The physical fitness of students from a selection of universities in Gdansk

Wydolność fizyczna studentów z wybranych uczelni Gdańska

INTRODUCTION

Among all the factors governing the physical fitness of the human body, the key element is the effectiveness of the circulatory-respiratory system, both in relation to the heart as the blood pump and to the regulation of the blood circulation in various vascular areas. It is significant in carrying the blood from the lungs to the muscles. Another element which plays a vital role here is the metabolic fitness of the active tissues and of the vegetative functions connected mainly with the transport of gases, thermoregulation and providing the active tissues with energetic substrata as well as excreting waste products. The higher the fitness of the respiratory and the circulatory systems, the higher the use of oxygen during physical exertion. The same applies to the oxygen potentiality of the tissues. Therefore the most adequate way to measure fitness is by checking the largest possible use of oxygen which can be recorded while performing maximal physical effort ($\dot{V}O_2$max). The method of directly measuring the maximal use of oxygen ($\dot{V}O_2$max) requires undertaking maximal physical exertion. In order to avoid the necessity of submitting the person examined to physical effort of the maximum intensity, indirect ways of measuring the maximal oxygen uptake have been developed (Astrand 1952).

Testing and assessing the physical fitness of university students, on the basis of the maximal oxygen intake, is performed all over the world (Andersen 1994, George 1997, Saltin 1995). Students at the beginning of their studies between the age of 19 to 21 undergo special evaluation due to the fact that their physical development has been completed. In addition, the effects of the physical education program within secondary schools is also monitored.

Therefore, the lower a person’s physical fitness, the lower will be the maximum potentiality, which is more and more rarely called upon and therefore less and less able to respond during physical exertion.

The aim of this study is to assess the physical fitness of first year students attending various institutes of higher education in Gdańsk, on the basis of the direct level of maximal oxygen intake.

MATERIALS AND METHODS

Research was undertaken on students not in training: students from the University of Gdańsk (UG) as well as the Academy of Physical Education (AWFiS).
Table 1. The anthropometric characteristic of subjects (UG- University of Gdansk, AWFIS – Academy of Physical Education and Sports)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Age (years)</th>
<th>Weight (kg)</th>
<th>Height (cm)</th>
<th>BSA (m²)</th>
<th>BMI (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG</td>
<td>115</td>
<td>19.30 ± 0.63</td>
<td>74.15 ± 9.25</td>
<td>182.12 ± 5.91</td>
<td>1.9 ± 0.2</td>
<td>22.4 ± 1.7</td>
</tr>
<tr>
<td>AWFIS</td>
<td>120</td>
<td>20.07 ± 1.06</td>
<td>73.55 ± 10.80</td>
<td>180 ± 7.92</td>
<td>1.9 ± 0.3</td>
<td>22.7 ± 1.8</td>
</tr>
</tbody>
</table>

The level of physical fitness was assessed on the basis of the maximal oxygen uptake ($\dot{V}O_2\text{max}$) according to the Astrand and Ryhming method (1954). Values are expressed as means ± SD. The statistical analysis of the date obtained was assessed by ANOVA.

RESULTS

Table 2. Mean values of the maximal oxygen uptake ($\dot{V}O_2\text{max}$) in male students of subjects performed the Astrand and Ryhming test from University in Gdańsk (UG) and Academy of Physical Education and Sport (AWFiS)

<table>
<thead>
<tr>
<th></th>
<th>$\dot{V}O_2\text{max}$ (lO₂/min)</th>
<th>$\dot{V}O_2\text{max}$ (mlO₂/kg/min)</th>
<th>Estimate physical fitness</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG</td>
<td>3.02 ± 0.59*</td>
<td>40.73 ± 7.42*</td>
<td>Low</td>
</tr>
<tr>
<td>AWFIS</td>
<td>3.38 ± 0.56</td>
<td>45.95 ± 6.21</td>
<td>Middle</td>
</tr>
</tbody>
</table>

DISCUSSION

The most universally accepted barometer of physical fitness is the organism’s maximal oxygen uptake ($\dot{V}O_2\text{max}$). This enables the assessment of the fitness of all physical mechanisms connected with intake, delivery and usage of oxygen as well as the processing of carbon dioxide.

The research shows that physical fitness among first-year students is poor. The highest average value of $\dot{V}O_2\text{max}$ was achieved by students of the Academy of Physical Education and Sport (45.95 mlO₂/kg/min). The lowest value was found among students of the University of Gdańsk (40.73...
mlO2/kg/min). The differences were statistically significant (p<0.05). After comparing our results with those achieved in different countries in Europe, America and Africa, it became clear that our students had the lowest average value of the maximal oxygen uptake (43.34 mlO2/kg/min) (fig. 1).

Berthoin at. all. 1994 examined students of University de Lille and achieved significantly better results of the maximal oxygen uptake (51.8 mlO2/kg/min). In England the results of 57 mlO2/kg/min were also much better than ours (McNaughton 1998).

Similarly in Denmark the level of physical fitness among students was higher and the results achieved were 50mlO2/kg/ml.

The results of tests both in Portugal, where the fitness of blind young people was compared with the one of students and sportsmen (Moura e Castro 1992), and in Kenya (Saltin 1995) were better than the levels of physical fitness achieved by our students.

It could be expected that the physical fitness of students of the Academy of Physical Education and Sport should be higher due to the character of their university, however their results proved to be poorer than those achieved by students from other countries.

It is a worrying discovery as most of the students tested have either completed the process of physical development or are about to do so. The fitness of the oxygen supply increases in children and adolescents up to approximately the age of 20, when it remains stable, and gradually decreases from the age of 25. Therefore, the lower the fitness during the growth period and the lower its value at the moment when physical development ceases, the more effort will be required to increase or maintain fitness at its current level.

The results of this research bear the greatest testimony to the fact that very few students are aware of the importance of the circulatory-respiratory system. We can only imagine what small percentage of adolescents actively work on their physical fitness. Since the research was carried out on first-year students, their current level of physical fitness is largely thanks to the physical education program implemented in secondary schools.

CONCLUSIONS

✉ A significant difference was observed between our students and others in terms of physical capability.

✉ A systematic and suitably designed and monitored program of physical exercise can lead to increased physical fitness amongst the study group of students.

REFERENCES

2. Astland P.O., 1952: Experimental studies of physical working capacity in relation to sex and age, Ejnar Munksgaard, Copenhagen.
SUMMARY

Physical fitness is an essential aspect of everyday life. The greater the ability to cope with physical effort, the more effective is the undertaking of everyday and professional tasks – physiologically and subjectively “lighter”, and less tiring for the organism.

The aim of this study is to assess the physical fitness of students not in training from the University of Gdańsk (n=115) as well as the Academy of Physical Education (n=120).

The level of physical fitness was assessed on the basis of the maximal oxygen uptake ($\dot{V}O_{2\text{max}}$) according to the Astrand and Ryhming method. The general level of fitness among those researched was found to be low. Comparing the results of our research with similar studies carried out on students in Europe, America and Africa, our students were found to be less fit.

STRESZCZENIE

Wydolność fizyczna jest niezbędnym wymogiem życia codziennego. Im wyższa sprawność fizjologicznej adaptacji wysiłkowej, tym efektywniejsze wykonywanie codziennych obowiązków, pracy zawodowej, która fizjologicznie i subiektywnie jest „lżejsza”, mniej obciąża organizm i powoduje mniejsze zmęczenie.

Celem pracy była ocena wydolności fizycznej osób nie trenujących studentów pierwszego roku z Uniwersytetu Gdańskiego (n=115) i Akademii Wychowania Fizycznego i Sportu (n=120).

Wydolność fizyczną oceniono na podstawie maksymalnego pochłaniania tlenu wyznaczonego pośrednią metodą wg Astranda i Ryhming. Wydolność całej zbadanej populacji oceniono na poziomie niskim. Porównując nasze wyniki badań z podobnymi uzyskanymi w badaniach studentów innych krajach Europy, Ameryki i Afryki, nasi studenci odznaczają się słabszą wydolnością.