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Effect of physical exercise on the physical condition of climacteric women

Efecto del ejercicio físico en la condición física de mujeres climáticas

Efeito do exercício físico na condição física de mulheres climáticas

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ABSTRACT

Physical fitness is the most commonly used expression to define a human being's capacity to move, and it can be improved by practicing physical exercises. For women in climacteric, it is important to exercise physically, because with the decrease in estrogen levels and the advance of age, there is a decrease in physical capacities that, together with non-



communicable diseases, increase their severity. The present research aimed to assess the effect of a set of exercises adjusted to the physical condition of climacteric women. According to the methodological design, the type of study was mixed (qualitative-quantitative) of longitudinal cut and the methods used were analytical-synthetic, the systemic-structural-functional, the theoretical systematization, the survey and the measurement. The main result was to confirm that physical exercise caused favorable effects in the group of climacteric women when they were evaluated well with the of tests applied. Therefore, as a conclusion, the practical verification yielded significant results in each test, corroborated the importance of evaluating at this stage, and demonstrated the positive changes that physical exercise brought to its practitioners.

Keywords: test, climacteric, physical condition, evaluation

RESUMEN

La condición física es la expresión más utilizada para definir la capacidad de movimiento del ser humano, y puede ser mejorada con la práctica de ejercicios físicos. Para la mujer en climaterio resulta importante ejercitarse físicamente, debido a que con el descenso de los niveles de estrógenos y el avance de la edad ocurre una disminución de las capacidades físicas que unido a las enfermedades no transmisibles incrementan su severidad. La presente investigación tuvo como objetivo valorar el efecto de un conjunto de ejercicios ajustados a la condición física de mujeres climatéricas. Según el diseño metodológico, el tipo de estudio fue mixto (cualitativo-cuantitativo) de corte longitudinal y los métodos utilizados fueron el analíticosintético, el sistémico-estructural-funcional, la sistematización teórica, la encuesta y la medición. El principal resultado fue constatar que el ejercicio físico provocó efectos favorables en el grupo de mujeres climatéricas al ser evaluadas de bien con la batería de pruebas aplicada. Por lo que a modo de conclusión la comprobación práctica arrojó resultados significativos en cada prueba, corroboró la importancia de evaluar en esta etapa, y demostró los cambios positivos que el ejercicio físico aportó a sus practicantes.

Palabras clave: batería de pruebas, climaterio, condición física, evaluación



RESUMO

Condição física é a expressão mais utilizada para definir a capacidade de movimento do ser humano, que pode ser melhorada através da prática de exercício físico. Para as mulheres no climatério é importante a prática de exercício físico, pois com a diminuição dos níveis de estrogênio e o avançar da idade há uma diminuição das capacidades físicas que, juntamente com as doenças não transmissíveis, aumenta a sua gravidade. O objetivo desta investigação foi avaliar o efeito de um conjunto de exercícios ajustados à condição física de mulheres climatéricas. De acordo com o desenho metodológico, o tipo de estudo foi misto (qualitativo-quantitativo) de corte longitudinal e os métodos utilizados foram Analítico-sintético, Sistêmico estrutural-funcional, Sistematização teórica, Técnica de inquérito e Medição. O principal resultado foi confirmar que o exercício físico provocou efeitos favoráveis no grupo de mulheres climatéricas quando estas foram avaliadas de acordo com a bateria de testes aplicada. Como conclusão, a verificação prática apresentou resultados significativos em cada teste avaliado, corroborando a importância da avaliação nesta etapa. Demonstrando as mudanças positivas que o exercício físico traz aos seus praticantes.

Palavras-chave: Climatério; bateria de testes, avaliação, condição física.

INTRODUCTION

The average age of menopause varies from woman to woman, as it is a phenomenon that each woman goes through naturally or prematurely, the latter due to different artificial or surgical causes or other factors, and menopause occurs in the final phase of the climacteric.

For Matzumura et al. (2020), the average age of menopause varies between 48 and 52 years, but with a tendency towards an increasingly older age; however, for Martínez et al. (2022), the climacteric is considered between 45 and 59 years. In Cuba, the reference ages range from 45 to 52 years, as can be seen, it constitutes a particular phenomenon for each country and woman.



In addition to the appearance of non-communicable diseases, middle-aged women run the risk of other diseases arising or worsening at this stage, such as uterine and breast cancer, which require specialized care and treatment, where physical exercise plays a rehabilitative role.

Breast cancer is the most common cancer among women, with new cases reported annually worldwide (Fernández, et al., 2020). The increase in life expectancy of women who have overcome the disease poses new challenges in terms of preventing possible relapses; while alleviating the side effects of treatment, as well as the loss of mass, muscle strength, mobility, the appearance of lymphedema or fatigue (Huo, et al., 2024; Rogers, et al., 2023).

According to Real et al. (2023), they have referred to the side effects of this type of cancer where physical exercise has been shown to be an important means of maintaining physical functions and reducing the symptoms of anxiety and depression in women who suffer from this disease.

Likewise, the effectiveness of physical exercise in studies such as Durazo et al. (2021); Oppert et al. (2021) shows that it is an effective measure to prevent and treat obesity and its comorbidities. On the other hand, Lacuey et al. (2020) state that it can help reduce excess adipose tissue and chronic low-grade inflammation, associated with obesity, and the risk of cardiovascular disease and other health problems.

From this perspective, it can be seen that the authors consulted reinforce the importance of physical exercise in different populations. On the other hand, Avilés et al. (2022) argue that there is a clear relationship between physical exercise and health, as physical inactivity is an independent risk factor for pathologies that are very prevalent in today's society.

The data offered by the National Office of Statistics and Information (ONEI, 2023), in its chapter 21 called Sport and physical culture, states that in Cuba the systematic practitioners counted in the health groups, in the year 2022 were a total of 412,628, broken down into different programs among which are the hypertensive group, with 180,957; those of basic



gymnastics for women, with 132,462; and those of aerobic musical gymnastics, with 394,445 practitioners.

These data show the trend in Cuba towards a decrease in systematic practitioners in all these modalities since 2018, a phenomenon that increased between 2020 and 2021 due to Covid 19. Hence, in agreement with Avilés et al. (2022), an increase in physical inactivity is a risk factor as it is closely related to a sedentary lifestyle, which translates into a person's poor physical condition.

Therefore, increasing the number of practitioners must be a constant, due to the usefulness of physical exercises and the benefits they bring to health; however, to verify their effects on the body, it is necessary to evaluate even if different ways are used to obtain the information.

Currently, it is assessed through different instruments such as questionnaires and tests widely used in the field of psychology, but in relation to the evaluation of physical condition, physical tests are applied included in a of tests with different means or calibrated measuring devices, taken from some studies, where physical condition is assessed in the middle-aged population (Avilés, et al., 2021; Martínez, *et al.* , 2022; Matzumura , et al., 2020 ; Medrano, et al., 2023).

The present study addresses the evaluation process, being linked to an initial diagnosis carried out on the chosen sample, before entering a physical exercise program, which requires the intervention of a multidisciplinary group, in accordance with the nature of the diagnosis.

It is considered that every evaluation process has a diagnostic function and every diagnosis requires an evaluation of certain conditions that allows a judgment or conclusion to be drawn about the situation or state of a problem and the possible causes that determine it. Evaluation, in a general sense, allows to know to what extent the objectives were achieved through the use of methods and means; its study can become a procedure when supported by systematization (Leandro, et al., 2022; Romero, 2020).



When analyzing the relationship between measurement and evaluation, the latter is identified with the application of tests, the assignment of grades and the establishment of a classification judgment. The continuity and systematicity of the evaluation are an essential condition to turn this task into an efficient control process (Romero, 2019, 2020). In this sense, diagnosis and control play a key role in anticipating, planning and directing the process in accordance with the demands posed by the state of development of women in the climacteric stage (MEC in Spanish), from the beginning of their physical exercise practice (Romero 2017).

For this reason, it is of interest that the Physical Culture professional who works with a MEC group can plan, dose and direct physical exercise appropriately, based on the diagnosis and control of the practitioners, in relation to their physical condition.

Although the specific tests to determine it are heterogeneous, health-related physical fitness includes cardiorespiratory capacity, muscular strength and endurance, flexibility and body composition (especially adiposity); and in children, also speed and agility (Jañez , et al., 2022).

According to Romero (2017), in the climacteric stage, due to the different factors that depend on it, it is necessary to evaluate the physical condition of the woman when there are manifestations of reduced cardiorespiratory capacity that may reflect fatigue in her daily life activities, so maintaining a good flow of oxygen in the blood is essential to protect the heart and lungs.

On the other hand, it is important to work on flexibility as well as the capacity to strengthen, to achieve general toning, but the perineal muscles after participating in labor need a correct dosage to be strengthened and thus avoid vaginal prolapses. Due to aging, the processes and coordination capacities decrease, this causes the healthy physical condition of the woman to be reduced, due to her sedentary lifestyle habits; in contradiction to the physical requirements that she must have, for a good state of health.



From a social perspective, the organic changes caused have an impact on the physical condition of the MEC, translated into lifestyles adopted during this period. Therefore, after the assessments that have been presented on this subject, the present work aimed to assess the effect of a set of exercises adjusted to the physical condition of climacteric women to serve as a guide for graduates in Physical Education.

MATERIALS AND METHODS

From an initial diagnosis, the governing documents related to the MEC were analyzed, the survey technique was applied to 30 women of the Palatine Council, to find out data of interest and compare them with the characteristics of this stage, an interview was conducted with teachers of the "Alfredo Sosa" sports complex and structured observation of several classes that included the application of physical efficiency tests, to a teacher at this center who worked with a group of women.

With the diagnosis information, data were compared and the results of the physical efficiency tests were verified in practice, which showed the need to apply other tests to measure the same capacities, in accordance with the anatomical-physiological characteristics of these women, and obtain better results.

For the pre-experiment, a mixed study (qualitative-quantitative) was used, with pre- and post-test, of longitudinal scope, organized to obtain partial and final results, from the statistical analysis of all the tests applied.

This instrument was applied in four groups, each consisting of 35 MEC, for a total of 140, aged between 40 and 59 years, referred by the climacteric clinic of the "Antonio Maceo" polyclinic in the Cerro municipality.

The selected sample presented climacteric symptoms, and it was guaranteed that they had not received hormone replacement therapy as a condition so that the information would not be biased after applying the of tests. The study had the characteristic of forming the groups by diseases associated with the stage.



The inclusion criteria were MECs who expressed their approval to participate in the research, without surgical complications or advanced stage diseases, and who did not use hormone replacement therapy.

The first group to be diagnosed consisted of 35 MEC, divided into 12 workers, 15 housewives and eight retirees. This group presented grade I obesity or overweight, manifested in the abdominal region; menstrual cycle alterations; irritability; and in a small percentage, hot flashes or sweating. The average age of the group was 48.22 years.

The second group consisted of 16 workers, 13 housewives and six retirees, for a total of 35 MECs who presented arterial hypertension as a characteristic, together with other symptoms of climacteric, caused by alterations in the menstrual cycle such as sweating, insomnia, anxiety and stress; the average age of the group was 48.97 years.

The composition of the third group was 12 workers, 18 housewives and five retirees. The MECs of this group presented osteopenia as a distinctive characteristic, menopause in a low percentage, sweating, insomnia, vaginal dryness, coitalgia and decreased libido, the average age of the group was 48.45 years.

The fourth group consisted of 10 workers, 21 housewives and four retirees, totalling 35, all of them of working age; but due to family or personal circumstances they were not working at that time. Among their most obvious characteristics were primary osteoporosis type I, joint pain, vaginal dryness, coitalgia, decreased libido, anxiety, depression and stress; six cases were in menopause, the average age of the group was 49.25 years.

Methods as analytic-synthetic method were used to answer various questions about physical exercise and the evaluation of the physical condition of MEC, to break down the phenomenon, then group it and study it as a whole, and to assess the most significant contributions of the consulted authors. The systemic-structural-functional method was used as an integral process for the design of the methodology to apply the of tests. The theoretical systematization included the analytical-synthetic method as a generalizing theoretical method, which favored the ordering of the information to critically interpret elements of the



theory and practice of the tests, materialized in the form of application, according to the methodology.

The structured survey was applied to the sample of participating MECs (user) for their characterization and classification, to form groups and to evaluate. The measurement was used throughout the research, from the initial diagnosis, in anthropometric measurements and the of tests; the statistical-mathematical techniques were used for the evaluation of the application of the tests sets, processed through the use of the SPSS software for Windows, version 20 and the EXCEL spreadsheet system, of the Microsoft Office software package (2007).

The set of physical tests evaluated were: anthropometric measurements; arm flexion and extension, in 30 seconds; abdominal strength; getting up and sitting in a chair, in 30 seconds; hand dynamometry; sit and reach flexibility; and a six-minute walk test, which evaluated MEC's physical condition.

The set of physical tests was applied every three months to a sample of 140 MECs, broken down into 4 groups, using pre- and posttest, where data of interest were taken to check whether they were different or similar in terms of the values obtained. Initially, the repetitions established for each of the tests were carried out during the two stipulated days, with a day of rest in between, in the morning; the methodological indications were followed, with the objective of complying with the validity, reliability and standardization, to obtain coincident results with little variation between the groups.

In a second stage, the set of exercises was applied, with the same procedure described and the same objective, to observe progression in the results, and to find out if the set of tests was flexible to changes, according to the results obtained.

After completing the application of the seven tests, an analysis was made to know the comprehensive evaluation of each MEC, which allowed Physical Culture professionals to have an individual assessment by tests, and in a general way, of the physical condition of each one, in order to plan and dose their class unit more easily, aimed at the proposed



objective and to emphasize those capacities in which they presented difficulties, for better planning and dosing of the entire training process.

For a comprehensive assessment, a final score was established using scales from two to five as minimum and maximum values, corresponding to the categories of excellent (E), good (B), average (R) and poor (M), according to percentile. A general range of 35 points was established, assigned by the total number of tests, as the total value to be achieved, where $N =$ is the sum of numerical values assigned to each evaluation category by tests. For example: $N = 5 + 5 + 5 + 5 + 5 + 5 + 5 = 35$.

RESULTS AND DISCUSSION

Table 1. Results of the initial diagnosis

Evidence	Level 1	Level 2	Level 3	Level 4	No Level
Abs 1	2.9 %	37.1 %	37.1 %	22.9 %	
Abs 2	30.2 %	36.8 %	-	33.0 %	
Planks 1	14.0 %	-	30.0 %	56.0 %	
Planks 2	-	20.0 %	42.9 %	37.1 %	
Long Jump 1	22.0 %	-	25.0 %	-	53.0 %
Long Jump 2	2.9 %	20.0 %	60.0 %	17.1 %	
Flexibility 1	21.0 %	-	30.0 %	49.0 %	
Flexibility 2	5.7 %	48.6 %	42.9 %	2.9 %	
800-meter race 1	15.7 %	-	20.3 %	-	64.0 %
800-meter race 2	-	11.4 %	48.6 %	40.0 %	

The initial diagnosis took as a starting point the physical efficiency tests used in the Cuban population for these ages.

1. The initial diagnosis showed that in the plank tests 56% of the sample reached the fourth level, without improving this result in the 37.1% that remained; after



the second measurement was applied, deformity in the technique, decreased arm strength and low physical preparation could be observed, which showed that it was not the most accurate test to measure arm strength in MEC.

2. In abdominal strength, 2.9% achieved the first level in the first measurement, the progress was that 30.2% was at this same level in the second measurement; however, deformity was observed in the execution of the technique and a lack of physical preparation similar to the previous test.
3. In the long jump to measure leg strength, they also reported a lack of preparation and discomfort in their ankles and knees, where 53% of the sample was evaluated without a level in the first test and 17.1% were at the fourth level in the second measurement.
4. In the endurance test, 64% of the sample was classified as having no level in the first measurement, as they did not meet the required standards. For the second test, 40% of the sample managed to be placed in the fourth level, which reflected that the cause of the results was the lack of preparation and the manifestation of discomfort in the knees and ankles.

These results justified the search for other affordable tests to assess physical condition in MECs, with the possibility of preparing them through the application of a physical exercise program; emphasis was placed on aerobic exercises, with the participation of large muscle groups at a moderate intensity, in sessions of 30-60 minutes, with an increase from three to five times per week.

Pre-experiment results

A detailed analysis of the groups participating in the study revealed that there were no significant differences in the statistical analysis performed in the Sit and Reach flexibility test. All groups improved their values in the second measurement, although group two achieved values above the group average of 34.86%.



However, it was necessary to point out that the average values were above the B evaluation, according to the established scale; and in correspondence with the study by Medrano et al. (2023), a significant correlation at 0.05% was shown between trunk flexibility and vitality, which enhanced the benefits of physical activity practice in the MEC (Figure 1).

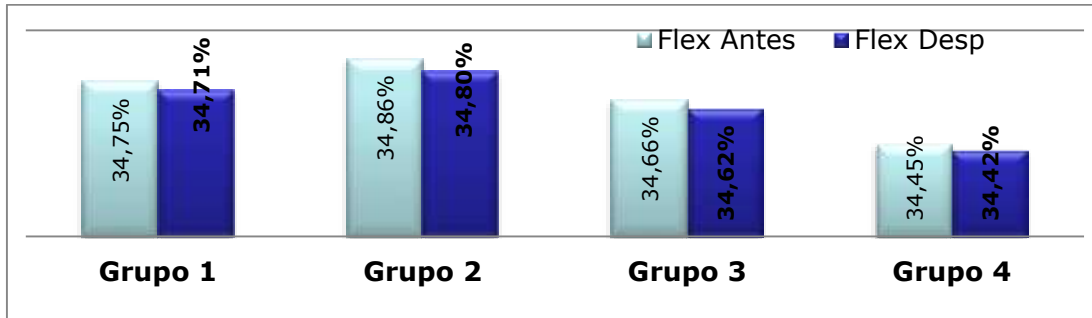


Figure 1. Average values of the flexibility test by groups

In hand dynamometry, group three achieved the best values of the sample with 16.8 and 15.2 kgf, in a first measurement with the right and left hand respectively, in the second measurement the values increased to 19.6 kgf in the right hand and 18.2 with the left hand; the rest of the groups showed similar results, with a predominance of strength in the right hand (Table 2).

Table 2. Average values of dynamometry by groups (before and after)

Test Dynamometry hand	Right hand Ant	Left hand Ant	Right hand Desp	Left hand Desp
Group 1	16.4 kgf	14.6 kgf	19.3 kgf	17.9 kgf
Group 2	16.0 kgf	14.3 kgf	18.8 kgf	17.6 kgf
Group 3	16.8 kgf	15.2 kgf	19.6 kgf	18.2 kgf
Group 4	15.9 kgf	14.1 kgf	18.6 kgf	17.5 kgf

The results obtained in this dynamometry test were evaluated by R, an aspect to be taken into account to adjust the strength exercises and work more systematically on this capacity; in this regard, Fernández et al. (2020); Real et al. (2024) demonstrated that an exercise program, with aerobic and muscle strength components, stimulated the improvement of the



physical and psychological state and the quality of life of women with various health problems.

In the six-minute walk test, the distance covered showed similar results between the groups, with the third group standing out, with an approximate previous distance of 631.37 meters and a progression of 697.86 in a second measurement, with cases that exceeded 700 meters, which showed a physical condition different from that achieved in the other groups. The heart rate during effort and recovery showed similar results, which demonstrated an adaptability to training loads, evidenced in the second measurement of all groups (Table 3).

In relation to the evaluation scale of this test at the end of the study, the average managed to be placed with the evaluation of B; in this sense, the research by González *et al.* (2024) presented the relationship between physical activity and the benefits in cardiovascular health, with a decrease in cardiovascular risk factors among which obesity and arterial hypertension were found, accentuated at this stage by the loss of estrogens in their function as cardiovascular protector.

The systematic practice of aerobic exercise increased the functional capacity of the heart, decreased the risk of coronary ischemia and increased the chances of survival from a myocardial infarction, and controlled symptoms and non-communicable diseases; therefore, having an optimal physical condition at this stage of life was considered essential.



Table 3. Average values of the 6-minute walk by groups. Distance traveled and Heart rate (before and after)

Test/Groups		Dist. Rec Ant		Dist. Rec Desp		
Group 1		628.17		690.46		
Group 2		630.85		695.53		
Group 3		631.37		697.86		
Group 4		626.32		689.37		
P 6 Min/Fre Card	FCRA ppm	FCRD ppm	FCEA ppm	FCED ppm	FCRecA ppm	FCRecD ppm
Group 1	78	72	144	120	84	72
Group 2	84	78	150	126	90	72
Group 3	72	66	138	108	66	60
Group 4	72	66	132	114	72	66

In the tests that measured strength capacity, it was found that there were no significant differences in the average values of each group, although in this sense group one showed the best results in the stand-up and sit-up test with 20.66 repetitions in the second measurement; in the ABs, this same group averaged 24.87 repetitions in its second measurement, contrary to groups two and four that obtained the lowest results, with averages of 15 to 16 sit-ups (Table 4).

The arm flexion and extension test showed stable values, however group one stood out, averaging values of 17.94 repetitions with the right arm and 16.86 with the left, in the second measurement.



Table 4. Average values of the strength tests, number of repetitions before and after by groups

Strength tests	Group 1	Group 2	Group 3	Group 4
Abs Before	21.83	14.37	15.85	14.35
Abs After	24.87	15.86	17.65	16.50
Up and sit Before	17.71	17.81	17.83	17.69
Up and sit After	20.66	17.91	17.96	17.76
Right arms Flexion Before	14.40	14.26	14.29	14.30
Right arm After	17.94	15.51	15.56	15.51
Left arm flexion Before	14.23	13.54	13.56	13.56
Left arm flexion After	16.86	14.91	14.94	14.96

In the anthropometric measurements, group one stood out, as the initial mean values of body weight were over 78.37 kg with a decrease to 73.58 kg, in a second group measurement. Although there were isolated cases in which this parameter was not met with the established rigor, the other indicators achieved good results translated into better health indices.

The criteria of González et al. (2024) were agreed upon when they pointed out in their study what Lacuey et al. (2020) referred to regarding the help of exercise to reduce excess adipose tissue and chronic low-grade inflammation associated with obesity, which can reduce the risk of cardiovascular diseases and other health problems.

Overall assessment of the test for each participant

In general, the comprehensive assessment through the seven tests applied demonstrated optimal results since the sample was evaluated with a B in a higher percentage, in addition to individually delimiting which tests had greater difficulties.

In summary, the groups showed homogeneity in the results. It was estimated that age and climacteric with irregularities in the menstrual cycles could have influenced the increase in values in group one, but in general the values behaved above the average by groups, with similarity in the results and a better progression always in the second measurement.



In this sense, Medrano et al. (2023) revealed that various studies demonstrated that physical activity had beneficial effects on physical condition with an increase in physical strength, cardiovascular endurance and balance, which presupposed a direct relationship between strength and cardiorespiratory capacity, but more exhaustive studies are necessary in the MECs.

CONCLUSIONS

The systematization of theoretical references based on the evaluation of the physical condition of the MECs allowed the positioning of five components to assess the of physical exercises. The physical efficiency tests applied in the diagnosis showed difficulties in strength and endurance, with a high demand not appropriate for this group.

The practical verification showed that the sample always achieved better results in the second measurement, with an approach based on the fact that physical exercise for the MECs had to be varied, in order to solve the hormonal changes and disorders of the stage, by combining strength exercises with aerobic exercise, supervised by a Physical Culture professional together with related specialists. This reinforced the information in the consulted literature on the relationship between physical exercise, physical fitness and their positive effects on health.

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



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