

IMPROVING STUDENTS' FUNCTIONAL CAPACITY BY INTRODUCING AEROBICS IN THE WARM UP PART OF PHYSICAL EDUCATION LESSONS

CIULEA LAURA EDIT¹, SZABÓ-CSIFÓ BARNA^{1*}

ABSTRACT. Introduction. The significance of this paper resides in the conception and introduction of a program of aerobics-specific exercises into physical education classes in order to prepare the body for effort, improving students' functional capacity. Aerobics is an attractive and efficient way of preparing the body for effort. Systematic practice of aerobics has complex long-term effects: muscle toning, the improvement of the activity of the cardiovascular and respiratory system. Due to the intensity of effort and to the fact that the entire body takes part in it, the benefits of practicing aerobics aim at improving functional capacity affecting body harmony by reducing fat and toning muscles. **Methods.** Students of the experimental group underwent various aerobic programs during warm up sessions while the control group used traditional warm up methods. To determine functional capacity of students the Ruffier test was applied and vital capacity was measured. **Results.** After introducing aerobic programs into the warm up part of physical education lessons of the experimental group there was a noticeable improvement in exercise capacity. The difference between the arithmetic means of the two, initial and final, tests was of 4.11 for the experimental group, which resulted from the mean of the initial test result 4.35, and the mean of the final test result 0.23 **Conclusion.** Research results evidenciate the efficiency of various aerobic programs, designed and implemented in order to improve functional capacity of students of the experimental group.

Keywords: *aerobics, functional capacity, students, improvement*

REZUMAT. Îmbunătățirea capacității funcționale a studenților prin introducerea gimnasticii aerobice în lecțiile de educație fizică, în partea de încălzire. Introducere. Importanța acestui studiu constă în conceperea și introducerea unui program de exerciții specifice gimnasticii aerobice, în cadrul orelor de educație fizică, în vederea pregătirii organismului pentru efort, care vor influența pozitiv dezvoltarea capacității funcționale a studenților. Gimnastica aerobică reprezintă un mod atractiv și eficient de pregătire a organismului pentru efort, de

¹ Universitatea de Medicină, Farmacie, Știință și Tehnologie Tîrgu Mureș.
*Corresponding author: barneas76@yahoo.com.

aceea considerăm oportună introducerea acesteia în cadrul lecțiilor de educație fizică, ca și mijloc de încălzire a studenților. Practicarea sistematică a gimnasticii aerobice are efecte complexe și de lungă durată: se produce tonifierea musculaturii, se îmbunătățește activitatea sistemului cardio-vascular și a celui respirator. Datorită intensității efortului și a faptului că întregul corp este angrenat în efort, beneficiile percepute în urma practicării gimnasticii aerobice vizează îmbunătățirea capacității funcționale cu efect asupra armoniei corporale prin reducerea stratului de țesut adipos și tonifiere musculară. **Metodă.** Studenților din cadrul grupei experiment li s-au introdus programe variate de gimnastică aerobică în partea de încălzire, iar studenții grupei experiment au lucrat cu mijloacele clasice de încălzire. În vederea determinării nivelului de dezvoltare a capacității funcționale a studenților a fost aplicat testul Ruffier și măsurarea capacității vitale. **Rezultate.** În urma introducerii programelor de gimnastică aerobică, în partea de încălzire din cadrul lecțiilor de educație fizică, în cadrul grupei experiment, s-a constatat îmbunătățirea capacității de efort a sportivelor din această grupă. Diferența dintre mediile aritmetice dintre cele două testări, inițiale și finale, este de 4,11 la grupa experiment, rezultată din valoarea mediei la testarea inițială: 4,35 și valoarea mediei de la testarea finală: 0,23. **Concluzii.** Rezultatele cercetării relevă eficacitatea programelor variate de gimnastică aerobică elaborate și implementate în vederea îmbunătățirii capacității funcționale a studenților din grupa experiment.

Cuvinte-cheie: *gimnastică aerobică, capacitate funcțională, studenți, îmbunătățire.*

Introduction

Physical condition is the sum of physical, mental and functional capacities of the human body that are necessary to optimally solve challenges posed by the living environment. Physical education activities with students require adjustments to innovative methods and means.

Specialists have turned their attention towards designing new methods for physical education classes with students in order to increase functional capacities of students.

Aerobics, through the means and materials it uses, has possibly the greatest impact regarding the improvement of students' motor and functional capacities (Ionescu, 1989). Aerobics emerged in the United States in the early '60s when Kenneth Cooper, a doctor at Houston Space Center, was given the task of physical training of American pilots and astronauts. He designed a series of gymnastic exercises which he called "aerobics" (maximal oxygen consumption of the body under maximal effort), intending to stimulate heart and lung activity.

Aerobic dance appeared around 1970 and was developed by fitness instructor Jacki Sorensen who combined running in place with jumps and dance steps (Ganciu, 2002).

“Aerobics consists of the sum of movements made to music, with varying complexity and intensity, with the purpose of creating a general feeling of well-being” (Bota, 2006, p. 183).

“Aerobics implies a set of basic gymnastic exercises and dance steps with musical accompaniment, made with the guidance of an instructor” (Laszlo, 2007, p.29).

Popescu G. (2005, p.29) defined aerobics as “an act of value creation, an act of culture which represents a factorial system that deeply influences the existence of the individual and the group”.

The word *aerobics* comes from the Greek term *Αεροβική (aerobiki)* which implies the presence of oxygen, so aerobics can be defined as “gymnastics with oxygen”.

An aerobic program consists of the execution of special exercises for each muscle group. The exercises are grouped into sets, each one having a well defined purpose (for abdomen, arms, thighs etc.) (Boyle, 2004). Aerobics helps to improve the flexibility of the body, muscle toning and the cardiovascular system.

Aerobics uses a wide range of free, logically grouped, actuating means, done as part of preparing the body for effort, and also as a fundamental part of training. Actuating means used in aerobics involve movements such as: running types, walking types with different paces, pedaling, dance etc. (Kramer et al., 1995). Specialists pursue the elaboration of new methods in order to increase functional capacities of students.

Objectives

This research aims at improving functional capacities of students by means of introducing aerobic programs into the warm up part of physical education lessons.

Hypotheses

This research started out from the general hypothesis that implementing various aerobic programs in the warm up part of physical education lessons brings about improvement in the fitness level of students. Aerobic programs introduced in the warm up part of the physical education classes will improve functional capacity parameters of students.

Methods

The research was conducted during the 2015-2016 academic year and included two groups: the experimental group made up of students from Tg.Mures University of Medicine and Pharmacy's Faculty of Pharmacy, and the control group which consisted of students from the Faculty of Dentistry of said university.

Students of the experimental group underwent various aerobic programs during warm up sessions while the control group used traditional warm up methods.

To determine functional capacity of students the Ruffier test was applied and vital capacity was measured. These were done at the beginning of the academic year, in October, as well as at its end, in May.

Vital capacity was measured at rest, in a state of physical relaxation, with a spirometer. Vital capacity testing was conducted at Tg.Mures Sports Clinic. The results was interpreted with GraphPad Prism5 demo version and for the student-t test we took the level of significancy of 0,05.

Results

1. Functional capacity - Ruffier test

Table 1. Summary of RI index value

Group	Statistical indicators Testing	M	CV	t-Student	P
Experimental Group	Ti	4.35±0.20	15.94	14.24	0.0001
	Tf	0.23±0.19	268.92		
	Difference	4.11			
Control Group	Ti	5.53±0.24	14.40	2.92	0.007
	Tf	4.53±0.24	17.76		
	Difference	1			

p>.05*; p<.05***

Interpretation of results

The statistical analysis conducted allowed us to outline the following aspects:

- After introducing aerobic programs into the warm up part of physical education lessons of the experimental group there was a noticeable improvement

in exercise capacity. The difference between the arithmetic means of the two, initial and final, tests was of 4.11 for the experimental group, which resulted from the mean of the initial test result: 4.35, and the mean of the final test result: 0.23, as shown in table 1.

- For the control group, the difference between the arithmetic means of the two tests is 1.00, resulting from the initial test mean of 5.53 and the final test mean of 4.53.

- At the initial testing, the students of the experimental group fell within the *good* mark range as regards exercise capacity, while at the final testing 4 students reached the *very good* mark.

- Students from the control group have improved their marks from *average* to *good* as regards exercise capacity.

- The coefficient of variation shows a moderate homogeneousness of both groups.

- Statistical analysis of the t-Student test highlights a strongly significant threshold for the experimental group, $p < 0.0001$, confirming thus the hypothesis of this research and rejecting the null hypothesis.

- For the control group, the statistical analysis of the t-Student test shows, as seen in table 26, a statistically significant difference, $p < 0.5$, rejecting the null hypothesis in this case too.

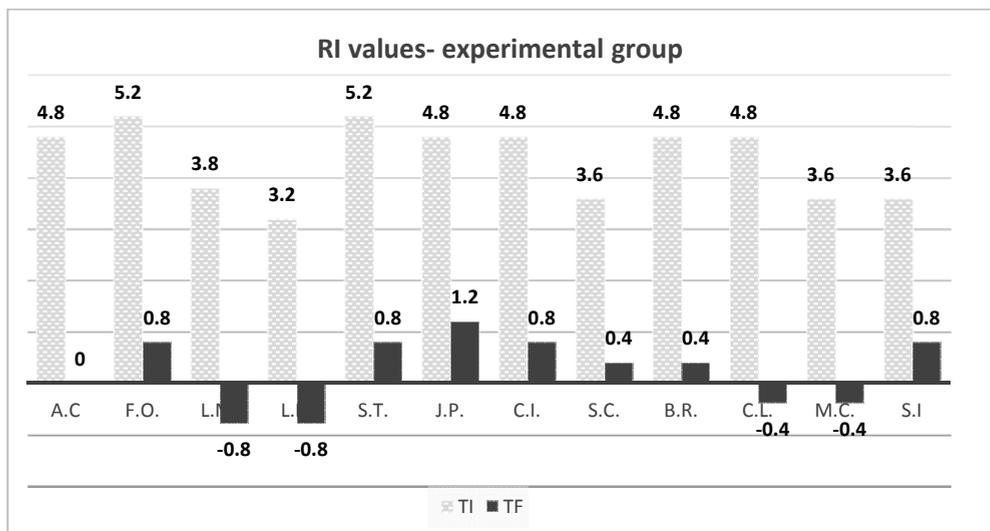


Figure 1. Graphical representation of RI values – experimental group

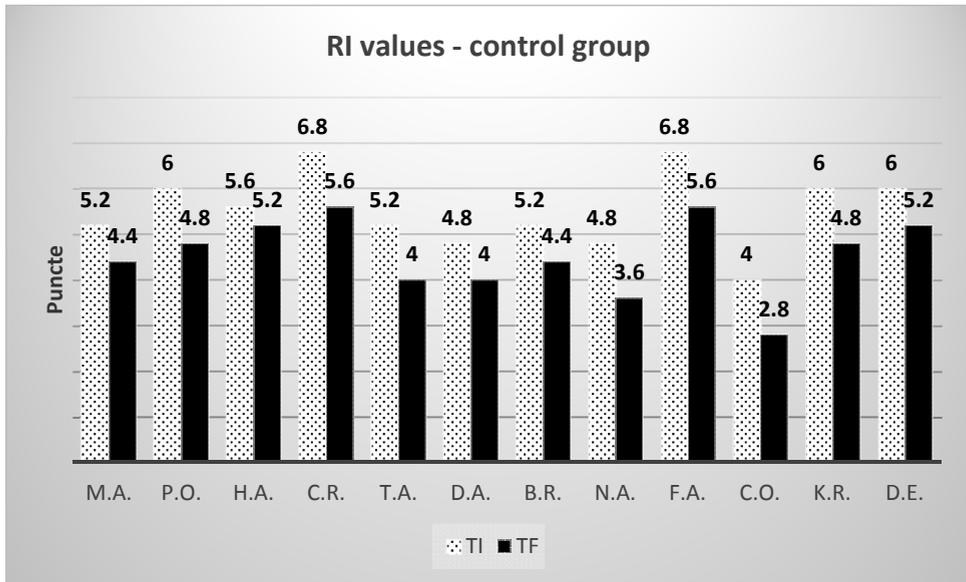


Figure 2. Graphical representation of RI values – control group

2. Vital capacity

Table 2. Statistical indicators for vital capacity

Group	Statistical indicators Testing	M	CV	t-Student	P
Experimental Group	Ti	4100±34.82	2.82	4.75	0.0001
	Tf	4358±41.67	3.04		
	Difference	258.3			
Control group	Ti	4083±47.41	3.85	1.81	0.08
	Tf	4208±49.94	3.94		
	Difference	125			

At the initial testing (Ti), the average value for students of the experimental group was 4100cm³. Later this value increased to 4358cm³. The difference between the two tests (258cm³) can be credited mainly to the introduction of aerobic programs in the warm up part of physical education lessons that were aimed at improving students' functional capacity. With the control group the difference between the two testings was of 125cm³. After calculating the coefficient of variation we were able to observe a high degree of homogeneousness, under 4%, for both groups.

After applying the t-Student test and calculating the correlation index p of the experimental group, a statistically strongly significant difference could be discerned, $p (0.0001) < 0.05$, which leads us to accept the research hypothesis and reject the null hypothesis.

With the control group, the statistical analysis using the t-Student test revealed a statistically insignificant difference, $p (0.08) > 0.05$, which confirms the null hypothesis.

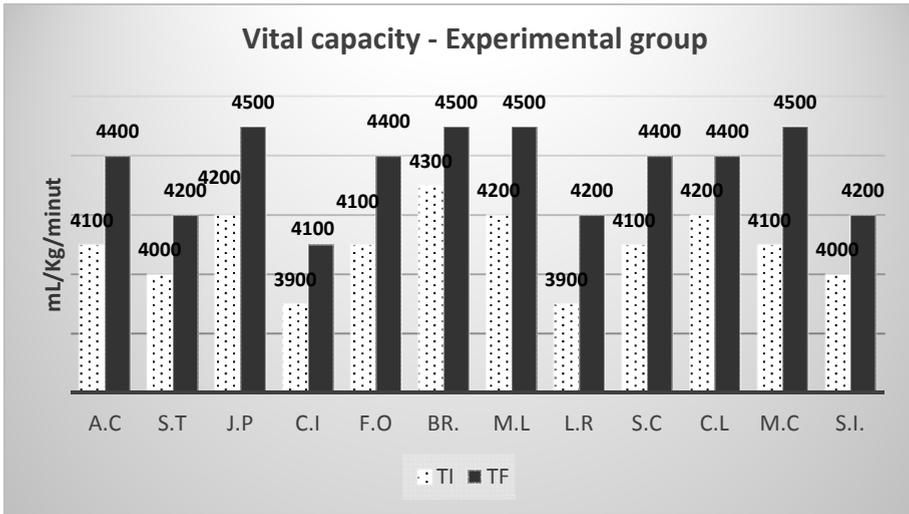


Figure 3. Graphical representation of vital capacity values - experimental group

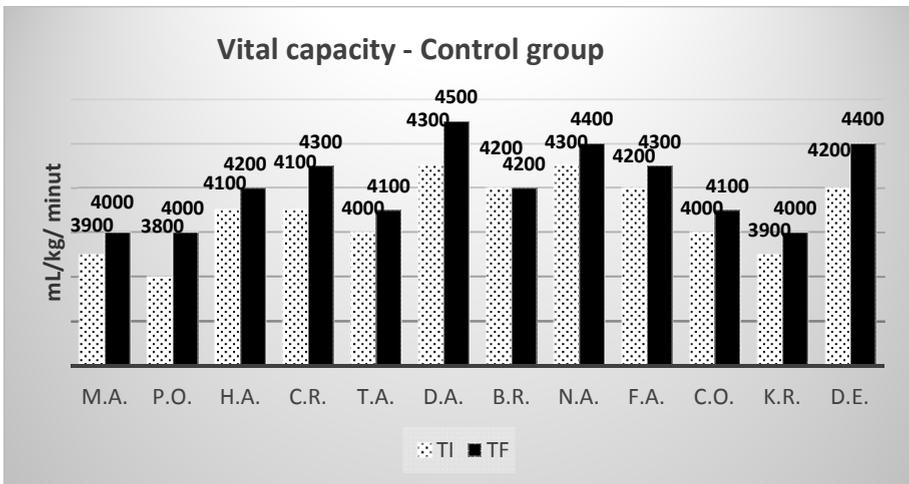


Figure 4. Graphical representation of vital capacity values - control group

Conclusions

The research has shown that students of the experimental group improved their functional capacity due to the introduction of various aerobic programs as a means of warm up.

Research results evidentiate the efficiency of various aerobic programs, designed and implemented in order to improve functional capacity of students of the experimental group.

The experimental group owes its superior progress to the aerobic program designed, adapted and implemented during warm up. The physical training program was created according to modern trends and based on recent research that highlighted the efficiency of aerobic programs as compared to classical methods some of which have become obsolete both methodologically and efficiency-wise.

The aerobic program designed and implemented as part of this research was focused on developing all functional components of the students. Thereby, using arguments, calculations and concrete statistical analyses, we have reached the following conclusions:

The working hypothesis, that the implementation of aerobic programs into the warm up part of physical education lessons will determine a long-term improvement of students' fitness level, is confirmed.

The results attained by students of the experimental group during functional tests confirms the hypothesis that aerobic programs will improve functional capacity parametres.

REFERENCES

- Bota, A. (2006). *Exerciții fizice pentru o viață activă. Activități motrice de timp liber*. București: Cartea Universitară, p.183.
- Boyle, M. (2004). *Functional Training for sports*", Editura Human Kinetics, pg.1.
- Ganciu, M. (2002), *Gimnastica aerobică*, București, Bren, pp. 90-148.
- Ionescu, A. (1989). Creșterea somato-funcțională a tinerei generații corelată cu dezvoltarea calităților fizice. *Revista Manifestări științifice*. București, nr. 2., pp. 58-73.
- Kraemer, W.J, Patton, J. F., Gordon, S. E. Harman, E. A. Deschenes, M. R. Reynolds, K. Newton R. U, Triplett, N. T., Dziados, J. E. (1995). Compatibility of high-intensity strength and endurance training on hormonal and skeletal muscle adaptations, *Journal of Applied Physiology*. Published 1 March Vol. 78, no. 3, 976-989.

- Laszlo, H.I. (2007). *Fitness*. Editura București: Didactică și Pedagogică, p.29.
- Maiorana, A, O'Driscoll, G, Cheetham, C, Collis, J, Goodman, C, Rankin Taylor, R, Green, D (2000). Combined aerobic and resistance exercise training improves functional capacity and strength in CHF, *Journal of Applied Physiology*. Mai; vol 88 nr. 5: 1565-1570.
- Popescu, G. (2005). *Impact aerobic*. Editura Elisavaros, p. 29.
- Stofan, J.R. (1988). Physical activity patterns associated with cardiorespiratory fitness and reduced mortality, *American Journal of Public Health* (12):1807-1813.