachers do not dose the exercises for attention to physical condition, in correspondence with the individual characteristics of the older adult with whom they work; the same physical load is applied to everyone and control is carried out through heart rate, but the result obtained in the evaluation of physical condition is not taken into account.

In 44.4% of the observations (20), teachers show mastery and use various organizational procedures and active methods, mainly games, which they apply creatively to carry out the activities planned during class and, in this way, comply the proposed objectives. 53.3 % of the observed teachers (8) do not identify the methods and procedures used, and mainly use the one recommended in the methodological guidelines. The need is evident, in 95.5% of the classes (43), for better use of materials that enable their organization and execution.

A survey was applied to 52 Community Physical Activity teachers who work in different centers in the province of Havana, related to the regularities that occur in the methodological planning process for the care of sarcopenia and physical condition in older adults, as a scenario in which attention to the development and maintenance of motor activity in this age group can be met, with the required quality.

When analyzing the first three questions related to teachers' preparation to care for the physical condition of older adults with a diagnosis of sarcopenia , 86.5% (45) of those interviewed stated that their preparation to face the task was bad, because they were

unaware of the syndrome, and they added that they had little time for self-preparation; 71.1% (37) had little bibliographic material to facilitate the preparation of classes, especially on topics related to the dosage of exercises and methods and procedures.

Only 28.8% (15) stated that the topics in the methodological preparations are not enough; however, 82.6% (43) considered that it is necessary to raise the level of preparation, through practical activities, with demonstration classes by the most experienced teachers; likewise, they proposed holding exchange workshops with other sports complexes, where conferences by family doctors on this syndrome and non-communicable chronic diseases are also offered.

100% (52) considered that the program lacks the necessary methodological components that allow the teacher to better prepare for the planning of physical activities to benefit the physical condition of older adults with a diagnosis of sarcopenia.

Questions five, six and seven are related to the incorporation of older adults into the grandparents' circles. All teachers considered that the figure does not correspond to the number of adults, according to the total population of the municipality; 53.8% (28) stated that the main limitations are the loss of connection with the family doctor and the lack, still persistent in the older adult population, of knowledge of the potential of practicing physical exercises.

51.9% (27) considered that there is a lack of interest on the part of older adults to participate in the activities of the grandparents' circle, due to two fundamental aspects: insufficient guidance from the family doctor towards the practice of physical activity and that they themselves focus their attention on drug treatment and diet.

From questions eight to ten, related to the link with the family doctor and nurse, 36.5% (19) of the responses stated that good relationships are maintained with these professionals; the opposite opinion was expressed by 44.2% (23) of those surveyed, who rated it in the order of fair.

76.9 % (40) stated that these professionals sometimes approach the grandparents´ circle when classes are held to measure blood pressure or give educational talks. The main causes are due to the lack of a sphygmometer and because they prioritize work in the office.

84.6% (44) raised the need to strengthen ties with the doctor and nurse, due to the knowledge of these professionals and the information they can provide about the diseases suffered by older adults who feel more confident and secure with their presence in the area and that their help is necessary to guide and incorporate adults into the practice of physical activity for the benefit of health.

In question 11, 92.3% (48) of the teachers interviewed proposed, among the actions to be implemented to improve care for the older adults, increasing educational talks by the family doctor. They also spoke out in favor of holding socialization workshops, with more experienced teachers, that contribute to the improvement of teachers' preparation to raise the quality of classes, with creative methods that allow better attention to the physical condition of the elderly. with a diagnosis of sarcopenia.

Results of the interview carried out with primary care doctors and specialists in charge of caring for the elderly.

Interviews were conducted with 12 health professionals linked to work with older adults in the province of Havana, with the aim of delving deeper into the care of older adults diagnosed with sarcopenia.

The interview used was standardized and was applied with the objective of knowing the point of view of the primary health care doctors and the specialists in charge of caring for the elderly, in relation to assessing the need that exists to count with a physical exercise program to improve care for older adults diagnosed with sarcopenia.

100% of primary care doctors and senior care specialists (12) have more than 10 years of experience in this type of work.

All the specialists considered that the use of physical exercises on a regular basis (three to five days per week) constitutes a very important element for the care of older adults with a diagnosis of sarcopenia, since it favors the control of risk factors that can lead to functional complications, such as risks of falls, fractures, dependency, fragility and death. They also stated that among the most beneficial exercises are strength endurance exercises in combination with aerobic exercises.

The prescription of physical exercises carried out by the doctors was oriented towards the execution of aerobic exercises of moderate intensity such as walking briskly five to seven days a week or performing other physical activities with a moderate intensity, as long as the patients did not have other pathologies or more serious physical impediments that prevent the practice of physical exercises.

Regarding whether it is considered pertinent to develop a physical exercise program that allows orienting, organizing, dosing and planning the physical rehabilitation of older adults with a diagnosis of sarcopenia, 100% (12) of the doctors interviewed agreed that despite the prescription they carry out as specialists, they do not know how to effectively plan and dose the suggested activities and, on the other hand, no control is carried out after the prescription is made. Therefore, the development of a physical exercise program for the care of older adults with a diagnosis of sarcopenia is very relevant for 100% (12) of medical specialists.

The analysis of the results of the initial diagnosis allowed their integration, which made it possible to identify convergent aspects that characterize the diagnosis:

- Insufficient methodological preparation.
- Weakness of the bond between the doctor and the community physical activity teacher which prevented teamwork.
- The interviews with doctors and specialists showed that there is insufficient knowledge of the exercise prescription and subsequent control of the physical exercises recommended by them (these indicate the exercises to their patients, based on the knowledge of their benefits for improving the health, but they do not know

what type of exercises to indicate, how to dose them, organize them, work on them and control them, so they focus their treatment on the patients' diet and medication treatment). All of them considered it pertinent to have a physical exercise program that improves the care provided to older adults with a diagnosis of sarcopenia.

- Lack of knowledge of the community physical activity teacher about the characteristics of sarcopenia and the particularities of its treatment, which prevented individualized care.
- The objectives of the classes were aimed at improving physical condition in general, which affected the individualization of the process and the omission of the particularities of the elderly, so the prescription of the exercises was not adequate.
- Lack of a physical exercise program for the care of older adults diagnosed with sarcopenia that serves as a basis for specialists to provide effective care to people in this age group who suffer from this condition.

The results of the diagnosis made it possible to identify a set of lacks and deficiencies in the care process for older adults with a diagnosis of sarcopenia that require, for their solution, a methodological instrument that incorporates the systematic practice of physical activity as a means of attention to the sick subject that allows establishing an appropriate work direction, planning the actions (the content) that must be developed, applying the most advisable procedures and evaluating, in a systematic way, the effects it generates on the health status of people with this condition.

The physical condition of the participants was assessed by applying a set of exercises made up of four indicators:

1. Get up, walk 2.44 meters and sit down again. With the objective of evaluating agility, balance and general mobility in older adults systematically practicing.
2. Sit and get up from a chair, for 30 seconds. With the aim of evaluating the strength of the lower limbs.
3. Push-ups with weights. Evaluate the strength of upper limbs.
4. Six-minute walk. With the objective of assessing aerobic endurance.

It was found that the participants in the research presented deficiencies in the aspects related to sitting and getting up from the chair and the test of getting up, walking 2.44 meters and sitting down again, results were recorded between fair and bad in the entire sample.

The measurement of the calf circumference was used to identify the loss of muscle mass, the recorded data was located from the minimum limit range of 31 cm and more, although the loss of body weight without an apparent cause was reported in its entirety. thus defined by medical diagnosis. Due to the above, a loss of strength and muscle mass was observed, which led to referral to the Physical Activity and Health Center, with a diagnosis of presarcopenia.

The results of the diagnosis confirmed the need to apply an instrument that promotes the reestablishment of the structural and functional indicators required by the research participants.

The set of weight exercises was applied for 12 weeks, from September 2021 to December 2021. Initially, the one repetition maximum test with non-extreme weights (1RM) was applied. This made it possible to establish the real magnitude of the physical load with which they had to exercise, the prescription, preparation and control of the set of exercises with weights aimed at strengthening the skeletal muscles. At 12 weeks, the 1RM test was applied again with the objective of comparing the preliminary results with those of the initial diagnosis and proceeding to analyze the results.

Based on the proposals presented by Méndez (2021); Solano & Carazo (2018), which contemplates work by muscular planes (pectorals, back muscles, shoulders, biceps, triceps, leg, gluteus, abdomen and calf) with exercises with weights (multipower), an exercise set for which the dosage is conceived in 80-minute sessions applying standard and extensive repetition methods, with 10-15 repetitions per exercise and a moderate intensity, with two weekly weight training sessions, two tai chi sessions and the last month, a weekly dance therapy session is added.

Features of the strength exercise set

Objective: increase muscle mass and strength through weight exercises.

- Number of sessions: 24
- Frequency per week: 2
- Intensity: Low (40-50% of 1RM)
- Number of repetitions per exercise: 6-15
- Number of series: 2-3
- Session time: up to 80 min
- Complementary physical exercise: tai chi and dance therapy
- Type of exercise: weights (multipower exercises)
- Forms of work: circuit, stations, row
- Methods: standard repetition, extensive.

Exercises for the pectoral muscles

Strength on lying position

Strength on inclined position

Exercises for back muscles

T-bar row with chest support

Lumbar hyperextensions

Exercises for shoulder muscles

Sitting strength

Exercises for the biceps

Standing biceps

Exercises for the triceps

Standing triceps

Exercises for leg muscles

Half squat from behind

Pendulum

Scissors from behind

Takeoff without flexion

Leg extension on machine

Lying bench leg flexion

Exercises for glutes

Hip extension on the floor

Weighted Trunk Raise

Abdominal crunches

Calf exercises

Work the calves, from the sitting and standing positions.

For the application of the proposed set of exercises, the following methodological guidelines are respected:

- The class is organized into three parts: initial, main and recovery.
- The exercises will be applied with a minimum frequency of twice a week per muscle group; They are not scheduled consecutively.
- The intensity of the work is low, because these older adults begin a endurance training program, taking into consideration the number of exercises (8-10), the

number of series (2-3), the repetitions (8-10-12-15) and rest time of 2-3 min, between sets.

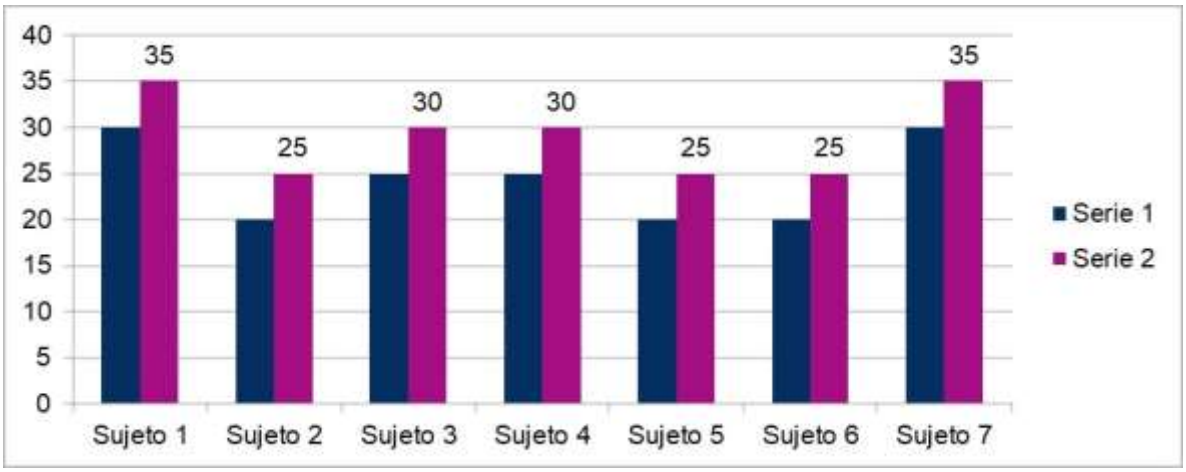
- The different types of exercises are performed with machines, free weights, own body weight, suspension bands and bands (TRX).
- The dynamic work regime is prioritized, indicated for working with the elderly.
- Aerobic work always predominates during exercise.
- Multi-joint exercises are applied first and then specific ones.
- The content planned for the initial, main and final parts of the class is strictly complied with, importance is given to warming up as a preventive method for injuries.
- Dosing takes into account the individual characteristics of each study participant.
- Functional indicators are controlled to evaluate organic responses.
- The execution of the exercises is reviewed, with the aim of guaranteeing quality in their execution.

Means used: the means available in the gym are used (levers, bars, dumbbells, discs, specific machines, benches, whistle and stopwatch).

Carrying out the tests outlined above allows to have the necessary information to develop the evaluation of the different selected indicators. The recorded results are shown in the figures below.

Figure 1 reflects the behavior of the 1RM calculation in the lying strength exercise. It is possible to see that the initial results are not similar, it performed in an environment of 20 to 30 repetitions, which is associated with the individual characteristics of the participants and their level of physical preparation.

Figure 1. *Behavior of 1RM in lying strength*



When evaluating the results of the second measurement, it is confirmed that, in all cases, there is a significant increase in relation to the initial evaluation.

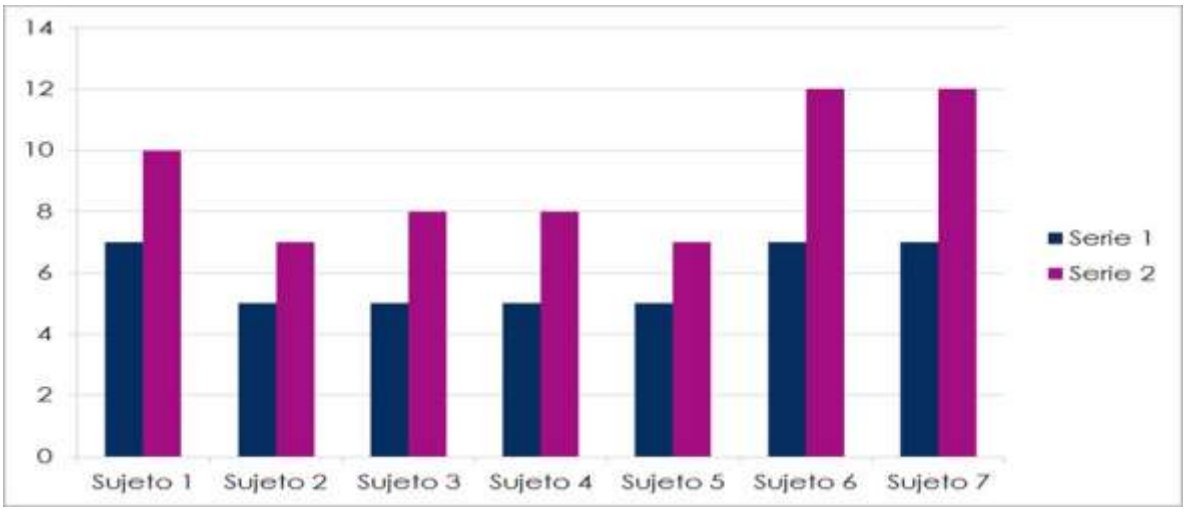
Figure 2. *Behavior of the takeoff indicator without bending*

In the case of measuring the indicator of take-off exercises without flexion, which are presented in Figure 2, the behavior is similar to that indicated in the indicator analyzed before. This behavior is manifested in all participants in the research, regardless of the sex

of each subject, which informs about the favorable influence of the strength exercises applied.

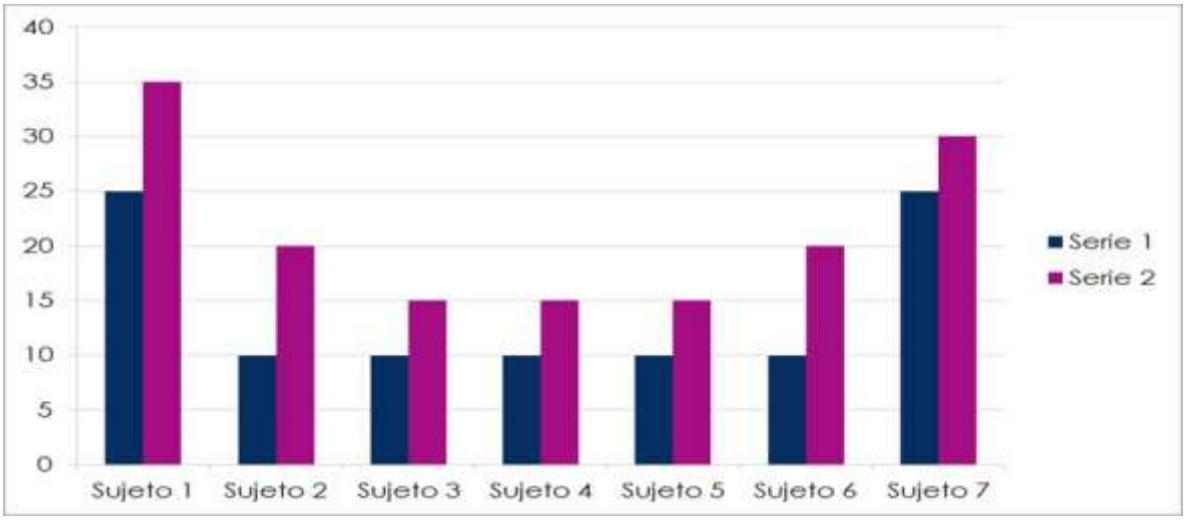
In the case of seated strength exercises, shown in Figure 3, it should be taken into account that it is the indicator in which the closest individual values are recorded in the first measurement; the same occurs when the results achieved in the second measurement are assessed. Additionally, it should be noted that all participants show favorable results, which indicates the convenience of the selected exercises for increasing strength in the participants.

Figure 3. *Behavior of the seated force indicator*



In the case of the half squat indicator, the results of which are shown in Figure 4, it is interesting that two of the participants presented results that were much superior to the remaining subjects. This trend is maintained when the results of the second measurement are assessed; however, the application of the exercises planned in the designed set has a significant impact on the increase in strength of all subjects subjected to the investigation.

Figure 4. *Behavior of the half squat indicator*



According to the different studies consulted for the research, it was found that, with respect to the diagnostic methods of sarcopenia, there is no consensus among the studies found. Although these opinions consider the variable muscle mass, not all assume the variable of muscle function, which is part of the definition of sarcopenia according to the European Working Group on sarcopenia in elderly people (Cruz et al., 2019). Regarding the tests used to analyze muscle mass, strength and function, there is no consensus or cut-off points for these variables in the different studies reviewed.

Bermúdez (2019) suggests the recommendations indicated by Padilla et al., (2014), in older adults who begin strength endurance training, work with low intensity to achieve better adaptation, which is manifested according to the older adult and your needs, lifestyle, sex and not the other way around, to subsequently progressively increase the intensity, until reaching 60-85% of 1RM, considering that the progressions must be managed reasonably under the supervision of professionals.

These recommendations are assumed in the research because these older adults participating in the study, for the first time, undergo an intervention through strength endurance exercises, combined with aerobic work, and the body's adaptation to the

conditions must first be achieved to the loads they receive, in order to prevent the intervention from being harmful to the health of the sample participating in the study.

By comparing the different studies consulted (Bermúdez et al., 2019; Gutiérrez et al., 2018; Méndez et al., 2021; Plaza et al., 2020; Vicente & Rodríguez, 2022) with the results of this research, it was possible to verify that, in all cases, when applying an intervention with endurance exercises in older adults with a predisposition to suffer sarcopenia and even with sarcopenia, improvements are achieved in both mass, strength and muscle function in 12 weeks of applying the strength and aerobic endurance exercises, which reverse or attenuate the evolution of this condition. The results obtained in the research confirm these findings, and improvements are found in the study group when controlling both daily and each period of time, of applying the set of exercises.

The increase in muscle mass recorded in the research presents a slight improvement compared to the studies consulted, it reached an increase of 0.3 to 0.5%, in relation to muscle strength, this may be related to the hypertrophy of muscle fibers and the improvement of neural factors involved in force production.

It is confirmed in the majority of the studies consulted that this type of strength endurance intervention provides important benefits to muscle function and walking speed is one of the most used tests for its assessment.

According to Barreto (2022), the improvement in muscle function contributes to raising static balance which, in turn, positively impacts dynamic balance and increases the ability to walk, climb stairs and other functions related to quality of life. The results of the research, in this sense, were similar; the improvement of muscle function is evident in the performance of each of the subjects trained in those exercises that are directly related to the activities of daily life.

CONCLUSIONS

The results of the research indicated that the application of strength exercises, in the care of older adults with a diagnosis of sarcopenia, is not considered an important means, which was confirmed when making the diagnosis.

The proposed set of exercises led to the reestablishment of the participants' morphofunctional indicators, which expresses the relevance of their fundamental particularities, among which their humanistic, flexible, collaborative, personalized, interactive and reflective character stands out.

The application of the proposed set favored the increase in indicators of muscle mass, strength and function in older adult subjects diagnosed with pre-sarcopenia, which influenced the quality of motor actions linked to activities of daily living. At the same time, it can constitute the basis for the design of care programs for people diagnosed with sarcopenia specifically.

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The author is responsible for writing the work and analyzing the documents.