

Relationship between Systematic Physical Activity and Cognitive Functions in the Third Age

E Ramírez de Armas¹, Jesús Ríos Garit², Y Rodríguez Alfonso² and C Alberto Bautista Sánchez Oms^{3*}

¹Bachelor of Psychology, Provincial Center of Sports Medicine of Villa Clara, Cuba

²Master in Medical Psychology, Instructor Professor, Provincial Center of Sports Medicine of Villa Clara, Cuba

³Associate Professor, Faculty of Physical Culture, Central University "Marta Abreu" de Las Villas, Cuba

***Corresponding Author:** C Alberto Bautista Sánchez Oms, Associate Professor, Faculty of Physical Culture, Central University "Marta Abreu" de Las Villas, Cuba.

Received: March 03, 2020; **Published:** April 16, 2020

Abstract

Introduction: The research constitutes a study of the relationship between the practice of systematic physical activity and cognitive functions in the elderly.

Objective: To characterize the relationship between the practice of systematic physical activity and cognitive functions in a group of older adults of the Provincial Center of Sports Medicine of Villa Clara.

Methods: A descriptive cross-sectional study was carried out, comprising 20 practitioners of the Health Promotion Group, of chronic pathologies, of the Provincial Center of Sports Medicine of Villa Clara, with a practice time of variable physical activity between 2 months and 10 years 90% of the practitioners had a history of high blood pressure and only 10% diabetes mellitus.

Results: The result found that attentive, motor and long-term memory functions show statistically significant differences, which allows to infer that systematic physical activity stimulates and energizes the state of cognitive functions, from 1 year of practice, in the group under study.

Keywords: Physical Activity; Cognitive Functions; Elderly

Introduction

Population aging in Cuba imposes the need for the study of this population segment, which is also more vulnerable in terms of health, with the premise that this population can also be an excellent model of successful aging, so research should focus on the identification of elements that allow acting for a satisfactory and quality aging, considering that healthy aging is a health proposal [1].

The so-called Third Age is associated with important neoformations that imply a functional decline in the emotional, cognitive and social sphere in relation to age. Although the physiological changes that the body undergoes are irreversible, this does not mean that the elderly can enjoy healthy aging, maintain or improve their physical, mental, social and quality of life that the human condition understands.

Population indicators show that every year there are more people reaching the old age stage, being a social, scientific and welfare concern. More than 15% of Cubans exceed 60 years and by 2025, Cuba, with almost a quarter of its population aged 60 years and over, will be the oldest country in Latin America and its population must already be decreasing in absolute terms, from five or maybe more years before. In 2050, he will not only be the oldest in Latin America, but also one of the oldest in the world. In recent years there has been a greater aging in the Villa Clara province, the oldest in Cuba with 23% of people 60 years of age or older, followed by Havana City (19%) and Santi Spíritus (17%) [2]. Of the 231,394 inhabitants of the municipality of Santa Clara, 39,006 people are over 60 years old, which represents 16.8% of aging, being, for this reason, in a situation of demographic aging [3].

Scientists recognize that the regular practice of physical activity can help prevent, reduce or alleviate many of the physiological, psychological and social inconveniences that accompany old age. Even some authors have considered physical exercise as a true "anti-aging

pill”, considering it as the most effective non-pharmacological measure for most diseases in these ages [4]. Along these lines, the evidence suggests that physical activity in older people helps to maintain a good cognitive functioning [5] that is to say, it modulates the cognitive response of the aged subject, optimizing neurocognitive functions, such as executive function, attention and verbal and visospatial memory, among other cognitive domains [6]. In addition, improvements in cardiovascular and muscular function have been reported by reducing the degree of fragility through aerobic exercise [7].

Given the population indicators, Sports Medicine together with Psychologists faces new research challenges, it is essential to deepen the phenomenon. The Provincial Center of Villa Clara has developed a line of research in relation to the elderly, with the aim of raising awareness and raising awareness among the professional involved in the physical activity of older adults, raising their quality of life with a perspective multidisciplinary and preventive character and characterize the relationship between the practice of systematic physical activity and cognitive functions in a group of older adults of the Provincial Center of Sports Medicine of Villa Clara.

Methodology

The study involved 20 older adults practicing systematic physical activity, belonging to the health promotion group of chronic non-communicable diseases of the Provincial Center of Sports Medicine of Villa Clara.

The population had a minimum age of 58 years, maximum of 78 years and a mean of 67.9 years. The female sex prevailed with 85% of the total and in a smaller proportion the male sex for 15%; An important element is that all cases had defeated upper-middle education. The physical activity practice time was a minimum of 2 months, a maximum of 10 years and an average of 2.4 years. 90% of older adults had a history of high blood pressure and only 10% suffered from diabetes mellitus.

The Abbreviated Neurosip Test, designed in 1991 by the authors, Dr. Feggy Ostrosky-Solis, Dr. Alfredo Ardila and Dr. Mónica Rosselli, was the test that allowed to evaluate the functions: attention and concentration, motor functions, short memory and long term. The review of the Clinical History was another documentary source determining the time of practice of systematic activity of older adults under study.

Results and Discussion

Of the total of older adults who made up the sample, 30% were involved in the practice of systematic physical activity for less than a year, while 70% represented the group of practitioners incorporated into such activity with more practice time, for a 2.5 year average; These older adults performed physical activity 3 times a week. The following table 1 shows the distribution of the number of practitioners according to the time of physical activity practice.

Practitioners	Weather	Percentage	
6	Under 1 year	30,0%	
7	1 to 2 years	35,0%	
7	More than 2 years	35,0%	
Total	20	-	100%

Table 1: Distribution of practitioners according to the time of practice of systematic physical activity.

In relation to the cognitive functions evaluated, it is observed in table 2 that both attention and concentration, as well as motor functions, show adequate behavioral values. It was found that 95% of the systematic practitioners presented a level of care that ranged be-

tween high and medium levels, in equal percent and evaluation behaved motor function; both functions obtained an average of 2.45 and 2.35 respectively. It is substantial to note that only 5% of older adults were evaluated with low levels in both mnemonic and motor function.

Variables	Results						Media
	High	%	Medium	%	Low	%	
Motor functions	8	40,0	11	55,0	1	5,0	2,35
Attention and Concentration	10	50,0	9	45,0	1	5,0	2,45
Short-term spontaneous verbal memory	11	55,0	9	45,0	0	-	2,55
Short-term spatial visual memory	18	90,0	1	5,0	1	5,0	2,85
Long-term spontaneous verbal memory	3	15,0	14	70,0	3	15,0	2,00
Long-term spontaneous verbal memory	13	65,0	7	35,0	0	-	2,65

Table 2: Behavior of cognitive functions.

Spontaneous verbal memory and short-term spatial vision constituted other cognitive constructs analyzed. As observed in table 2, 55% of older adults were characterized by having a high level in their spontaneous verbal memory, the rest of the sample under study had average levels of expression, no older adults with low levels were registered in the functioning of verbal mnemonic ability. On the other hand, spatial vision memory exhibited high levels where values rose up to 90%, however, and unlike spontaneous verbal memory, said mnemonic capacity showed, in a smaller proportion, medium and low levels of behavior.

The research also showed that 15% of older adults showed high levels of long-term verbal memory, in the same figure 3 adults were evaluated with low levels (15%) and the highest percentage was concentrated in the medium level with 14 adults older, a figure that represents 70% of the total number of practitioners under study. Visuospatial memory, meanwhile, fluctuated between high levels (65%) and medium levels (35%) with an average of 2.65, a significant result was that no practitioners were exhibited who presented a low level of mnemonic evaluation, such results are shown in the table below.

Scientific studies recognize that regular physical activity can be considered as one of the most important elements for people’s health, especially in older adults [8], it is recommended as one of the main favoring agents towards healthy aging, which would have a positive impact on the prevention and management of multiple pathologies associated with old age [9].

In this sense, the current research revealed that systematic practitioners who had been more than 1 year old had better levels of attentive, mnemonic and motor capacity compared to the group of practitioners under 1 year (Table 3), which allows to infer that the practice time positively influences the state of these cognitive functions. The results obtained coincide with Norman López’s study [10] justifying the favorable impact that physical activity has on cognitive functions in a cognitively healthy aged population, with better performance in the intervention group after six months of physical activity practice. Similarly, other authors print in their studies the relationship between psychological variables, highlighting that the group of elderly who continued a program of physical activity, the defects in their variables of balance and gait were less pronounced compared to those older adults who did not perform any type of activity [11]. In this sense, Catañer, in a study conducted with older Spanish adults, highlighted that those who attended a physical activity program, maintained a good state of motor balance, improved flexibility and coordination as well as the degrees of joint movement [12].

Variables		Physical Activity Practice Time			Anova
		Under 1 year	1 to 2 years	More than 2 years	Significance
Attention and Concentration	Low	1	0	0	.028
	Medium	4	4	1	
	High	1	3	6	
Motor functions	Low	1	0	0	.008
	Medium	4	6	1	
	High	1	1	6	
Statistician: $p \leq 0,05$					

Table 3: Relationship between practice time of physical activity and attention and concentration and motor functions.

Examining the behavior of spontaneous verbal memory and short-term and long-term visospatial memory based on the time of physical activity practice, the current study noted that spontaneous and visospatial verbal memory, both long-term, show statistical significance of .005 and .003 respectively, denoting that from the year of systematic physical activity practice the mnemonic functions optimized their conditions and status, also presuming that the practice time intervenes positively in both functions. Short-term spontaneous and visospatial verbal memory did not undergo significant changes (Table 4). These results show that participating in a regular physical activity can enhance the coding, storage and evocation processes of episodic information in the long term, these inferences are complemented by the scientific references that occur in the field of physical activity precisely in the period of development recognized as Senior Citizens.

Variables		Physical Activity Practice Time			Anova
		Under 1 year	1 to 2 years	More than 2 years	Significance
Short-term spontaneous verbal memory.	Low	0	0	0	.425
	Medium	4	2	3	
	High	2	5	4	
Short term visospatial memory.	Low	0	0	1	.574
	Medium	1	0	0	
	High	5	7	6	
Long-term spontaneous verbal memory.	Low	3	0	0	.005
	Medium	3	4	7	
	High	0	3	0	
Long-term visospatial memory.	Low	0	0	0	.003
	Medium	5	2	0	
	High	1	5	7	

Table 4: Relationship between practice time of physical activity and spontaneous and visospatial memory in the short and long term.

In accordance with the results, they indicate in their research, an increase in visospatial processing and an increase in the rate of visospatial response precisely in the long-term mnemonic dimension, constituting these improvements more evident in the group of older adults involved in a regular physical activity program [10]. From a neuropsychological perspective it has been shown that aerobic physical exercise has a positive impact on the brain [13]. The literature describes the benefits of physical exercise on the health of the brain of the elderly, mainly at the level of their neuroplasticity and the potential effects on a wide range of cognitive domains, including attention, executive function and memory, especially episodic; it is stated that when performing aerobic exercises, the BDNF protein is stimulated, a neurotransmitter that favors synaptic plasticity, the learning process and the memory process [14,15]. Precisely, regular physical activity would protect the elderly from metabolic diseases, deterioration Cognitive and dementia [10].

In general, studies have shown the conservative and potentiating effect that physical activity has on cognitive performance in normal aging [16] as well as its neuroprotective function against changes related to neurodegenerative diseases such as Alzheimer’s disease and other types of dementia, at the level of the different cognitive domains, including visual and verbal memory [17]. Even the role of regular physical activity has been shown as an important predictor for discriminating between elderly people with normal cognitive functioning and those with pathological cognitive impairment [18].

Conclusion

The study allows us to suggest that attentive, motor and long-term memory functions show statistically significant differences, which allows us to infer that systematic physical activity stimulates and energizes the state of cognitive functions, after 1 year of practice, in the group under study.

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Volume 11 Issue 5 April 2020

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