Conclusions

The finality of our research aims at proving the impact that gymnastics program has in order to improve the values of physical development indicators. Starting from the premises that the lack of sports culture leads to a poor body development and motricity. After having implemented the aerobics program we first of all noticed a development on the part of the individual from a biological, psychological and social point of view. There is a need to create programs that aim at improving and mantaining the students health state and quality of life.

Promptly finding solutions by initiating long-term strategic programs of sports activities that prevent sedentarism, obesity, fatigue, stress, different cardiovascular, respiratory or osteoarticular disease.

A healthy individual, with real aptitudes towards a high level life quality needs to continually practice sports activities during their free time and after finishing the courses at university, implementing physical exercise as a way of life.

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Introduction

Sporting and physical education activities make up a direct stimulus, nearly exclusive for the morf-functional development, and their absence can lead to situations harmful to health, of which dimensions are hard to anticipate. The mobility represents the key element for the tasks that target the instructive content of any physical education programme (Colibaba-Evalet, Bota, 1998). In the physical education and sporting activity in the non-specialized universities we are interested in the exhausting effort which, through its parameters (intensity, volume, complexity), obliges their bodies to react intensive and generalized (Deacu, Finichi, 2010).

Generally, moving qualities represent a more interesting subject among specialists, the methodology of the development of these qualities, being the centre preocupation of the experts from different sporting branches. During the driving act, the driving qualities influence each other and constantly depend on one another, and this leads to the so-called manifestation regime of the driving qualities (Bompa, 2001). This regime represents the differential way of manifestation of a driving quality, determined by the influence of one or more driving qualities, with which the first manifests in the same time or even entirely and represents functional combinations of speed, force, skill and stamina.

The force and speed are found in a reverse proportion rapport: if the speed is bigger, the charge used is smaller (Bompa, 2003).

Testing of anaerobic processes relevant to athletes practicing speed efforts, strength, sports and for those whose samples (5 “-6”) requires a maximum energy flow.

Power is defined as the M. Epuran, the amount of work (energy, work, work) that can be performed in a unit of time. Strength and speed are involved to ensure a maximum body movement values. In this category are explosive movements: throwing weights, flat 50m, high jump, long jump.

\[
\text{Power} = \frac{\text{Force} \times \text{Distance}}{\text{Time}}
\]

\[
\text{Power} = \frac{\text{Work (Mechanical)}}{\text{time}}
\]

Power = Force \times Velocity, because distance \div time = speed, so power expresses how quickly the work is performed (mechanical). Measurement of the high jump (flashing) consists of reports made to weight using height nomogram Lewis (Epuran, 2005).

Since force is a measure instantaneous and all human movements are executed over a period of time, continuous force-time relationship, and not just once in a power point determines interest to study this relationship. In many sports, strength exercises are performed mainly aimed improving strength, speed of movement to a given resistance (body weight, weight of the object) and not force itself. In these cases, the maximum force is considered the basic condition for a high speed motion (Zatsiorski, 2005).

For this we chose that in our research we approach the conditional capacities, especially those combined of speed and strength, in physical education classes with the students of the Petroleum Gas University of Ploieşti. Through this process we followed the effects which resulted after applying the preparal program in the research, adressed especially to the development of the combined driving capacities, through plyometria (Deacu, 2008).

Purpose

The purpose of our research consists in the emphasizing of the efficiency of some methods of preparation for the improvement of the conditioned capacities, especially the ones combined of speed and force (the swing), of students who practice sporting games in the physical education lessons.

Hypotheses

1. If we use the plyometric exercises during training, the raise of the swing of students who practice sporting games during the physical education lesson will be possible.
2. A higher manifestation of the maximum anaerobic-alactacide power during the sporting game will be realised based on the gatherings from the preparation program.

Tasks

- Fixing some methodical priorities and the principles of the plyometric training;
- Fixing the tests;
- Elaborating a training program using the plyometric method;
- Fixing the development level of the the combined driving qualities of the subjects (initial and final testing);
- Arranging and grouping the gathered data necessary for the statistical-mathematical processing;
- Processing the obtained data and drawing the conclusions.

Research methods

- Scientific documentation;
- The descriptive method – the observation;
- The experimental method;
- Processing and interpretation methods: the logical method, the statistics method, the grafical method.

The content of the experiment
The experiment took place during the physical education lessons with the students of the Petroleum Gas University of Ploieşti.

The subjects of the research are 40 students from the Petroleum Gas University of Ploieşti and falls within the 15-20 years age, 20 students belonging to the experimental group and the other 20 to the control group. The subjects of the experimental group were trained with the use of plyometric exercises during the physical education classes.

Three vertical jumps are performed -the best jump is considered - (Tudor, 2005). The estimation of the power was made in comparison with the values presented by dal Monte 1988 (Bota, 2000). For the technique not to influence the height of the jump, only one vertical jump without a big upsurge is recommended. This type of jump is called the „Sargent jump”, named after the man who analysed it from a biomechanic point of view. It is one of the most relevant proofs concerning the estimation of the swing at the lower limbs level, in a vertical plan. It is executed standing next to a 4 meter long wooden ruler, the performer stretches his arm up, leaves a mark on the ruler, then jumps with a small upsurge and makes another mark on the ruler. The distance between the 2 marks is measured. To measure the height of the jump we used the Ion Grinţescu method (Tudor, 2005).

The training program included the following exercises (Deacu, 2008):

- Multiple or sequential jumps – the on-the-spot jumps are combined with the from the spot horizontal jumps. These require a maximum effort utilised in a sequence. The distance must not be bigger than 30 meters.
- In-depth jumps – counter-movement jumps are used from a high crate, followed by counter-movement jumps off boxes, benches, low fences.
- On-the-spot jumps – a jump in which the detachment and the landing is executed on the same spot. These jumps are of a somewhat small intensity, but they still have a short damping phase and require a fast comeback. The jump is executed sequentially, with a short damping phase between jumps.
- From the spot horizontal jumps – the maximum effort used when detaching from the ground horizontally or vertically is stressed.
- Exercises with boxes – this type of exercises utilises jumps successive with the jumps in depth. These exercises depend on the height of the boxes. They have both horizontal and vertical components.

The applied tests – The Ion Grinţescu Test to measure the height of the vertical jump, and to measure the maximum anaerobic-alactacid power the Sargent Test was used, with the following formula:

\[ P = \sqrt[4.95]{xGxV_D} \]

where

- \( P \) = power in kg/s,
- \( G \) = corporal weight,
- \( D \) = swing in cm.

Tabel 1. The interpretation of assessment test Sargent for men (Dal Monte, 1988)

<table>
<thead>
<tr>
<th>Mark</th>
<th>15-20 ani</th>
<th>20-30 ani</th>
<th>30-40 ani</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak</td>
<td>&lt;113</td>
<td>&lt;106</td>
<td>&lt;85</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>113-149</td>
<td>106-139</td>
<td>85-111</td>
</tr>
<tr>
<td>Mediu</td>
<td>150-187</td>
<td>140-175</td>
<td>112-140</td>
</tr>
<tr>
<td>Well</td>
<td>188-224</td>
<td>176-250</td>
<td>141-168</td>
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<tr>
<td>Very good</td>
<td>&gt;224</td>
<td>&gt;210</td>
<td>&gt;168</td>
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- Table 2. The values of the maximum anaerobic-alactacid power – Experimental Group

<table>
<thead>
<tr>
<th>Student</th>
<th>Stature (cm)</th>
<th>Weight kg</th>
<th>( P = \sqrt[4.95]{xGxV_D} ) kg/s</th>
<th>Stature (cm)</th>
<th>Weight kg</th>
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<tbody>
<tr>
<td>1.</td>
<td>175</td>
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<td>115- satisfactory</td>
<td>175</td>
<td>79</td>
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<td>2.</td>
<td>183</td>
<td>79</td>
<td>119- satisfactory</td>
<td>183</td>
<td>78</td>
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<td>184</td>
<td>67</td>
<td>138- satisfactory</td>
<td>181</td>
<td>67</td>
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<tr>
<td>4.</td>
<td>178</td>
<td>57</td>
<td>120- satisfactory</td>
<td>178</td>
<td>56</td>
</tr>
</tbody>
</table>
### Figure 1

The values of the maximum anaerobic-alactacide power – Experimental Group

Kg/s, kilo/second; IT, initial testing; FT, final testing.
Table 3. The values of the maximum anaerobic-alactacide power – Control Group

<table>
<thead>
<tr>
<th>Student</th>
<th>Stature (cm)</th>
<th>Weight kg</th>
<th>$P = \sqrt{4.95xGx\sqrt{D}}$ kg/s</th>
<th>Stature (cm)</th>
<th>Weight kg</th>
</tr>
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<tbody>
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<td>3.</td>
<td>169</td>
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<td>169</td>
<td>95</td>
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<td>4.</td>
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<td>62</td>
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<td>61</td>
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<td>108- weak</td>
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<td>17.</td>
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<td>18.</td>
<td>174</td>
<td>59</td>
<td>111- weak</td>
<td>174</td>
<td>58</td>
</tr>
<tr>
<td>19.</td>
<td>178</td>
<td>56</td>
<td>110- weak</td>
<td>178</td>
<td>56</td>
</tr>
<tr>
<td>20.</td>
<td>174</td>
<td>61</td>
<td>113- satisfactory</td>
<td>174</td>
<td>60</td>
</tr>
</tbody>
</table>
Figure 2. The values of the maximum anaerobic-alactacide power – Control Group
Kg/s, kilo/second; IT, initial testing; FT, final testing.

Table 4. The progress realised by each group (average) – Sargent Test (kg/s)

<table>
<thead>
<tr>
<th>Group</th>
<th>T.I.</th>
<th>T.F.</th>
<th>D = T.F. - T.I.</th>
<th>D_{TF-TI} (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>121,55</td>
<td>127,65</td>
<td>6,1</td>
<td>5,01</td>
</tr>
<tr>
<td>Control</td>
<td>118,15</td>
<td>119</td>
<td>0,85</td>
<td>0,72</td>
</tr>
</tbody>
</table>

Figure 3. Values of the arithmetical mean - Sargent test

Kg/s, kilo/second; IT, initial testing; FT, final testing; Control Group; Experimental Group
Discussions

The result of the Sargent Test for determining the maximum anaerobic-alactacid power is:

The Experimental Group, at the final testing, registers a gain in power of 5,01% (6,1 kg/s) in comparison with the initial testing. One student modified his grade from weak to satisfactory.

The Control Group, at the final testing, registers a gain in power of 0,72% (0,85 kg/sec) in comparison with the initial testing. One student modified his grade from satisfactory to weak.

In terms of the coefficient of variation, all the groups have a high homogeneity both in the initial test and final testing. Similar studies have been addressed by Bocioaca, 2003 and Vaida, 2011.

Conclusions

➢ At the Sargent test which evaluates the maximum anaerobic-alactacid power, the biggest progress were made by the experimental group, and for the control group the progress was insignificant. On a whole, it can be appreciated that regarding the anaerobic-alactacid capacity of the subjects, there still is the possibility of improvement in a significant quantity through the use of plyometric exercises, which concludes to the fact that the functional reserves of young people are insufficiently explored.

➢ Following this research, the obtained results demonstrate that the plyometric method used during the physical training produces significant swing growth, the subjects of the experimental group having significant diminished values at the end of the training program.

➢ Strength training is essential for jumpers and sprinters as body weight (during the beat movement with vertical separation) and body mass provide a very high resistance.

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