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Indicadores fisiológicos cardiovasculares y su relación con la Educación Física. Análisis en estudiantes de medicina

Cardiovascular physiological indicators and their relationship with Physical Education. Analysis in medicine students

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Resumen

Uno de los problemas que agrava a la sociedad en la actualidad son las enfermedades crónicas no trasmisibles, dentro de ellas se encuentra la hipertensión arterial, objeto de análisis en esta investigación por el incremento paulatino en la comunidad de adolescentes y jóvenes. Se formuló como objetivo: describir el comportamiento de la condición cardiovascular de estudiantes de primero y segundo años de la carrera de Medicina, como premisa para su incorporación a la Educación Física. El estudio se contextualizó en la Universidad de Ciencias Médicas de Villa Clara con 100 estudiantes de 1º y 2º años de dicha carrera, donde las edades oscilan entre los 18 y 20 años de edad. Para ello se utilizaron métodos como la observación, la encuesta, la entrevista, la medición. Los principales resultados se enmarcaron en la descripción de los indicadores, la estratificación de grupos, resultando que los estudiantes del sexo masculino tienden a padecer la enfermedad más que en el sexo femenino, por lo que se recomienda el trabajo profiláctico por parte de los profesores de Educación Física, propiciándole el mejoramiento de su condición física y a su vez calidad de vida y lograr en ellos una formación integral.

Palabras clave: indicadores fisiológicos, diagnóstico, educación física, estudiantes

Abstract
One of the problems that aggravate society at present is chronic non-communicable diseases, among them is high blood pressure, the object of analysis in this research due to the gradual increase in the community of adolescents and young people. The objective formulated: to describe the behavior of the cardiovascular condition of first and second year students of the Medicine career, as a premise for their incorporation into Physical Education. The study was contextualized at the Villa Clara University of Medical Sciences with 100 students of 1st and 2nd years of this career, with ages range between 18 and 20 years of age. To do this, methods such as observation, survey, interview, and measurement were used. The main results were framed in the description of the indicators, the stratification of groups, resulting that male students tend to suffer from the disease more than female, so prophylactic work is recommended by teachers of Physical Education, promoting the improvement of their physical condition and in turn quality of life and achieving comprehensive training in them.

Keywords: *physiological indicators, diagnosis, Physical Education, students*

Introducción

In the most recent statistical report of the World Health Organization (WHO)published in Geneva-Switzerland, a Global Action Plan 2013-2020 was prepared, in order to define a roadmap for actions led by countries in the field of prevention and control of non-communicable diseases, bad habits such as smoking, lack of exercise, not having a balanced diet and excess consumption of alcoholic beverages, they are the main causes of non-communicable diseases, the greatest threat to human beings, which cause two thirds of the deaths in the world. (Chang, 2015)

The Pan-American Health Organization (PAHO) and the WHO seek to prevent and improve the control of non-communicable chronical diseases. In terms of attributable deaths, the main metabolic risk factor is the increase in blood pressure (to which 19% of deaths are attributed worldwide), followed by overweight, obesity and an increase in blood glucose. Tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets increase the risk of dying from one of the non-communicable diseases (NCDs).

Several Latin American countries suggest, in studies carried out, that arterial hypertension (HT) is considered one of the main cardiovascular risk factors, increasing morbidity and mortality from myocardial infarction and contributing to the development of cardiovascular, cerebrovascular and

renal diseases. Globally, one in five adults is estimated to have high blood pressure, that is, a systolic blood pressure (SBP) ≥ 140 mmHg, and / or a diastolic blood pressure (DBP) ≥ 90 mmHg4.

In Cuba one of the diseases that constitutes a health problem is high blood pressure, therefore, its prevention is a universal and important health measure. In this sense, population promotion and education strategies have been created to decrease the mean arterial pressure, to influence its risk factors (lack of exercise, high salt intake, obesity, smoking, inadequate alcohol intake) and propose modifications. of lifestyle of the population. However, an individual strategy is necessary to achieve an adequate perception of the risk of having high blood pressure.

Cardiovascular diseases are today the leading cause of death in most Latin American countries and worldwide, as well as infectious diseases have declined. In developed countries around 50% of all deaths are caused by cardiovascular diseases, while in developing countries this proportion is close to 16%.

Cardiovascular diseases are responsible for a third of deaths worldwide and they are eminently foreseeable, thus, to produce a significant reduction, population-level strategies are required such as lifestyle modifications, which should include: healthy diet, physical activity, decrease in smoking.

The WHO declares an integrative conception of health by stating that it is a behavior of complete physical, mental, and social well-being, and not just the absence of disease or illness. The enjoyment of the maximum degree of health that can be achieved is one of the fundamental rights of every human being without distinction of race, religion, political ideology or economic or social condition. The health of all peoples is a fundamental condition for achieving peace and security and depends on the widest cooperation of individuals and States. World Health Organization (WHO, 2015).

Studies by Bauman, Lewicka and Schöppe (2005); Warburton (2009); World Health Organization (2018); Muñoz, Arango and Segura (2018); Along with reports from the Pan American Health Organization (PAHO, 2016) for the Americas region, they warned that the negative consequences of chronic non-communicable diseases (CNCDs) turn upon the health conditions of people, their families and the community, as well as its economy and the public and private systems of the nations, which threatens the economic growth of Latin America and the Caribbean. Therefore, the

recommendations for its prevention and control are directed towards the implementation of highly cost-effective strategies such as the promotion of physical activity.

Muñoz, Arango and Segura (2018) also warn that although the problem of chronic diseases has aroused interest in researchers and clinicians worldwide for their study and management, strategies to increase their performance are still ineffective. Despite the knowledge about the benefits of physical activity, the prevalence of this activity is very low worldwide.

Dealing with the above ideas, the WHO (2018) presents "World recommendations on physical activity for health", including some recommended levels of physical activity for health for three age groups: from 5 to 17 years old, from 18 to 64 years old, and from 65 onwards. In the case of the group of 18 to 64 years, it refers that for the adults of this group, physical activity generally consists of recreational or leisure activities, displacements, occupational activities, domestic tasks, games, sports or exercises programmed in the context of daily, work, family and community activities.

Among the investigations related to physical activity and cardio respiratory functions, those of Warburton (2009) and Bauman et al (2005) stand out, who insist on the direct relationship between physical activity and cardio respiratory health (reduction of risk of cerebrovascular diseases, cerebrovascular accident and hypertension), based on the following statements: physical activity improves cardio-respiratory functions; physical fitness has direct dose-response relationships between intensity, frequency, duration and volume of activity; risk reduction is achieved from 150 minutes of moderate or intense exercise per week.

In the Statistical Yearbook of Cuba (2018) it is highlighted that the modifiable factors that affect the high prevalence rates of hypertension worldwide are dissimilar. These include consumption of foods that contain too much salt or fat, insufficient intake of fruits and vegetables, overweight and obesity, the harmful use of alcohol and tobacco, physical inactivity, psychological stress, socioeconomic determinants and access inadequate to health care.

In investigations carried out in precedent years according to the previous publication, it is stated that the prevalence in the province of Villa Clara is that every 1,000 inhabitants, 227.9 suffer from HT, starting from the age between 19-24 years that represent the age of medical students in that province.

In this context, high blood pressure is conceived as the elevation of systolic and / or diastolic blood pressure, which in all probability represents the most frequent chronic disease of the many that plague humanity, according to Hernandez (2015). Its importance lies in the fact that the higher the figures, both for diastolic and systolic pressure, the higher the morbidity and mortality, and this is the case in all the populations studied, in all age groups and in both sexes.

HTA is considered a chronic non-communicable disease characterized not only by high blood pressure levels, but as another risk factor related to a greater number of cardiovascular phenomena, therefore, HTA according to Casanova (2010), must be considered as something more than a problem of high blood pressure.

The program of physical activity for hypertensive practitioners of the National Institute of Sports, Physical Education and Recreation (INDER 2015), is structured in stages: stage I (familiarization stage) and stage II (development stage), aims to promote the development of physical condition in hypertensive patients to contribute to their work, social and personal well-being. And among its contents it includes exercises: stretching and joint mobility; strengthening exercises with or without implements; aerobic exercises; adapted sports games; respiratory and muscle relaxation exercises.

These previously mentioned contents can be pedagogically treated from the Physical Education class, however, it is stated than in Medicine carrier they are not widely promoted in first and second years, it is also observed in young people with this condition are unaware of it and limit themselves to do physical-educational practices that can promote their, physical health and integral formation.

Currently, a great number of medical students are excluded from physical activity simply because of this disease. The objective of this article is to describe the behavior of the cardiovascular condition of first and second years students of the medicine career, as a premise for their incorporation into Physical Education.

As it is already known, the importance of physical activity for people's health is more than proven, both in specialized literature and in daily practice; hence, its benefits for ECNT carriers such as HTA must be taken into account, especially if they are of young ages such as university students, who in

this context can take advantage of the practice of physical activity in order to reduce the consequences of it due to inactivity processes. In this sense lies the importance of this article.

Materials and methods

In the development of the investigation, the theoretical and empirical methods were used. Among the empirical methods:

Documentary review: with the aim of verifying in the official documentation, aspects related to the state of health of the students.

The survey: hypertensive students to know needs and interests for the practice of physical activity.

The interview: to the physical education teachers, with the purpose of knowing the characteristics of the physical activity that they direct.

Measurement to students: in order to know the state of the physiological indicators related to cardio respiratory fitness.

Methodological triangulation: to verify the data obtained from different methods.

For statistical processing, the frequency distribution to obtain the mathematical values of the data obtained related to cardio respiratory fitness, and represents them in tables.

The population used was the 256 first and second year students of the medicine career. A sample of 100 students was taken from them, who reported a history of chronic non-communicable diseases, of both sexes, the average age being 19.4 years. All with a history of being exempted from Physical Education in the above centers.

The intentional selection of the sample obeys to the following criteria:

Refer HTA history

Be part of the first and second years

Be willing to participate in the research

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Pág. 17-30

To obtain the values of the indicators, the institution's doctor was used as facilitator and specialist, the professional that works and is related every day with these students.

Cardiovascular physiological indicators to measure:

HR: heart rate (beats / min)

PAD: diastolic blood pressure (mmHg)

SBP: systolic blood pressure (mmHg)

MAP: medium arterial pressure (mmHg)

These physiological indicators are obtained in two moments: under basal conditions and under sustained weight test conditions, to establish the significant differences and to get to conclusions for taking correct decisions with the high blood pressure students.

Results and Discussion

Results of the methodological triangulation

- It is verified that the orientation to carry out therapeutic physical activity exists in the documents.
- The limitation of participation and incorporation of students to Physical Education activities and classes was verified.
- Conformism with the exempted condition is evidenced.
- There is ignorance of the characteristics of the disease.
- Low teacher responsibility is appreciated towards these students.
- There is low knowledge from students about the importance of Physical Education to counteract their illness.

The application of the measurement allowed the students to be grouped into three groups based on the criteria of the Cuban National Program of Arterial Hypertension: normal tensive , pre hypertensive and hypertensive, they were constituted as expressed in the following table.

Table 1. Distribution of the simple by sex and groups

Sex	Normotensive		Pre hypertensive		Hypertensive		Total	
Male	14	31,8%	19	43,2%	11	25%	44	42,3%
Female	28	50,0%	22	39,3%	6	10,7%	56	57,7%
Total	42	42%	41	41%	17	17%	100	100%

As can be seen, there was predominance in the sample of the female sex and these in the group of normotensive patients; Pre-hypertensive students prevailed in men. The group of normotensive patients coincided with students who occasionally carried out some physical activity and have some knowledge about the personal treatment of their disease.

In the case of pre hypertensive students, they are satisfied with the exempted condition, but they are willing to join some physical activity; and in the group of hypertensive patients, a lack of knowledge of the characteristics of the disease, limitation of participation and incorporation into physical activities in previous stages was evidenced, but they showed a greater concern about risk factors of their disease, and showed intentions to incorporate into Physical Education class to improve their living conditions.

Table 2. Hemodynamic variables in resting and at the end of isometric exercises by group and sex

		Normotensive		Prehypertensive		Hypertensive	
		Female	**Male**	**Female**	**Male**	**Female**	**Male**
CF	**Basal**	76 ± 9,0	67 ± 7,6*	79 ± 10,2	70 ± 9,47*	81 ± 15,7	79 ± 7,3
	PPS	83 ± 9,6	69 ± 10*	86 ± 10,6	75 ± 11,7*	91 ± 8,7	88 ± 11,5
SBP	**Basal**	108,5 ± 7,4	109,1 ± 8,8	119,8 ± 9,1	119,2 ± 10,1	131 ± 9,8	136,8 ± 10,2
	PPS	116,6 ± 6,7	116,4 ± 6,8	129,3 ± 6,4	128,4 ± 8,9	139 ± 12,8	143 ± 10,77
DBP	**Basal**	68,9 ± 9,6	71,3 ± 6,2	78,7 ± 7,6	74,6 ± 5,2	88 ± 7,69	86,3 ± 8,24
	PPS	82,0 ± 8,5	80,0 ± 5,3	90,5 ± 6,4	86,5 ± 6,6	97 ± 7,2	94,5 ± 7,9
MBP	**Basal**	82,1 ± 7,9	84,0 ± 5,9	92,4 ± 7,1	89,4 ± 5,85	102 ± 6,6	102,6 ± 7,1
	PPS	93,5 ± 6,9	92,1 ± 5,4	103,5 ± 5,08	100,1 ± 5,9	111 ± 8,5	110,6 ± 6,8

It is seen in Table # 2 that the basal values of heart rate (HR) were higher in the female sex in all groups, with statistical differences in normotensive and pre-hypertensive.

During the sustained weight test, the heart rate values reached higher values in the female sex in all groups, and were higher only for normotensive and prehypertensive women. The values obtained for the systolic blood pressure, diastolic blood pressure and medium arterial pressure at rest did not differ between the sexes. However, these indicators at the end of the exercise were slightly higher in women, except the SBP, which was higher in men, although without significant statistical differences.

It is appropriate in this section to consider the importance and need to take advantage of the benefit of physical activity on the organic functioning of the students categorized in one of the three groups of the HTA, reflected in the table.

After the applied tests, it is determined that hypertensive students should be linked to Physical Education classes, where they work with a purpose to counteract the disease through the practice of physical exercises.

Taking into account the national programs for both physical activity and health areas, it is encouraged that students who present HBT maintain their physical condition and have better performance in their cardiovascular system, which is why the intention is to carry out a series of exercises in Physical Education classes in which the teacher can gradually make modifications due to their intensity of work, repetition, time. If any alteration or exhaustion is observed, other modifications must be made in correspondence with the characteristics of each student, their compensation, among other elements.

Methodological guidelines for the application of exercises in Physical Education classes:

1. The teacher must have the instrument to measure the pressure.
2. Blood pressure should be controlled at the beginning and at the end of the class.
3. The increases in the load of exercises must be individual and progressive, in correspondence with the characteristics of each student.
4. Segmental work should be avoided, promoting the overall development of the organism.

5. If during the development of the class the student feels any discomfort or headache, he must suspend the activity he is doing.

Taking into account the above, the following exercise proposal is made

Warm-up exercises: The warm-up carried out by hypertensive students should be simple, with easy-to-perform exercises, since most of them with this condition have been without exercises for a long time or have never practiced.

1. Stretching exercises:

Starting position: standing up, legs apart, side arms, trunk flexion in front, with view to the front.

Starting position: standing up, arms next to the body, extend one arm up and the other down. Alternate.

Starting position: standing up, hands clasped behind, flex the trunk in front raising arms.

2. Joint mobility exercises:

Starting position: standing up, legs apart, hands on the waist, count one flexion in front of the neck and head; two flex in the back.

Starting position: standing up, legs apart, hands on the waist, twist the neck on both sides,; alternate.

Starting position: standing up, legs apart, hands on waist, perform

One: lateral flexion of the neck and head to the left.

Two: right flexion. Alternate.

3. Arms and trunk exercises:

Starting position: standing up, legs apart, side arms, circle with arms in front and circle with arms behind.

Starting position: standing up, legs apart, arms extended in front, open and close the hands, changing the position of the arms (lateral, up and down).

Starting position: standing up, legs apart, arms up, perform deep trunk flexion, trying to touch the tip of your feet, return to the starting position.

4. Leg exercises:

Starting position: standing up, legs apart, hands on the waist, elevation of the knees in front in an alternative way.

Starting position: standing up, legs apart, hands on waist, diagonal assault, alternating.

5. Half squats and abdominals:

Standing up, legs apart, hands on the waist and trunk slightly flexed in front, perform knee flexion (90 °), return to the starting position.

6. Abdomen exercises:

Starting position: supine, with support of the forearms and elevation of the legs, perform scissors movement.

Starting position: supine, legs flexed at a 45-degree angle, arms crossed on the chest and hands on the shoulders, perform contraction movement of the abdomen, with small movement of the trunk in front.

7. Breathing exercises:

Starting position: standing up, walking on the tip of your feet taking air through the nose (strong and deep), expelling it through the mouth (soft and long).

Initial position: standing up, perform arm lift from the sides up gently, taking the air in through the nose and expelling it through the mouth while lowering the arms.

Initial position: standing up, make a gentle walk, taking a deep breath in through the nose and blowing it out strongly through the mouth in the form of a breath.

Carrying out these exercises both in the teaching and extra-teaching hours in a systematic way, must facilitate in the students a better adaptation of their organism to physical activity, so that their cardiovascular system can be more easily compensated by a determined effort, improving their health and physical well-being.

Ball games and other activities:

Some of the sports that can be used are: Volleyball, Basketball, Soccer, Quiquimbol.

Other activities of a physical - recreational nature that can be carried out on their own in or outside the school, which greatly favor the rehabilitation process of hypertensive students are: dance therapy, the beach, camping, cycling, fishing, hunting, board games and all those activities that due to their energy requirements are within the individual possibilities of realization.

Conclusions

The elements found in the educational practice of the investigated hypertensive students, reflect unfavorable conditions in relation to conditions for carrying out physical activity, lack of materials and means for adequate attention from physical activity, which further limits their incorporation into the Physical Education.

The cardiovascular indicators of the first and second year students of the Medicine career showed a female predominance in the pre-hypertensive condition, while the male group was mostly hypertensive, according to the Cuban National Program of Arterial Hypertension.

The behavior of the cardiovascular condition of students of first and second years of the Medicine career in basal conditions, did not show differences in the group of female students; however, under test conditions of sustained weight, differences were reflected in the SBP indicator of the students.

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