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Original article

INCREASING THE QUALITY OF LIFE IN FEMALE ADOLESCENTS BY IMPROVING THEIR PHYSICAL FITNESS

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Abstract

This research *aims* to emphasize the improvement of the functional development (fitness) markers by using aerobic gymnastics means. This research tries to improve the female adolescents' fitness and quality of life through the use of aerobic gymnastics means, to motivate them to independently and long term practice physical exercises, both during physical education classes, and during their leisure time.

The goal of this research is to increase the quality of life in female adolescents, as a result of the improvement in their physical fitness, through the practice of specific aerobic gymnastics physical exercises. As research methods we used: the bibliographical study, the testing method, the experiment method, the statistical-mathematical method, and the graphical representation method.

Methods. The research comprised a number of 40 subjects (20 female adolescents forming the experimental group, and 20 the control group), aged between 18 and 25, and it was conducted at the "Vasile Alecsandri" University of Bacău. The subjects went through a fitness-type aerobic gymnastics program, three times per week. The program comprised harmonious physical development exercises, stretching, relaxation exercises, coordination drills, which envisaged the improvement of the body's functionality markers. The effectiveness of the applied methods was assessed through the Ruffier test, used to evaluate the adaptation to effort. The research data highlight the increase in the quality of life, as a response to the improvement of the subjects' fitness and adaptation to effort.

Results. In regards to the *functional assessment* (the Ruffier test), the data recorded during the initial tests emphasized an insufficient adaptation to the effort, and a poor physical fitness in both groups. The progress of the experimental group, compared to the control group's indicates the effectiveness of the aerobic gymnastics programs, through the values of the Ruffier index that increased from an insufficient adaptation (in the initial assessment) to a medium adaptation to effort (in the final assessment). For the functional capacity, the experimental group recorded significantly better result than the control group, reaching optimal values.

Conclusions. After analyzing the data, one can see that the final results are improved, which proves the effectiveness of the means and methods used here to improve the functional effort capacity.

Using individualized programs and combining different forms of aerobic gymnastics practice, by their contents, help maintain health, improve and correct the morphological line, giving the body a harmonious line and correct posture, which leads to a better quality of life.

Key words: aerobic gymnastics, effectiveness, improvement, physical fitness, quality of life

Introduction

The quality of life "represents the assessment index for the human life, measuring the level of success of an individual or a society" (Carr, Higginson, 2001). In a synthesis, one can say that the quality of life area is defined as being "the entire aspects of personal and societal life that are under the action of objective, subjective, and political factors" (Grigore, 2007). "The movement performed through exercising, professional and non-professional athletic performance, contributes to the creation of a positive self-image, to the implementation in the daily life activities of certain

self-regulating mechanisms for the psycho-behavioral states" (Rață G., Rață Gh., 2008, p.9).

"Considering that the beneficial effects of exercising are multiple and work on different levels" (Bota, 2006) (physical, psychological, and social), one can say that they represent a way of improving the physical fitness, and, implicitly, are a means to secure a high level of the quality of life. A correct lifestyle ensures a good state of health and a better quality of life.

Material and method

This paper aims to present an optimal working strategy that would improve the female

adolescents' fitness, as an opportunity to increase their quality of life, by creating individualized athletic

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activities programs based on aerobic gymnastics means. The research started from the hypothesis stating that the aerobic gymnastics means plays an important role in the life of a certain segment of the young female population, occupying a special place in the female adolescents' leisure time.

The research tasks envisaged to:

- select certain exercises with an increased effect on improving the fitness, as well as certain aerobic gymnastics complexes, applied through the circuit method;
- choose the subjects for the experiment;
- measure and test the subjects at the beginning and at the end of the experiment;
- record the results;
- do a statistical analysis of the data resulted after the tests, and elaborate the paper.

The research methods used were: study of the bibliographical material, the observation, the experiment, the tests, the statistical-mathematical method and the graphical representation method. For the analysis and interpretation of the data recorded during the research, I used Microsoft Office Excel 2003, to calculate the following indices: arithmetical mean, dispersion, standard deviation (SD), variability coefficient (VC), student's T test - paired samples (Fisher), student's T test - independent samples (F Levene), and the calculation of the regression factor or the enhancement of the effect (r^2) (SPSS: General linear model – univariate).

The research comprised a number of 40 female students (20 forming the experimental group, and 20 the control group), aged between 18 and 25. The research was conducted at the "Vasile Alecsandri" University of Bacău, throughout the academic year 2012-2013, taking 28 weeks, and 84 aerobic gymnastics lessons. The experimental group subjects were involved in aerobic gymnastics programs, while the control group subjects participated only in standard physical education lessons. The main functional parameters were assessed through the Ruffier test,

Results of the research

The results of the study are relevant, superior values being recorded during the final tests, proving

which evaluates the physical fitness, and is based on the variations of the heart beat during three moments: rest, right after the effort, and cool-down. The immediate modifications of the cardiac and vascular parameters, emphasized by the increase of the main functional parameters' values are in tight correlation with the individual's training level, the intensity, duration, and volume of the performed effort. According to the recorded values, indications can be given to improve the person's fitness through training.

The time allocated to an aerobic gymnastics program was 60 minutes, information being given to the female students at the end of each lesson, from the professional publications regarding the role of physical exercises, diet, eating, relaxation, rest. The participants benefited from three aerobic gymnastics lessons per week, on Monday, Wednesday and Friday, the female adolescents' training being in accordance with the aim and goals set for the experimental research. The aerobic gymnastics programs were repeated in those days, with a different dosage. During these aerobic gymnastics programs, individualized programs were performed also, according to the needs of each female student, especially for the areas that needed muscular strengthening for modeling a harmonious body. The individualized programs were performed once a week, on Wednesdays, respecting the aerobic gymnastics lesson parts.

During the warm-up part, the aerobic part, and the cool-down part, there were no modifications, the difference in regards to the individualized programs being made by the muscle groups' development part, through the number of repetitions performed for each area. A varied assortment of exercises was used, from basic gymnastics, ballet, specific aerobic gymnastics steps, classical and modern dance. In order for the lessons not to become monotonous and the exercises boring, new and varied exercises were introduced. The performed exercises were correlated with music and dancing, using gymnastics objects and apparatuses, to make them more attractive.

the effectiveness of the methods that were applied and of the operational models used during the experiment. Table 1 presents the data recorded during testing.

Table 1. Statistical values of the Ruffier index, initial and final assessment

Ruffier Index	Group	X.	X.	S.	S.	Vc	Vc
		I.T.	F.T.	I.T.	F.T.	I.T.	F.T.
Aerobic functional capacity (Ruffier Test)	Experimental	11.48	7.45	1.42	0.38	12.40%	5.13%
	Control	11.52	9.68	1.26	0.61	10.95%	6.31%

Legend: X – arithmetical mean; S – standard deviation; Vc (%) – variability coefficient; I.T. – initial testing; F.T. – final testing.

Table 2. Correlations between the Ruffier initial and final tests

Ruffier Index	No. of subjects	Correlation	Sig. (p < 0.05)
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1	Ruffier Initial & Final (experimental)	20	.806	.000
2	Ruffier Initial & Final (control)	20	.867	.000

Legend: E – experimental; C – control; sig – significance threshold ($p < 0.05$).

When testing the aerobic capacity (Ruffier test, Table 2), one could see that there is a direct correlation between the initial and final tests, the correlation coefficient values for the experimental

group being around 0.806, and for the control group, around 0.867, which shows a good positive correlation; it fits in the 0;1 interval ($p < 0.05$).

Table 3. Paired samples Student's t-test for the Ruffier index

	Pair difference					t	df	Sig. ($p < 0.05$)
	Arithmetic mean	Standard Deviation	Standard Deviation from the mean	95% the confidence interval of the difference				
				Minimum value	Maximum value			
R. I./F. E	4.03000	1.13791	.25444	3.49744	4.56256	15.838	19	.000
R. I./F. C	1.84000	.79233	.17717	1.46918	2.21082	10.385	19	.000

Legend: E – experimental; C – control; T – Student's t-test; df – number of degrees of freedom (it indicates the volume of the group, the equation being $df=n-1$, n – representing the number of subjects); sig – the significance threshold ($p < 0.05$).

In order to see whether the results are significant, the obtained t values were compared with the t values in the Fischer table, corresponding to $df = n-1$ degrees of freedom, and a confidence interval of 95% (0.05).

If the obtained t values are higher than the Fischer table t value, one can conclude that the differences are significant, if not, one can say that they are insignificant.

Table 4. Independent samples Student's t-test

		Levene's Test for the variance equality		T test - for the means equality						
		F	Sig. ($p < 0.05$)	t	df	Sig. ($p < 0.05$)	Difference of the means	Standard deviation for the difference	The confidence interval of the difference 95%	
									Minimum value	Maximum value
Ruffier	there are no sign. diff. between variances	5.448	.025	-13,842	38	.000	-2.23000	.16110	-2.55613	-1.90387
	there are sign. diff. between variances			-13.842	31,878	.000	-2.23000	.16110	-2.55613	-1.90387

Legend: F – Levene test value; sig – significance threshold ($p < 0.05$ or 95%); T – Student's t-test.

One can see that the Levene's F test value (table 4) is statistically significant ($F=5.448$, $p < 0.05$). The obtained t value is $t(31.878) = 13.842$, $p < 0.01$, results that lead to the confirmation of the initial hypothesis. The increase of the effect in the case of the Ruffier test (table 5) is given by the value of $r^2 = 0.835$, indicating a percentage of 84; this means that the applied aerobic gymnastics programs had a great effect.

Table 5. Measurement of the effect in the Ruffier test

Source	Sum of the type III squares	df	Means' square	F	Sig. (p < 0.05)	Effect increase
Corrected model	49.729	1	49.729	191,614	.000	.835
Intercept	2934.369	1	2934.369	11306.634	.000	.997
Iv	49.729	1	49,729	191,614	.000	.835
Error	9.862	38	.260			
Total	2993.960	40				
Corrected Total	59.591	39				

a .R²= .835 (R² adjusted = .830)

Legend: df – number of degrees of freedom (it indicates the volume of the group, the equation being df=n-1, n – representing the number of subjects); F – Levene test value; sig – significance threshold (p < 0.05).

Discussions

The experimental group recorded an average value of 11.48 in the initial testing, and of 7.45 in the final testing. The control group recorded an average value of 11.52 in the initial testing, and of 9.68 in the final testing (Figure 1). The difference between the two tests was improved by a percentage of **4.03** in the experimental group, and by a percentage of **1.84** in the control group. The variability coefficient shows a high homogeneity in both groups, both in the initial and in the final tests (Table 1). The obtained Student's t-test values ($t=15.838$ experimental group and $t=10.385$ control) are higher than the value of the variable $t=2.093$ in the Fischer table (table 3), for df = 19 degrees of freedom, and a confidence interval of 0.05 or 95%. This interpretation of t, as well as the $p < 0.05$, indicates the fact that the differences are significant for both groups. In order to see whether the aerobic gymnastics was effective, and whether there are significant differences between the experimental and the control group, the independent t test was used. The interpretation was done according to the significance threshold and the Levene (F) test value. If $p < 0.05$ and F have a high enough value, then the differences are statistically significant and goes on the second row (meaning there are significant differences between the variances), which is why the value of the second t from the Student's t-test was chosen.

“Physical activity performed regularly and following certain rules, makes an individual get access to a superior (optimum) quality of life” (Suciu, Aldea, Dumitru, PASS 2005).

Dobrescu T., in 2008, considers that any form of practising physical exercises regularly, leads to getting a good physical condition.

We consider that the manner for *optimizing physical condition in order to ensure an increase of the quality of life*, by specific and personalized motor means for different adult categories, is important for

the field of study, both scientifically and practically, idea which is also supported by Enache, in 2001.

Conclusions

The superior results obtained in the final tests prove the effectiveness of the individualized aerobic gymnastics used during this research, which had an effect on the development level of the functional indices, thus confirming the initial hypothesis stating that the aerobic gymnastics means play an important role in the life of a certain segment of the young female population, occupying a special place in the female adolescents' leisure time.

The Ruffier index values increased from an insufficient adaptation level in the initial assessment, to a medium level of adaption to effort in the final assessment.

The aerobic gymnastics programs had favorable effects on the development of the respiratory system by strengthening the diaphragm, and amplifying the respiratory movements, aspects proven by the increase of the vital capacity, showing the effectiveness of the means used to improve the subjects' fitness and quality of life.

The recorded results indicate the fact that the individualized aerobic gymnastics programs that were applied to the experimental group subjects had a greater effect on the functional development indices (physical fitness), in comparison to the control group subjects, who underwent standard physical education programs.

The way in which *fitness is improved, in order to increase the quality of life* through specific and personalized motor means, for different categories of adults, is important for our field, both from a scientific, and from a practical standpoint.

I believe it is useful to use the aerobic gymnastics structures with an adequate musical background during the female adolescents' physical

education lesson, this contributing to the creation of a good working mood, allowing the effort to be performed easier, effort that leads to the development of the psychomotor skills, and especially to a harmonious physical development.

These structures can educate and train one of the basic components of "human bodily beauty" (Luca A., 2001), the expressiveness of movements and the moral traits of the personality.

Through a regular practice of physical exercises, one can reduce the states of depression, distrust, increase the resistance to stress, the ability to focus, improve the self image and increase self-confidence, the physical exercises having beneficial effects also on one's psyche.

The purpose for practicing various physical activities is to increase one's quality of life by: increasing one's physical capacity, improving one's physical fitness, increasing one's self-confidence, increasing one's enjoyment of physical activity.

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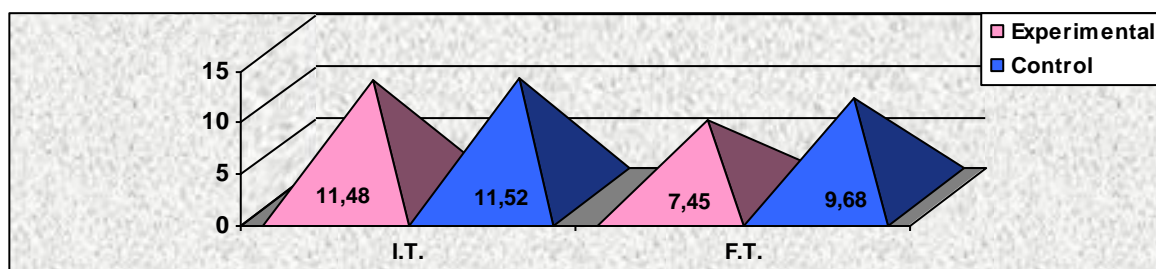


Figure 1. Ruffier Index