Effect of a One-Semester Conditioning Activities on Physical Fitness of the Students

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Abstract: The benefits of physical activities associated with physical fitness are positive at certain levels. The aim of this research is to determine students' physical fitness level by using EUROFIT test battery and as a result, to design a physical activity program that they have to carry out in their daily activities. The research subjects are students (male) from the Faculty of Physical Education and Sport, Stefan cel Mare University of Suceava, in a number of 20 (height 179.90±8.44 cm; weight 79.58±12.04 kg). The research was conducted in sports facilities including: sports games hall, gym, swimming pool and outdoor artificial ground. The statistical significance of 0.05 threshold in ANOVA test was obtained in two cases and concerning the correlation, in 5 out of 10 cases it indicated a very strong correlation, while in 3 cases the value indicated a strong correlation and only in 2 tests there was recorded a moderate correlation. This good level of the physical fitness is the result of practicing exercises for at least 9 hours per week, but it is needed to focus on those physical fitness components with poor results at EUROFIT tests and also to maintain the body mass index below 25. These reference values will allow comparisons between students during physical activities and provide a baseline against which progress in physical fitness among Romanian youths and students could be compared.

Keywords: youth; activity; Eurofit; assessment; analysis.

1. Introduction

Developing motor skill competence is the way to maintain adequate physical fitness and confirm that there is a strong relationship between motor skills and physical fitness (Stodden, Langendorfer, & Roberton, 2009). A medium term program of regular exercise applied to students enhances physical fitness components, but to maintain or improve benefits it is needed to practice physical exercise every day with moderate to vigorous intensity (Danoff & Raupers, 2014).

By applying EUROFIT and ALPHA-FITNESS batteries to the students population there is confirmed that regular physical activity improves physical fitness, and speaking of genders, males have a better level and also practice more physical exercise (Estrada, Sotelo, Valdes-Ramos, Murua, & Manjarrez-Montes-de-Oca, 2017); also the level of students physical fitness was below average according to the EUROFIT test standards, but results for body mass index were normal (Hraski, Kunjesic, & Emeljanovas 2013).

For obese students, an effective way to enhance cardiovascular fitness and to manage the weight, there should be practiced aqua aerobic exercise at 60-75% of maximum heart rate for at least 3 times per week (Abadi, Elumalai, Sankaraval, & Ramli, 2017). The connection between body composition and physical fitness for males indicates a better level of the motor capacities, aerobic exercise and strength (Palomino-Devia, Gonzalez-Jurado, & Ramos-Parraci, 2017); also there is an inverse relationship between cardiorespiratory fitness and body fat for males and that could influence the level of the blood pressure, so it is recommended to maintain a healthy lifestyle (Diez-Fernandez et al., 2017; Hingorjo, Zehra, Hasan, & Qureshi, 2017).

For youth population the resilience is directly linked with cardiorespiratory fitness, mental health-related quality of life and cognitive performance in domains that require selective attention (Pozuelo-Carrascosa et al., 2017; Wengaard, Kristoffersen, Harris, & Gundersen, 2017); also, health-related physical fitness at active students indicates a higher self-esteem, task orientation and a very good level of emotional intelligence, meaning more efficiency in daily tasks (Ahmed et al., 2017; Song et al., 2017).

Lack of exercise or value below 2000 calories per week increases the chance of heart attack by 64% comparing to people who burn more than 2000 calories in physical activities per week and there is recommended selective exercise for cardiovascular fitness (Paffenbarger, Wing, & Hyde
2017). The increased obesity rate is the effect of reducing regular physical activity (and this may affect cognitive processing, motor function and brain activity) and it is needed an intervention to increase physical activity to improve physical fitness and health (Pate, Flynn, & Dowda, 2016; Cirillo, Finch, & Anson, 2017).

A systematic review including 45 studies shows that physical fitness (components or clusters) could be associated with academic performance for youth (Santana et al., 2017) and this is an important reason to extend the number of hours for physical activity programs due to the positive effect at motivational, physical and social level (Cumillaf et al., 2015; Dubuc, Aubertin-Leheudre, & Karelis 2017; Lorenz, Stylianou, Moore, & Kulina, 2017).

Adopting a healthy life style (exercise, nutrition, lectures, rest) produces rapid and significant improvements concerning body composition, physical fitness, optimal results for medical tests related to health (Lee, Lee, & Yeun, 2017).

Another way to promote physical activities among youths is to convey them specific knowledge in order to be educated for an active lifestyle, because there is a connection between subjects with high knowledge and their physical activity (Chen, Liu, & Schaben, 2017).

Improving muscular fitness at youths may optimize body mass index, reduce adiposity level and decrease metabolic syndrome and cardiovascular risk (Garcia-Hermoso et al., 2017; Ramirez-Velez et al., 2016); the body composition is an important predictor for physical fitness (Abu Hanifah et al., 2014). Using strength exercises as physical activity improves the fitness level (Brentano, Umpierre, Santos, Lopes, & Kruel, 2016) and the use of combined strength and aerobic training programs determines a positive effect on physical fitness and health and also produces a decrement of body mass and body mass index and induces bradycardia (Karatrantou, Gerodimos, Hakkinen, & Zafeiridis, 2017), but also the aerobic fitness exercises have a protective role for health status, the diseases incidence being lower (Laaksonen, Lakka, Salonen, Jukka, & Niskanen, 2002).

The development level of health-related fitness components is unequal and depends on residence area, housing type, meaning that there should focus where there is the worst performance for a healthy body, the best results being in urban areas, but, in this case, the physical fitness was low (Andrade et al., 2014; Bebcakova et al., 2015).

The use of electronic devices to monitor physical activities could increase the motivation to exercise and change daily routine related to this,
but for aerobic exercise the impact is limited and the best results were obtained only when the subjects worked in groups (Lee, Chen, Hsiao, & Lin, 2015; Lystrup, West, Olsen, Ward, & Stephens, 2016; Wilson, Ramsay, & Young, 2017).

The benefits of physical activities associated with physical fitness are positive at certain levels: a good level motor skill competence, weight management control, reducing the risk of chronic diseases, a good academic performance, healthy lifestyle, a good resilience, cognitive performance, self-esteem, task orientation, emotional intelligence and due to all these we must promote regular physical exercise.

1.1. Methodology

The aim of this research is to determine the students physical fitness level by using EUROFIT test battery.

If we determine students physical fitness level, we will be able to design a physical activities program that they have to carry out in their daily activities for a healthy lifestyle.

Participants

The research subjects are students (male) from the Faculty of Physical Education and Sport, Stefan cel Mare University of Suceava, in a number of 20 (height 179,90±8,44 cm; weight 79,58±12,04 kg). The subjects were informed about the research conditions and they gave their consent to participate. The research was conducted in sports facilities of University including: sports games hall, gym, swimming pool and outdoor artificial ground. All subjects provided written informed consent prior to the research. This study was approved by the Research Ethics Committee of the Stefan cel Mare University of Suceava.

Procedure

The applied tests to the subjects are from the Eurofit test battery: 20 m endurance shuttle run, handgrip test, standing long jump, bent arm hang, sit-ups in 30 seconds, sit and reach, plate tapping, 10 x 5 m shuttle run, Flamingo balance test.

The applied workout methodology was in accordance with the age particularities of the subjects and adapted to the university sports facilities, being applied exercises from collective sports, bodybuilding, aerobic sport, motion games, swimming. In addition to the activities carried out within the research, the subjects were included in the academic program another 7 hours of physical activity weekly.
Descriptive statistics were calculated based on the collected data, while ANOVA and correlation (Pearson) were used for the purpose of determining the difference in measured variables between two testings.

1.2. Results

Table 1 presents the obtained data by processing statistical and mathematical results for the Eurofit test battery by the subjects in the two carried out testings (at the beginning and at the end of the research). The average of the body height was 179.90±8.44 cm and for the weight the average was 79.58±12.04 kg; with these two values we were able to determine the body mass index which was, in average, 24.50±3.47 and that means that the research group was with a normal weight, but we registered 7 out of 20 individual values over index 25 (Hraski, Kunjesic, & Emeljanovas, 2013). Comparing the EUROFIT test results with norms provided by the European Council and with results of other studies, we may conclude that the results are good or above average (Heimer et al., 2004; Hraski, Kunjesic, & Emeljanovas, 2013). Also comparing these results with Physical Activity Index questionnaire applied, we can conclude there is a correlation between EUROFIT tests results and Physical Activity Index questionnaire answers (Leuciuc, 2018).

Table 1 The evolution of subjects (men) results at EUROFIT tests battery

<table>
<thead>
<tr>
<th>Test / Statistical parameters</th>
<th>Testing</th>
<th>Mean</th>
<th>SD</th>
<th>F</th>
<th>P</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate tapping (s)</td>
<td>Pre-test</td>
<td>9.08</td>
<td>1.37</td>
<td>0.725</td>
<td>0.400</td>
<td>0.900</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>8.71</td>
<td>1.37</td>
<td>0.142</td>
<td>0.709</td>
<td>0.689</td>
</tr>
<tr>
<td>10 x 5 m shuttle run (s)</td>
<td>Pre-test</td>
<td>13.58</td>
<td>1.17</td>
<td>8.747</td>
<td>0.005*</td>
<td>0.580</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>12.52</td>
<td>1.00</td>
<td>0.095</td>
<td>0.760</td>
<td>0.670</td>
</tr>
<tr>
<td>Standing long jump (m)</td>
<td>Pre-test</td>
<td>209.68</td>
<td>15.15</td>
<td>0.063</td>
<td>0.803</td>
<td>0.810</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>211.58</td>
<td>14.67</td>
<td>0.063</td>
<td>0.803</td>
<td>0.810</td>
</tr>
<tr>
<td>Bent arm hang (s)</td>
<td>Pre-test</td>
<td>40.47</td>
<td>15.80</td>
<td>0.142</td>
<td>0.709</td>
<td>0.689</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>42.53</td>
<td>19.31</td>
<td>0.142</td>
<td>0.709</td>
<td>0.689</td>
</tr>
<tr>
<td>Sit-ups in 30 seconds (no. reps)</td>
<td>Pre-test</td>
<td>25.74</td>
<td>5.58</td>
<td>0.063</td>
<td>0.803</td>
<td>0.810</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>26.26</td>
<td>5.77</td>
<td>0.063</td>
<td>0.803</td>
<td>0.810</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Test</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>F-MS factor</th>
<th>MS residual</th>
<th>p-statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sit and reach (cm)</td>
<td>Pre-test</td>
<td>23.74</td>
<td>11.56</td>
<td>0.202</td>
<td>0.655</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>25.32</td>
<td>10.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handgrip test (dexterous/clumsy) (kg force)</td>
<td>Pre-test</td>
<td>64.68</td>
<td>10.14</td>
<td>0.863</td>
<td>0.359</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>61.47</td>
<td>10.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flamingo balance test (no. imbalances)</td>
<td>Pre-test</td>
<td>0.21</td>
<td>0.70</td>
<td>0.760</td>
<td>0.389</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>0.42</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 m endurance shuttle-run (laps)</td>
<td>Pre-test</td>
<td>58.18</td>
<td>26.21</td>
<td>4.840</td>
<td>0.034*</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>73.48</td>
<td>17.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body height (cm)</td>
<td></td>
<td>179.90</td>
<td>8.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td></td>
<td>79.58</td>
<td>12.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body mass index</td>
<td></td>
<td>24.50</td>
<td>3.47</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend: * significant value for \( p<0.05 \); SD – standard deviation; F - MS factor/MS residual; p - statistical significance.

### 1.3. Discussion

Although the program for improving the physical fitness was applied weekly, there were tests that recorded regresses: handgrip and Flamingo balance test.

The statistical significance of 0.05 threshold in ANOVA test was obtained for the 10x5m shuttle run and 20m endurance shuttle-run tests. And concerning the correlation, in 5 out of 10 cases it indicated a very strong correlation (plate tapping, sit-ups in 30 seconds, sit and reach, handgrip test – for both arms), while in 3 cases the value indicated a strong correlation (standing long jump, bent arm hang, 20m endurance shuttle-run) and only in 2 tests there was recorded a moderate correlation (10x5m shuttle run, Flamingo balance test), being similar to other previous studies (Tsigilis, Douda, & Tokmakidis, 2002) (table 1).
Although the program was applied during 12 weeks, it is observed that not all fitness components were improved in the same way. The best effect was obtained for the following components: cardio-respiratory endurance (20m endurance shuttle run), running speed (10x5m shuttle run), flexibility (Flamingo balance test), strength endurance (bent arm hang, sit-ups in 30 seconds) (Danoff & Raupers, 2014), segmental speed (plate tapping). For other components the progress was minimal (muscular strength - standing long jump) or even regress was registered (balance test - Flamingo balance test; static muscular strength - handgrip test) (Benedek & Leuiciuc, 2010; Bebcakova et al., 2015).

The subjects group was homogenous, the exceptions being sit and reach and 20 m endurance shuttle run tests; and at sit and reach test, males had usually poor results comparing to females (Andrade et al., 2014).

According to the results of subjects, in the future, it will have to design physical activities programs that include exercises for fitness components where progress was minimal or even regress was registered. Moderate to intense exercises are efficient to improve cardio-respiratory fitness so, these are ideal means to be used in physical activity with youth and students (Allison et al., 2017). To convince youth practicing regular physical activity, it is needed to find attractive sports that produce enjoyment and motivate them to develop their physical fitness (Murphy, Rowe, & Woods, 2017).

This good level of the physical fitness is the result of practicing exercises for at least 9 hour per week, but it is needed to focus on those physical fitness components with poor results at EUROFIT tests and also to maintain the body mass index below 25.

These reference values will allow comparisons between students during physical activities and provide a baseline against which progress in physical fitness among Romanian youths and students could be compared. We can conclude that the physical fitness level is good among male students in northern part of Romania, but in the future it is needed to extend in other universities in Romania and in other Central and Eastern European countries and also to increase the number of subjects.

References

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