STUDY ON THE LEVEL OF ARTICULAR MOBILITY AT THE FEMALE STUDENTS

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Abstract
Objectives. Regarding the testing of the level of physical condition or fitness of the students should be a permanent concern for the factors that have attributions and responsibilities tangential to the shaping of the generations in training. The essential condition of university specialists with this orientation is the closure of a feed-back type pragmatic circuit in which the findings do not restrict themselves to a goal in and of themselves, but automatically induce a correct analysis of the causes of deficiencies and effective improvement measures. For young students, physical exercise and sport must be a necessity to help strengthen health and improve motor skills. The aim of this paper is to study the dynamics of the development of mobility among the medical students, the homogeneity of the collectives and, last but not least, the efficiency of the didactic activity.
Methods. Evaluation of the subjects in this experiment was achieved by using two joint mobility tests, namely, the mobility of the spine (flexion of the trunk in the seated position) and the flexibility in the shoulders. Testings were made at the beginning and end of the academic year 2017/2018.
Results. From the statistical analysis of the two tests - the initial one (at the beginning of the academic year) and the final one (at the end of the academic year) it was found that there were increases of the average values in the two tests after the application of the proposed program.
Conclusions. Thus, by regularly implementing stretching, pilates, and yoga exercises in aerobic gymnastics, which it provides control and precision in the performed movements, creates better working conditions for the whole locomotor apparatus, but also develops mobility while contributing, along with other components of fitness, to improve physical condition.
Key Words: mobility, students, evaluation, aerobic gymnastics.

Introduction

The testing of the level of physical condition or fitness of the students should be a permanent concern for the individuals with responsibilities tangential to the shaping of the generations in training. The essential condition of university specialists with this orientation is the closure of a feed-back loop in which the findings do not restrict themselves to a goal in and of themselves, but automatically induce a correct analysis of the causes of deficiencies and effective improvement measures (same comment as above).

For young students, physical exercise and sport must be a necessity to help them strengthen their health and improve their motor skills as well as to instill some moral qualities that lead to the ideal of balance "Mens sana in corpore sano" (Petreanu M., 2014).

It has been shown by some studies, (Herawati, Herawati, Agussalim, Maryana, Suharyono 2016) that improving the physical condition by practicing aerobic gymnastics leads to increased wellbeing, better academic performance, and lower levels of student anxiety. Therefore, through various evaluations, the students obtain confirmation of their performance during the instructive-educational process, the generated information having a self-regulation function for increasing their efficiency (Tudor, 2005).

According to some authors, Manos M. (2007), the physical condition refers to the condition of a person who has a good physical condition and who practices physical exercise and various sports in order to be in shape, that is to say, successfully coping with daily stress with a good physical and mental health. To what extent different socio-professional groups realize the importance of practicing exercise is a mandatory condition to assess their health.

The physical condition or general fitness of

the ordinary person is characterized by the level of adaptation to the demands of professional and social life as an attribute of "quality of life". Some authors have several components. After Epuran M. (2005), the 5 components of fitness that are subject to measurement are: aerobic capacity - the aerobic fitness, strength and muscle endurance, flexibility and body composition and nutrition.

In this paper we will refer only to one of the components of fitness, namely to flexibility, which, is after Niculescu M., Georgescu L., Marinescu A., (2006), is the ability to [work] the joints and muscles to their maximum capacity. It is possible for a person to have a good physical condition compared to a certain fitness components (as defined below) but in terms of other components to be insufficiently trained.

The interest in this physical quality is explained by the value of flexibility in performing any movement action. Scientists' research highlights the need to develop the flexibility to master sports and to carry out any action in the course of work (Pogrebniak, Kudelko, Nagovitsina, 2013).

The aim of this paper is to study the dynamics of mobility development among the medical students, how homogenous this mobility is across the the evaluated group and, last but not least, the efficiency of the didactic activity in [improving mobility]. Through this study we want to find new ways to optimize the general physical training among the medical students nd, thus, can apply the most optimal variants of general physical training programs within the aerobics gymnastics lessons.

Methods

The research for the issue in question was performed by applying the following methods: reading and analysis of the specialized scientific literature (documentary analysis), the notes taken during the training classes, the use of the experimental method, measurement and assessment methods, the tests method and the statistical-mathematical method.

Flexibility can be developed by several methods and means. The program applied to the group of subjects included the following means: - exercises specific to the pilates method both at the stand and at ground level - beginner and medium level exercises, yoga exercises, classical ballet exercises adapted to aerobic gymnastics maintenance and stretching exercises.

The subjects included in this study were between 18 and 20 years old, students in the first year of study at the Faculty of Medicine and Pharmacy, who opted for Aerobic Gymnastics as part of the base course in the Physical Education and Sports discipline.

At this age, the young have completed the processes of growth and development The body has reached during in this period the optimal degree of somatic and vegetative maturity (Dragulin & Pelin, 2006).

The evaluation of the subjects in this experiment was accomplished by using two tests on articular mobility, namely, the mobility in the spine (flexion of the trunk in the seated - Sit and Reach Test – Lower back) and flexibility in the shoulders joint – Static Flexibility Test. The tests were performed at the beginning and end of the academic year 2017/2018.

Even though the process of the body growth in height is over, there are still great possibilities for morphological and functional development. Physical education within this institution is aimed at concluding and enhancing physical development through a high-level and methodical work, to complete and capitalize on previous training. ´ The young complete their intellectual development and their professional training" (Ganciu, 2009)

Results

According to the scale of evaluation of the results obtained in the measurement of the lower back flexibility, 29 subjects from the experimental group were classified as "Poor", 17 subjects - "below average", 16 subjects in the "average" category, only 5 subjects at "above average" and 10 subjects were classified as" excellent ", data obtained from the initial testing (Figure no. 1).
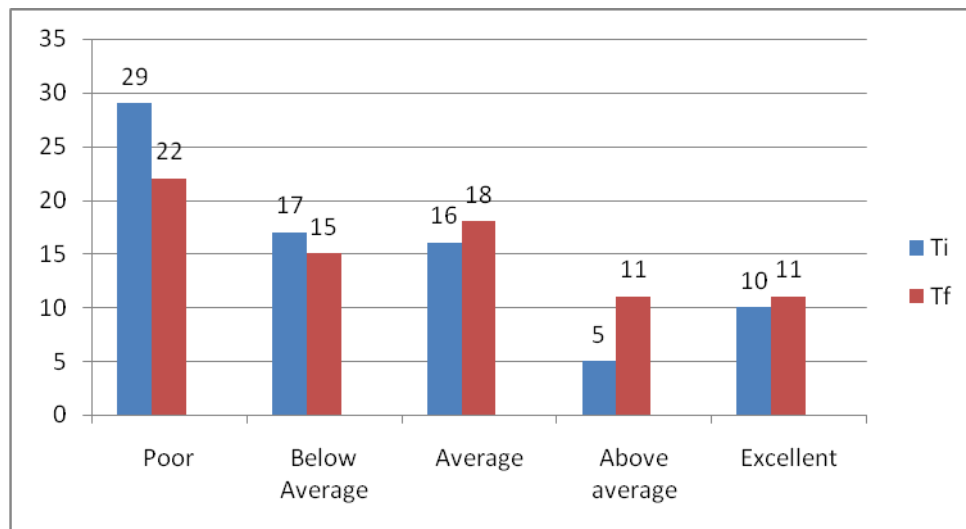
Figure no 1: Graphic representation of results – Sit and Reach Test – Lower back; where, „Poor" means the interval
< 4 cm, Below Average 4 – 6,9 cm, Average 7 – 11,9 cm, Above Average 12 – 15 cm and Excellent > 15 cm
(Evaluation scale after Davis et al. 2000) and Ti – Initial Testing, Tf – Final Testing

As for the final testing, using the same standards, the subjects were ranked as follows: in the "Poor" category - 22 subjects, in the category "below average" - 15 subjects, "medium" - 18 subjects, " Above Average - 11 subjects and "excellent "- 11 subjects. (Figure 1). As we can see, there were changes from one test to another in the assessment scale, which means improvements in the results for each category.

Table 1: Statistical indicators – Sit & Reach Test

	X	**M**	**Mo**	**Min**	**Max**	**A**	**d**	**S.E.**	**S.V.**
Ti	*4,92*	*5*	*0*	*-23*	*20*	*43*	*6,26*	*0,97*	*73,65*
Tf	*6,67*	*7*	*4*	*-18*	*21*	*39*	*6,12*	*0,91*	*64,77*
where X – the average, Max.- maximum, Min. – minimum, M – median, Mo – mode, S.E. – Standard Error, A – range, d – deviation, S.V. – Sample Variance and Ti – Initial Testing, Tf – Final Testing									

The average – at the initial testing, the average value recorded for this sample was 4.92 cm, falling into the "below average" category and in the final testing the average value was 6.67 cm in the same experimental group (table no 1); the average difference was 1.65 cm; the size of the increase was 35.62%, which means that the programs proved their efficiency (Table no.3)

Regarding *the coefficient of variation*, it expresses the percentage of the degree of homogeneity of the subjects and it was 174.35 in the initial testing and 120.56 in the final testing, which implied a heterogeneous subject population and, consequently, the population average being unrepresentative *(table no 3)*

After applying the Student t test between the initial and the final test we obtained the value 15,55, the value of "$p < 0.05$" shows that the zero hypothesis is not confirmed, and so there are differences between the two tests (table no.3).
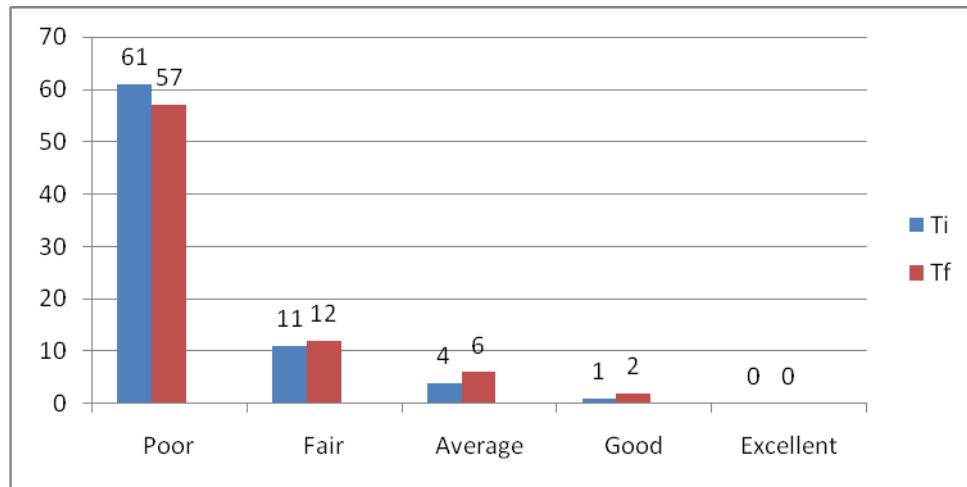
Figure no 2: Graphic representation of results – Static Flexibility Test – Shoulder, Where, „poor" means the interval > 45,1 cm, „Fair" 33,3 – 45,1 cm, Average 24,8 – 33 cm, Good 12,7 – 24,8 cm and Excellent < 12,7 cm (evaluation scale adapted from Johnson ,1986) and Ti – Initial Testing, Tf – Final Testing

On the second test, according to the scale of evaluation of the results obtained after measuring mobility in the shoulders joint, 61 subjects from the experimental group were classified as "poor", 11 subjects "fair", 4 subjects in the "average" category, only 1 subject at "good", data obtained from the initial testing.

As for the final testing, using the same standards, the subjects were ranked as follows: in the "poor" category - 57 subjects, in the category "fair" - 12 subjects, "average" - 6 subjects and 2 subjects at "good category"- 11 (Figure 2). As we can see, there were changes from one test to another in the assessment scale, meaning improvements in the results for each category.

Table no. 2 : Statistical indicators – Static Flexibility Test – Shoulder

	X	M	Mo	Min	Max	A	d	S.E.	S.V.
Ti	*64,03*	*70*	*77*	*24,5*	*89*	*64,5*	*14,10*	*0,97*	*278,88*
Tf	*60,37*	*65*	*75*	*23*	*87*	*64*	*13,90*	*0,91*	*284,93*

where X – the average, Max.- maximum, Min. – minimum, M – median, Mo – mode, S.E. – Standard Error, A – range, d – deviation, S.V. – Sample Variance and Ti – Initial Testing, Tf – Final Testing

The average – at the initial testing, the average value recorded for this sample was 64.03 cm, falling into the "poor" category and in the final testing the average value was 60.37 cm in the same experimental group (table no 2); the average difference was 3.66 cm; the size of the increase was 5.72 %, which means that the programs proved their efficiency (Table no.3)

T*he coefficient of variation*, which expresses the degree of homogeneity of the subject population, was 26.08 in the initial testing and 27.95 in the final testing, which means that the homogeneity of the subjects was high at this indicator, with the average being representative *(table no 3)*

After applying the Student t test between the initial and the final test we obtained the value 11,95 ; the value of "$p < 0.05$" shows that the zero hypothesis

is not confirmed, so there are differences between the two tests (table no.3).

Table no 3: The dynamics of the evolution, initial and final testing

Statistical indicators	Sit and Reach Test – Lower back		Static Flexibility Test - Shoulder	
	Ti	**Tf**	**Ti**	**Tf**
X	4,92	6,67	64,03	60,37
S	8,58	8,04	16,69	16,87
C.V.	174,35	120,56	26,07	27,95
t	15,55		11,95	
p	Semnificativ < 0,05		Semnificativ < 0,05	
The size of the increase	35,62 %		5,72 %	

where X - The Average, S - Standard Deviation
C.V. - the coefficient of variation, t – T Student,

The size of increase – represents the medium progress expressed in percentage points or the effect observed in the subject population following the implementation of the pedagogical programs and it was calculated using the formula:

The size of increase = the difference between averages (X Tf – X Ti) / X Ti * 100

Using this metric, the average increased by 35.62% as measured by the first test and by 5.72 % as measured by the second test (see table 3). This trend implies that the exercises used in the experiment led to improved final results.

Discussion

The regular implementation of stretching, pilates and yoga exercises during aerobic gymnastic exercises ensures control and precision in movements by removing rigidity of execution and undue muscle strain. Thus, [the gymnast] will obtain a better efficiency in learning the technique of execution of the steps and movements specific to aerobic gymnastics reflected by elasticity and plasticity.

[Implementing] specialized and accessible programs for the age students from medical academic environment leads to an active and conscious participation in aerobic and dance classes.

Therefore, combined exercise structures that address to the need for articular mobility and muscle elasticity and tendons should not be missed in aerobic gymnastic training programs. By applying mobility exercises, better working conditions are created for the entire locomotor system. The mobility also develops, and contributes, along with other components of fitness, to improving the physical condition.

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