1. НАУКОВИЙ НАПРЯМ: ІННОВАЦІЇ ФІЗИЧНОГО ВИХОВАННЯ, СПОРТУ ТА ТУРИЗМУ

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PHYSICAL CAPATITY AND BODY COMPOSITION OF GIRLS HROM URBAN AND RURAL AREAS

The paper presents the results of research on the physical capacity and body composition of young girls living in a metropolitan and rural areas. The level of aerobic capacity (Astrand-Ryhming test), the level of anaerobic capacity (Quebec test) and body composition (TANITA MC-780 S MA) were analyzed. The results of the research showed a differentiated body composition of both groups, a similar level of aerobic capacity and a significantly higher level of anaerobic capacity of girls from the urban environment.

***Key words**: girls, body composition, aerobic, anaerobic capacity*

Introduction

Physical capacity is defined as the ability for the proper functioning of the body in a wide range of human life requirements [3]. Considering the above in the context of systems of obtaining energy for the work of skeletal muscles, aerobic and anaerobic efficiency are distinguished, and their manifestations are visible in many everyday life situations as well as in sports and recreation. The level of efficiency and fitness of the body is the result of genetic determinants and a number of environmental factors, such as place of residence, type of work, diet and the level of physical activity. Considering the above, and assuming that physical performance plays a key role in the development of children and adolescents, this study attempts to determine the level of aerobic and anaerobic capacity as well as the body composition of fifteen-year-old girls living in the metropolitan (Warsaw) and rural (Sochocin) areas.

Human body composition became the subject of scientific research in the second half of the 19th century. Currently, body composition analysis is performed using electrical bioimpedance, which is a reliable, non-invasive, safe and very effective way to determine the components of the human body composition. Bioimpedance consists in measuring the total resultant electrical resistance of the body, which is "a derivative of resistance (reactive resistance) and reactance (active resistance) using a set of surface electrodes that are connected to a computer analyzer and also using a current of a given frequency and intensity [4, p. 79]. This method allows one to accurately assess muscle mass, adipose tissue, lean tissue and body hydration status. It is also a more precise method for calculating the body mass index BMI.

Aim of the research: to determine the level of aerobic and anaerobic capacity as well as the body composition of fifteen-year-old girls living in a metropolitan and rural areas.

Research material

Participants: 30 girls living in a metropolitan area (Warsaw) and 30 girls from a rural area (Sochocin). The average age of the respondents was 14.53 years, the average body height was 165.40 cm and the average body weight was 55.78 kg. The research material consists of numerical data describing the results of anthropometric measurements, body composition and tests of aerobic and anaerobic capacity.

Test methods

The body composition of the examined girls was determined by the bioelectrical impedance (BIA) method with the use of the TANITA MC-780 S MA device. The following issues were assessed: body weight, adipose tissue mass, muscle mass, mass of lean tissue, water content.

The height of the body was determined using an anthropometer by measuring the distance between the base and the highest point of the head (vertex), keeping the following conditions: maximally upright body position, head positioned in the Frankfurt plane, anthropometer perpendicular to the base.

In order to determine the body type of the examined persons, the BMI index and the Quetelet I index, expressing the ratio of body mass (g) to body height (cm), were calculated.

The aerobic capacity was determined indirectly using the procedure according to the protocol of the Astrand-Ryhming method [1] on a Monark 824 E cycloergometer. VO2 max. was estimated during physical exertion with gradually increasing load. The initial load in the test was selected individually for each person (1 W / kg), and the pedaling cadence was 50 rev / min. The first stage of the load lasted 6 minutes. If the HR was between 130 and 170 bpm and the difference in the HR rate in the last minute did not exceed 5 bpm, the test could be considered as a complete one. If the differences were greater, the test was extended for some more minutes until the HR balance was obtained. If the HR was below 130 bpm and the load increased by ½ W / kg it was held for another 6 minutes. Work with a given load was performed until the functional equilibrium was achieved, the moment of its occurrence was determined on the basis of the heart rate, in the range of 65% - 80% HR max, i.e. 130-160 bpm; the optimal HR value should not exceed 85% HR max; 170 / min. Based on the mean value of HR during functional equilibrium and the amount of workload with which the test person was working, the estimated value of the maximum oxygen uptake in liters per minute was read from the Astrand nomograms and the value read was multiplied by the age factor.

Girls' anaerobic capacity was determined using the Quebec test [5], which consisted of 10 seconds of work with the

maximum intensity of the lower limbs on a Monark 824 E cyclo-ergometer connected to an IBM computer equipped with the "MCE v.5.0" programme [10]. According to the Bar-OR procedure [2], the load on the cycloergometer pan was 0.075 of body weight. The analysis showed the relative mechanical operation [J/kg] and the relative maximum power [W/kg].

While developing the research results, basic statistical indicators were used: sums, mean values, standard deviations from means. In order to determine the significance of differences in mean values between the groups of the studied girls, the Student's t-test was used for independent samples, assuming the value of the $p < 0.05$ as significant. The research was carried out in Warsaw and Sochocin in the period of 1-30.10.2018.

Results

Table 1. List of anthropometric indicators

Indicators	Sochocin (n=30)	Warsaw (n=30)	Statistic value „p”
Age of person (years)	15,64 ±0,20	15,51 ±0,35	0,0758
Body height (cm)	165,89 ±4,83	169,77 ±10,82	0,0782
Weight (kg)	61,43 ±11,90	58,67 ±12,42	0,3838
BMI (kg/m2)	**22,37 ±4,65***	20,17 ±2,62	**0,0279**

Legend: * - statistically significant difference

Student's t-test results showed:

- no significant differences in the mean values of indicators describing age, body height and body weight of the compared groups of girls;
- significantly higher mean BMI value in the group of girls from the rural area (Sochocin).

Table 2. Summary of the values of Quetelet I indicators describing the body type of the studied groups of girls

Body type	Indicator value	Sochocin (n=30)	Warsaw (n=30)
Construction Slim	≥ 303	3 people (10,00%)	7 people (23,33%)
Construction Average	304-387	19 people (63,33%)	18 people (60,00%)
Construction strong or obese	< 387	8 people (26,67%)	5 people (16,66%)

Legend: * - statistically significant difference

The analysis of the data in the table above shows that the studied groups of girls differed in terms of body type. Considering the differences in the numbers, it should be noted that the greatest differentiation in favour of girls from the metropolitan areas occurred in the slim and the strong or obese groups.

It can be assumed that the observed phenomenon may explain the previously identified significant differences in the BMI values.

Table 3. List of body composition indices studied groups of girls (M ± SD)

Indicators	Sochocin (n=30)	Warsaw (n=30)	Statistic value „p”
Adipose tissue (%)	**26,73*±6,35**	20,59±7,02	**0,0007**
Adipose tissue (kg)	**17,19*±7,72**	12,19±5,45	**0,0053**
Fat-free mass (kg)	44,24±4,96	46,50±10,17	0,2805
Muscle mass (kg)	42,03±4,68	43,82±9,67	0,3664
Water mass(kg)	32,38±3,63	34,04±7,43	0,2781

Legend: * - statistically significant difference

The assessment of the degree of differentiation of the mean values of indicators describing various aspects of body composition based on the results of the Student's t-test showed that girls from the rural area (Sochocin) differed significantly from their peers in terms of percentage and weight of adipose tissue.

Table 4. Summary of indicators of aerobic and anaerobic capacity studied groups of girls (M ± SD)

Indicators	Sochocin (n=30)	Warsaw (n=30)	Statistic value „p"
VO2 max.(ml/kg/min)	39,80±7,80	41,56±9,76	0,2758
Mechanical work (J/kg)	63,91±7,39	**77,72*±8,80**	**0,0087**
Power max.(W/kg)	7,72±0,84	**9,15*±1,04**	**0,0007**

Legend: * - statistically significant difference

The results of the Student's t-test showed that:

- girls from rural (Sochocin) and metropolitan (Warsaw) areas did not differ significantly in terms of the average VO2 max. values describing aerobic capacity;
- girls from the metropolitan areas (Warsaw) performed significantly more mechanical work in the Quebec test;
- girls from the metropolitan areas developed a significantly higher maximum power in the Quebec test.

Summary

The results of the research presented in this study showed that fifteen-year-old girls living in different environmental conditions (large cities and villages) on a daily basis are characterized by a number of similarities and differences.

When analyzing the anthropometric indices of the compared groups, it should be noted that there were no significant differences in body weight and height, with a significantly higher BMI in the group of girls from a rural area, which, in the context of the data contained in Table 2, may be related to the type of body build.

The above assumption is confirmed by the data illustrating the differentiation of the body composition of the surveyed girls, which showed that girls from the rural area were characterized by a significantly higher content of adipose tissue.

On the other hand, when considering the differentiation of indicators describing various aspects of the physical capacity of the surveyed girls, it should be emphasized that there are no statistically significant differences with regard to the maximum oxygen uptake, which may be a premise for the thesis about a similar level of their daily physical activity.

A different situation was found when comparing the indicators of anaerobic capacity, as it turned out that girls from the metropolitan areas significantly exceeded their peers both in terms of the amount of work performed in the Quebec test and the maximum power developed during the test effort. In order to explain this phenomenon, one can again refer to the aforementioned different proportions of the body type in the groups, where there was a clearly higher percentage of girls with a strong physique in the case of girls from the rural area. Many years of the authors' own research can be considered as an additional argument for such a possibility, which showed that people with lower body weight usually achieve better results in the Quebec test.

Comparing the obtained results to the studies of other authors, it should be emphasized that the average values of VO2 max. of the surveyed girls (39.8-41.55 ml / min / kg) are clearly higher than the data for students of UMSC (36.2 ml / kg / min) and the Presov University (34.47 ml / kg / min) - quoted in the work of Krawczyk [6].

The situation is similar when the results of the Quebec test of the surveyed girls are compared with the data on the level of anaerobic capacity of non-training UMCS students quoted by Norkowski [8, pp. 192-195].

It should also be emphasized that the indicators describing the average amount of mechanical work (77.72 J / kg) and maximum power (9.15 W / kg) developed in the Quebec test by girls from the urban environment do not differ significantly from the results given in the study by Sienkiewicz -Dianzenza [9] concerning young, physically active women and amounting to, respectively (7.72-8.19 J / kg and 9.35 W / kg).

Conclusions

1. The lack of statistically significant differences in the indicators describing the level of fitness in both groups may indicate a similar level of daily physical activity of the respondents.
2. Statistically significant differences in the level of anaerobic capacity of the studied groups may be the result of individual genetic determinants both in the context of the proportion of skeletal muscle fibers [7] and the body type of individual people.
3. The obtained results should be treated with great caution due to the small number of respondents and the lack of information on their lifestyle, diet, social conditions, etc.

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CLASSROOM PHYSICAL ACTIVITY BREAKS TIME SEAT REPLACEMENTS AND THEIR IMPACT ON CHILDREN`S DAILY SUFFCIENT PHYSICAL ACTIVITY OUTCOMES

*This study discusses the effect of Classroom Physical Activity Breaks (ABC-PA) time seat replacements and their impact on children's daily sufficient physical activity outcomes. Experimented in present below the recommended 3*5min (ABC-PA), apply for every two hours and 6*5min (ABC-PA) involved for every one-hour static classroom setting. Controlled by a group without no ABC-PA per day. Using Fitness-Gram battery tests components as a valid field method to evaluate physical fitness in school-aged children. Founded on studying dings and statistical applied. Our results reported that ABC-PA-5min for every one-hour are more physically than ABC-PA with 5min for every two-hour static classroom setting. Vindicated in this study owed to their total dynamic standing disks per day more apt to raise energy expenditure and sitting time classroom adjustments.*

Keywords: *primary schools, children, physical activity, exercise time and frequency, active break program.*

Introduction

Research approves Active Breaks Classroom-Based Physical Activity programs (ABC-PA) as a time-efficient, feasible and appealing approach [HYPERLINK "file:///D:\\конференція\\листопад_2020\\статті\\Zerf.docx" \l "Ama19" 1].

Subjected in similar studies to be integrated at least 3*5-min of moderate-intensity physical activities into their classroom routines, daily2]. However, some modifications in terms of their essential alternative frequency, intensity and time implications. Studies have explored general perceptions of active break strategies, reporting that active breaks that were short (e.g. < 5-min) and quick and easy to implement would be more likely to be adopted in daily practice [HYPERLINK "file:///D:\\конференція\\листопад_2020\\статті\\Zerf.docx" \l "Aga18" 3]. Challenging further research to inspect factors associated with their efficacy intervention fidelity and feasibility 4]. The case of this study appraised by time seat replacements as an important factor in decrease sedentary behaviour. Defined as an act requiring low levels of energy expenditure while a person is sitting or lying [HYPERLINK "file:///D:\\конференція\\листопад_2020\\статті\\Zerf.docx" \l "Hen17" 5]. Tested in the present above two-time models, a group with the recommended 3*5min (ABC-PA), apply for every two hours and 6*5min (ABC-PA) involved for every one-hour static classroom setting, be controlled by a group without no ABC-PA per day.

To judge the efficacy and potential of time seat replacements, all results of samples pre-test and post-test were compared with a control group with no ABC-PA. Using Fitness-Gram battery as a comprehensive assessment of school health policies and public health applications 6]. Elaborated by the Cooper Institute under five components of health-related fitness: aerobic endurance, muscular strength and muscular endurance, flexibility, and body composition. Calculated based on health-fitness standards specified from their age and gender designed to promote physical activity with the vision of improving the efficiency and effectiveness of school-based physical education [HYPERLINK "file:///D:\\конференція\\листопад_2020\\статті\\Zerf.docx" \l "Ken16" 7].

Admit by similarities as the usual complete test battery practises in many countries to prevent the non-communicable diseases arising from an unhealthy lifestyle (Jacqueline, et al., 2014). Implemented in the present to estimate the impact of time seat replacements on children's daily sufficient physical activity outcomes. Clarify by Hills, et al., (2015) as the ideal model with a more bodily classroom activity, more energy expenditure and sitting time classroom adjustments4].

MATERIALS AND METHODS

Advised this academic study as the first Algerian pilot research among our primary schools. His appointment aims to test the effect of time seat replacements and their impact on children's daily sufficient physical activity outcomes.

Hypothesis in this study below two times reset postural models, group with the recommended (ABC-PA), apply for every two hours and 6*5min (ABC-PA) involved for every one-hour static classroom setting controlled by a group without no ABC-PA per day. All groups with ABC-PA apply the same program be integrated toward four-week using video-based physical activity for the academic years (2017-2018). Set in Figure 1 as a program and Figure 2 as ABC-PA time-seat protocol practises in the present study.

The only role of teachers, who voluntarily accepted to be engaged in this experience, was the applications of the video-based physical activity. Appropriated for their students by respecting model content and encouragements of their students to repeats their proposed daily base-physical-activity proposed.

Participants

The samples included 4 teachers and 5-grade class levels. Represent a total of 135 children (74 girls and 61 boys), 45 in each class. All participants provide their written consent to attend the study. Their characteristics before experiment beginning, are shown in Table 1. The ethics committee Physical Education Institute, University of Abdel Hamid Ibn Badis Mostaganem provided its approval under the code '45/IEPS/2017'.