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Evaluación clínica, morfológica y funcional en relación a la actividad física en el adulto mayor

Clinical evaluation, morphological and functional in relation to the physical activity in the biggest adult

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Resumen
Se realizó un estudio descriptivo de corte transversal con los practicantes sistemáticos de actividad física en el Centro Provincial de Medicina del Deporte de la provincia Villa Clara, pertenecientes al grupo de promoción de salud de patologías crónicas no transmisibles. Participaron en el estudio los 20 integrantes del grupo, los cuales presentaban una edad mínima de 60 años, máxima de 78 y una edad media de 67,9 años. El objetivo del estudio consistió en describir la relación entre las variables clínicas, morfológicas y funcionales con la práctica de actividad física sistemática en adultos mayores; dichas variables fueron relacionadas estadísticamente mediante la prueba Anova, con el tiempo y frecuencia de práctica de actividad física. Los principales resultados evidenciaron que las variables que presentan un estado favorable en su control fueron las clínicas y las funcionales, no existió relación entre el tiempo de práctica con los niveles de colesterol, glucemia, el peso corporal y porciento de grasa. No obstante, se comprueba que el tiempo de práctica sistemática de actividad física en estos adultos mayores mejora el consumo de oxígeno y permite desarrollar una capacidad aeróbica adecuada.

Palabras clave: actividad física, adulto mayor, estado de salud

Abstract
A descriptive cross-sectional study was conducted with systematic physical activity practitioners at the Provincial Center for Sports Medicine in Villa Clara province, belonging to the group of health promotion of chronic non-communicable diseases. The 20 members of the group, who had a minimum age of 60 years, a maximum of 78 and a mean age of 67.9 years, participated in the study. The objective of the study was to describe the relationship between clinical, morphological and functional variables with the practice of systematic physical activity in older adults; These variables were statistically related through the Anova test, with the time and frequency of practicing

physical activity. The main results evidenced that the variables that presented a favorable state in their control were clinical and functional, there was no relationship between practice time with cholesterol levels, blood glucose, body weight and fat percentage. However, it is verified that the time of systematic practice of physical activity in these older adults improves the oxygen consumption and allows to develop an adequate aerobic capacity.

Keywords: *physical activity, older adult, health status*

Introduction

Different types of aging are recognized, among which the individual and the demographic or population stand out. Individual aging is the process of evolution - until now irreversible - that each person experiences in the course of their life and has been defined as the series of morphological, psychological, functional, and biochemical modifications that originate the passage of time on beings alive. It is characterized by the progressive loss of the body's reserve capacity in the face of changes. Tabio, Rubido and López (2011).

Population aging is the increase in the number of older adults with respect to the population to which they belong, and this population group has gradually increased. The social challenge that this represents is due to the needs that it generates from an economic, biomedical and social point of view. (Huenchuan, 2011).

In the 21st century, the global trend towards declining fertility and prolonging life expectancy has given the phenomenon of population aging an unprecedented importance. After Europe and North America, the Caribbean is the oldest region in the world: 10% of the total population of that region is 60 years or older. Oliva, Espinosa and Sánchez (2007).

In Cuba the percentage of older adults is higher than in several developed countries. With 11 238 317 inhabitants, it is one of the oldest countries on the continent, and the trend is increasing; a consequence that, although it responds to the social achievements of the Revolution, with population indexes on a par with developed countries, places before all, and especially before youth, the great dilemma of compensating the exhausted labor forces and advancing a nation, from its social and economic base; for this reason, policies and methods have been established with medico-social projections that make these people feel more useful to the family and to society. Cruz, Hernández, Morera, Fernández and Rodríguez (2008).

The report of the National Office of Statistics and Information (ONEI) on Population Studies and Data, closed in 2014, describes that at the territorial level the aging process is observed more or less intensely, Mirabal (2011). This index moves in a minimum range of 16.3% in the province of Guantánamo, and a maximum of 22.6% in Villa Clara, this being the oldest province for some years now. Next to it appears Havana with aging values of 20.5%. Rodríguez, Reyes, Correa, González, Gil, Rodríguez Pérez (2010).

These two provinces together group 26% of the country's population, concentrating between the two 28.8% of its population aged 60 and over. At the municipality level, Plaza de la Revolution appears as the oldest with 27.0% of people over 60 years of age.

This phenomenon worries and occupies researchers and specialists across the country who work to ensure a better quality of life for their older adults.

As people age, there is evidence of changes and alterations in their physical and psychological health. These changes are progressive and inevitable, but it has been shown in various investigations that the rate of degeneration can be changed with physical activity. With adequate aerobic exercises, even if they begin at the age of 60, life expectancy, functional independence can be increased from one to two years and help prevent and / or control diseases such as cardiovascular diseases, hypertension, diabetes, osteoporosis and depression, Alfonso (2010).

Physical activity is a very effective means of preventing and delaying the inevitable deterioration of functional capacity in individuals. The degree of physical condition of a person determines its ability to function autonomously and to have a full and independent life. (Ruíz and Herrera, 2009).

Physical activity should not be confused with exercise. This is a variety of planned, structured, repetitive physical activity and performed with a goal related to improving or maintaining one or more components of physical fitness. Physical activity encompasses exercise, but also other activities that involve body movement and are performed as part of moments of play, work, active forms of transport, housework and recreational activities. García, Pérez, Chí, Martínez and Pedroso (2012).

According to the importance of the subject, the present study was carried out with the aim of: Describing the relationship between clinical, morphological and functional variables with the practice of systematic physical activity in older adults treated at the Villa Clara Provincial Center for Sports Medicine.

The importance of the research lies in the fact that it is shown that the time of systematic practice of physical activity in older adults improves oxygen consumption and allows the development of adequate aerobic capacity, which undoubtedly increases their quality of life.

Methodology

The entire population of the group of systematic physical activity practitioners were studied, 20 older adults, who attend the Sports Medicine Center.

The variables studied were: age and sex; variables related to physical activity: time of practicing physical activity, frequency of practicing physical activity; clinical variables: control of arterial hypertension (HT), control of glycemia (glycemia), total cholesterol; anthropometric variables: weight, height, body mass index (BMI), fat percentage (% Gr) and functional variables: maximum oxygen consumption (VO2Max).

For the collection of the information, the clinical history was used as a documentary source from which the data of the clinical and morphological variables that were worked and for the measurement of the maximum oxygen consumption (VO2Max), the modified Cooper Test was carried out in two moments, the first after 4 weeks of adaptation and conditioning and the second at the conclusion of the second stage of medical intervention and exercises.

Cooper Test: It was designed in 1968 by Kenneth H. Cooper (Oklahoma, 1931). It is a test of demand; where the distance traveled in the suggested time (12 minutes), seeks to maximize the physical, respiratory and cardiovascular capacity of the person, until bringing him to a point close to exhaustion. It was used to estimate the maximum oxygen consumption (VO2max) and to establish aerobic capacity, for members of the United States Army. The generalization of its use made the test for different population groups for different age groups, including systematic practitioners, using the modification for older adults from Pancorvo (2010).

For the statistical analysis, the SPSS version 22.0 for Windows package was used, which allowed summarizing and processing the collected data and reflecting them in tables for their proper interpretation.

Descriptive statistics were used to characterize the sample, where the mean, maximum and minimum, which are central tendency and dispersion statistics, respectively, were used. Once the results were obtained, the Anova mean comparison test was determined, taking the time of physical activity variable as a factor, in order to establish relationships with the behavior of clinical, morphological, and functional variables.

Results and Discussion

Table 1. Time of practicing physical activities

Time	**N**	**Percentage**
Under 1 year	6	30.0
From 1 to 2 years	7	35.0
More than 2 years	7	35.0
Total	20	100.0

Source: Clynical Histories X = 2.5

Table number 1 summarizes the practice time of the physical activity of the members of the sample, from which only 6 have been involved in this type of activity for less than a year. From the above it follows that 70% of the practitioners have been involved in systematic physical activity for more than a year, with an average of 2.5 years. They carry out the practice with a minimum frequency of 3 times per week.

Tabla 2. Clynical variables behavior

Variable	**Control HTA**		**Glycemic Control**			**Colesterol**	
Category	Controlado	No controlado	Buen Control	Control Aceptable	Mal Control	Normal	Riesgo
Number	15	5	10	8	2	13	7

							75	
%	75	25	50	40	10			25
							1,35	
Medium		**1,25**			**1,60**			

Source:Clynical Histories

Table 2 describes the behavior of the studied clinical variables, focusing on the control of arterial hypertension, glucose control, and cholesterol levels, respectively. In relation to the control of arterial hypertension (HT), this showed an average of 1.25; which indicates a marked trend towards adequate control in the studied population. This evident 75% are shown to be in the controlled category and only 25% have trouble maintaining their control.

90% of them have good metabolic glycemic control, since their glycemic levels oscillate between good control and acceptable control, with an average of 1.60, which translates into adequate metabolic control. In the case of cholesterol figures, an average of 1.35 was found, indicating that normality prevails among practitioners, followed by the risk category with a 25%.

Table 3. Behavior of the body mass index

Clasification	**Number**	**Percentage**
Normal weight	8	40,0
Over weight	5	25,0
Obese	7	35,0
Total	**20**	**100**

Source:Clynical Histories X = 2,95

Table 4. Behavior of fat percentage

Fat percent	**Number**	**Percentage**
Desire	9	45,0

No desire	11	55,0
Total	**20**	**100,0**

Source:Clynical Histories X = 1,55

Among the morphological variables shown in Tables 3 and 4, the behavior of the body mass index and the percentage of fat were taken into account. The largest number of study individuals (60%) are in the overweight and obese categories, for an average of 2.95, which establishes a correspondence between this variable and the percentage of body fat, presenting an average of 1 , 55 where 55% have an unwanted fat percentage.

Table 5. Behavior of the maximum oxygen consumption.

Categoría	**Number**	**Percentage**
High	3	15,0
Good	4	20,0
Average	6	30,0
Low	2	10,0
Poor	5	25,0
Total	**20**	**100,0**

Source:Clynical Histories X = 4,10

Table number 5 shows the distribution of the studied cases according to oxygen consumption, divided into 5 categories in descending order. The results show an average of 4.10. Thirteen of the practitioners (65%) are in the ideal categories, which translates into favorable functional capacity. On the other hand, 35% of the sample shows behaviors that oscillate between low and poor levels, because they have not developed adequate aerobic capacity.

Clínical		**Clínical Physical activity time practice**			**Anova**
		Less than 1 year	From 1 to 2 years	More than 2 years	**Meaning**
HBP Control	controlled No controlled	2	7	6	.010

		4	0	1	
Glucemic numbers control	Good Control	1	4	5	.037
	Acceptable Control	3	3	2	
	Bad Control	2	0	0	
Total Cholesterol	Normal	2	5	6	.143
	Risk	4	2	1	
	Hypercholesterolemy	0	0	0	

Table 6. Relation between physical activity time practice and clynical variables.
Source:Clynical Histories. *Estadígrafo: p≤ 0,05*

Table 6 shows the results of the relationship between the practice of physical activity and control of blood pressure, control of blood glucose and cholesterol levels. When analyzing blood pressure control, it is observed that the majority of the practitioners in the sample with more than one year of incorporation are included in the controlled category, a significant result with p≤ 0.05 with a confidence interval of 95%. Similar result is shown for metabolic control, where it is notable that the longer practice of physical activity, the better the glycemic control.

In this study, despite the fact that the largest number of older adults are within the category of normal cholesterol and with longer practice time, when performing the statistical analysis, no significant differences were found, which means that in this study there is no relationship between the time of sports practice and control of cholesterol levels.

Variables		**Sports practice time**			**Anova**
		Less than 1 year	From 1 to 2 years	More than 2 years	**Meaning**
BMI	Low weight	0	0	0	.948
	Normal weight	2	4	2	
	Over weight	2	0	3	
	Obese	2	3	2	
Fat percentage					

Desire	1	3	5	.155
No desire				
	5	4	2	

Table 7. Relationship between the time of sports practice and the morphological variables.
Source:Clynical Histories. *Estadígrafo: p≤ 0,05.* **BMI:** Body Mass Index

Table number 7 shows that there is no statistical significance when comparing the morphological variables in relation to the time of practicing physical activity, allowing to affirm that the time of practice did not generate changes neither in body weight nor in the percentage of fat of the individual studied.

Table 8. Relation between physical activity practice time and the functional variables.

Variable	**Evaluación**	**Tiempo de práctica de actividad física**			**Anova**
		Less than 1 year	From 1 to 2 years	More than 2 years	**Meaning**
Consumo Máximo De Oxígeno	Very high	0	0	0	.000
	High	0	0	3	
	Good	0	0	4	
	Average	1	5	0	
	Low	1	1	0	
	Poor	4	1	0	

Source:Clynical Histories. *Estadígrafo: p≤ 0,05*

The response to exercise in older adults has been widely evidenced and its regular practice contributes to the improvement of aerobic capacity. Table 8 shows the relationship between time of physical activity and maximum oxygen consumption, with a highly significant result, which allows to infer that in this study the systematic practice of physical activity improves oxygen consumption and therefore, the higher the oxygen consumption, the more physical fitness, the functional capacity increases and the possibility of performing daily activities in the older adult improves.

The purpose of this research is to evaluate the benefits of practicing physical activity in older adults, in this study the average time of practicing physical activity is 2.5 years and a minimum frequency of 3 times per week, in terms of clinical variables, the relationship between time of practicing physical activity with blood pressure control (.010) and metabolic control (.037) was statistically significant, which coincides with the results obtained by other authors, Morellano (2017) where the variations of clinical variables began to appear after 6 months of practice, with a frequency of 3 sessions per week and achieved stability after one year of continued practice.

The results of this study regarding glycemic control have a significance of (.037). Regarding the cholesterol figures, a significance of (.143) is obtained. The number of practitioners included in less than one year of practice, show a similar state of the variable in relation to those who have been practicing from one to two years or more than two years, which influences the results of the applied statistical test.

In the present investigation, the time of practicing physical activity does not keep statistical significance, on the body mass index (.948) and the percentage of fat (.155), giving differences to what was found by Gomez-Pinilla, Vaynman & Ying (2008) who state that with a specific training program it was able to reverse (at least partially) the changes in body composition in initially sedentary older adults, preserving the percentage of fat at healthy levels.

On the other hand, it also differs from the study carried out by Pérez and Rojas (2014), decreasing body weight by 2.1% and waist circumference by 2%, it is valid to point out that the percent of modifications found are relatively low.

Physical exercise acts by increasing energy losses, increases lipid oxidation and generally produces a certain reduction in fatty deposits, but by itself it is not capable of producing a reduction of such a parameter, so it is necessary that it be accompanied by a diet hypocaloric that guarantees a reduction in caloric intake.

From the study it is inferred that the systematic practice of physical activity improves oxygen consumption, with a statistical significance of (.000), similar results appear in several works carried out with different physical fitness tests widely used in this population, where in all applied tests were measured aerobic resistance, being directly proportional to the health of the individual studied. These studies conclude that older adults with higher aerobic endurance obtain higher scores on physical functioning. (Garcés and Salvador, 2014).

There are similarities, in turn, with the study from Montenegro (2013), showing that VO2max showed an improvement six months after the implementation of the systematic exercise plan, an approach that is consistent with that of Pancorvo (2010).) who affirms that an adequate conservative cardio-respiratory-metabolic program, lasting several weeks in severely sedentary people and / or with certain chronic non-communicable diseases, as well as for older adults, can dramatically increase their aerobic physical capacity at the expense of their VO2max. From there on the increase would be more gradual until reaching its maximum possibilities, determined by the state of health, age and genetic endowment.

It has been shown that physical exercise gives the practitioner a healthier and more aesthetic appearance; it allows to conserve greater vital and physical strength; helps maintain and regain physical and mental balance; delays involution of skeletal muscle, facilitates joint activity and prevents osteoporosis and bone fractures; interferes with cardiovascular aging, preventing arteriosclerosis, improving endocrine function, mainly of the adrenal (resistance and adaptation to stress), promoting neurovegetative balance and psycho-intellectual activity. The response to exercise in older adults has been widely evidenced and its regular practice contributes to the improvement of the quality of life.

This allows to reflect on the words of Samaranch, JA (1994) when, in Lausanna, as President of the International Olympic Committee, he argued that exercise and sport are

used for such important purposes, as the improvement of the psycho-physical health of human beings, as well as collaborating to preserve the best quality of life possible, even at very advanced ages.

Conclusions

Older adults who come to the Villa Clara Provincial Sports Medicine Center, carry out physical activity in a systematic way with a frequency of three times per week, oscillating the practice time from two months to ten years.

It was determined that the variables that present a favorable state in their control were clinical and functional, which leads to infer that they are closely related to the type and time of practice of systematic physical activity, but not the morphological ones, apparently influenced for other factors, such as diet.

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