THE IMPACT OF MATERIAL AND TECHNICAL CONDIONS AND METHODS OF ORGANISATION ON THE ANTHROPOMETRIC STATUS OF ADOLESCENTS

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Original scientific paper

ABSTRACT

Physical education class presents an organised form of activities for children, in the educational system, as well as sport sections, school competitions, sport days. The fact is that the real situation is not often suitable for conducting the classes with specific teaching units, but schools generally have unsuitable space for physical education classes or do not have it at all. Under such technical and material conditions or without them at all, expertise of a teacher comes to the fore. The skillfulness reflects in necessity of adjusting that is modifying the curriculum. The aim of the research is to determine differences between examinees in terms of anthropometry, depending on material and technical conditions and methods of class organization, i.e. curriculum implementation. The participants in the study were 142 adolescent, 17 years of age (± 6 months). In order to assess anthropometric features, 9 anthropometric measurements were used. Data processing was done by applying multivariate analysis of covariance (MANCOVA); significance of difference was determined by analysis of variance (ANOVA), while differences among examinees of the experimental and the control group were determined by discriminant analysis. After the experimental treatment, it was determined that there was not statistically significant difference between the experimental and the control group within the anthropometric measures system.

Key words: Anthropometric status, adolescents, organization of teaching, modified curriculum, material and technical conditions.

INTRODUCTION

Physical education that allows students to engage in moderate-to-vigorous physical activity can play an important role in health promotion. Unfortunately, moderate-to-vigorous physical activity levels in physical education lessons are often very low (Lonsdale et al, 2013). Physical education class presents an organised form of activities for children, in the educational system, as well as sport sections, school competitions, sport days. Physical education teachers, being professionals, should conduct physical education classes in the school gyms with the requisites and the equipment. The fact is that the real situation is not often suitable for conducting the classes with specific teaching units, but schools generally have unsuitable space for physical education classes or do not have it at all. Under such technical and material conditions or without them at all, expertise of a teacher comes to the fore.

School-based physical education programs face numerous challenges including pervasive inactivity among children and families (Nader et al, 2008), competing academic priorities (Kahn et al, 2002; Pate et al, 2006) and budget cuts (McKenzie et al, 2008). Despite recent progress in the implementation of policies that support physical education programs (Kann, 2007; Lee et al, 2007), schools are struggling to provide the frequency and intensity of physical education and physical activity opportunities recommended in Healthy People 2010 (Bevans et al, 2010).

Numerous research indicate that motor activity should contain 10-15 hours of physical activity per week, during the period of growth and develoment, so that elementary needsfor moving would be met (Krsmanovic, 1999).

Examining the structure of anthropometric dimensions of female population, 17 years of age, 6 morphological dimensions with statistically significant differences were obtained from 35 anthropometric variables, which exceed the expected. These are: body volume and subcutaneous adipose tissue, longitudinal dimensions of skeleton and transversal dimensionality for which the author points out as of dubious interpretation, which is in accordance with previous research (Bala, 1977).

Study of sociological features' impact on the anthropometric structure, on the sample of 540 male examinees, 19-27 years of age, proved that sociological structure does not influence latent morphological features (Hosek et al, 1980).

Conducted research on education system responsibilities for proper development during adolescence, points out that it is necessary to activate kinesiologic stimuli, in the period of active growth and development, which are adjusted to primary anthropological features of an individual (Protic, 2006).

Research on the sample of 89 students 12 years of age, from urban and rural areas proved that

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students from urban areas are taller and heavier, but have more subcutaneous adipose tissue (Celes, 2007).

Based on applied experimental treatment that lasted for one competition season, research was conducted with junior basketball team, it was determined that material and technical condition, as well as available terms and players' motivation were factors influencing success in basketball , and thereby the anthropometric status (Stamenkovic, 2013).

The aim of the research is to determine differences between examinees in terms of anthropometry, depending on material and technical conditions and methods of class organization, i.e. curriculum implementation.

METHODS

Participants

The study comprised of 142 examinees, as the sample of adolescent population, from two gymnasiums in Novi Sad, 17 years of age (± 6 months). The control group consisted of the students who had their physical education classes in the school gyms, twice a week, one school class at a time, according to the standards of the curriculum. Other group that is experimental group consisted of 74 students who had physical education class once a week, a block schedule of two school classes' duration, in a rented place which was not intended for school classes, because of specific material and technical conditions the curriculum was changed as well.

Testing was done in physical education classes. It was conducted with the consent of professors and students. There were two stages of measuring: initial and final measuring. The treatment lasted for 4 months and covered the control and the experimental group.

Instruments

Envisaged anthropometric measurements were measured according to the International Biological Programme (Weiner & Lourie, 1981).

For assessing anthropometric features, 3 groups of anthropometric measurements were used (Bala, 1980.):

- For assessing longitudinal skeleton dimensionality: body height;
- For assessing body mass and volume: body mass, average circumference of the thorax, abdominal circumference,maximal circumference of the upper arm and the forearm;
- For assessing subcutaneous adipose tissue: skin fold of the upper arm, skin fold of the back, abdominal skin fold.

Testing methods

Data processing was done by applying multivariate analysis of covariance (MANCOVA); significance of difference was determined by analysis of variance (ANOVA), while differences among examinees of the experimental and the control group were determined by discriminant analysis.

RESULTS

Based on the obtained results (Table 1), it is evident that there are statistically significant differences between examined groups, in terms of anthropometric measurements, after the experimental treatment. It is evident that the obtained results indicate that there are statistically significant differences. This information also indicates that it is possible to set a clear line between the experimental and the control group in the research space, after the experimental treatment.

Table 1.
Significance of differences between group after experimental treatment

Analysis	n	F	p
MANCOVA	9	1.587	.126
DISCRIMINANT	9	2.256	.022

We can conclude that after the experimental treatment examinees from two groups do not differ, even though they work in different material and technical conditions.

This also shows the extent to which adjusted curriculum positively influences growth and development of an examinee that is adjusted curriculum met the objectives and task that should be cover by one physical education class.

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Table 2.
Significance of difference between the groups of examinees after the experimental treatment

Anthropometric measurements	Adjusted $\overline{X}$ e	Adjusted $\overline{X}$ k	F	p	Coefficient of discrimination
Body height	183.89	184.33	3.238	.074	.020
Body mass	74.24	74.35	.009	.924	.000
Average circumference of thorax	93.86	94.67	7.514	.007	.010
Maximal circumference of the forearm	27.97	27.99	.009	.925	.008
Abdominal circumference	83.61	82.95	.654	.420	.009
Circumference of the upper arm	29.72	30.21	11.248	.001	.035
Skin fold of the upper arm	11.20	11.80	5.113	.025	.021
Skin fold of the back	11.50	10.70	2.542	.113	.044
Abdominal skin fold	17.20	16.90	.081	.776	.001

It is interesting how much the experimental treatment influenced examinees of the both groups, so the adjusted middle values of examines of the control group are higher in seven of nine applied measurement, while lower adjusted middle values can be found in two of nine applied measurements: abdominal circumference and abdominal skin fold. Further analysis of the obtained results (Table 2) indicates that there are statistically significant differences in terms of anthropometric measurements. By analyzing values, it is clear that there are statistically significant differences in four of nine applied measurements in favour of the control group. We can ascertain that statistically significant differences occurred in three measurements(circumference of the thorax, circumference of the upper arm and skin fold of the forearm) on the initial measuring and after the experimental treatment, while one measurement (body height) had statistically significant difference on the initial, final measuring and after the experimental treatment.

DISCUSSION

In the system of anthropometric measurements, there are statistically significant differences between the experimental and the control group in the initial measuring in four of nine applied anthropometric measurements (circumference of the thorax, abdominal circumference, circumference of the upper arm and skin fold of the upper arm) in favour of the experimental group. In the system of anthropometric measurements, there isn't statistically significant difference between the experimental and the control group in the final measuring. In the system of anthropometric measurements, it is determined that there isn't statistically significant difference between the experimental and the control group after the experimental treatment.
The experimental treatment showed that the results in the space of anthropometric measurements are not statistically significant, but when observing single measurments, adjusted values of arithmetic mean are in favour of the control group in three of nine applied anthropometric measurments (circumference of the thorax, circumference of the upper arm and abdominal skin fold).

The mismatch between the curucculum and exsisting material and tecnical conditions directly impacts on the anthropometric status of adolescents (Katanic, 2010).
According to research, physical education classes are not efficient, However, physical education classes do not influence causes that influenced reserch such as: maladjustment of the curriculum, insufficient number of physical education clases, inadequate material nad technical conditions (Krsmanovic, 1996).
Undoubtedly, adequate exposure to high-intensity physical education is an effective contributor to healthy lifestyle among children and across the life span. Yet, many physical education programs fall short of national recommendations in terms of both class time and intensity of physical activity. One study suggests that physical education quality can be enhanced by establishing, protecting, and improving both activity-promoting resources and instructional practices. In particular, access to an adequate number of physical educators per student as well as well-maintained, safe, and appropriate facilities and sport and exercise equipment will enhance students' opportunities for adequate physical activity. In addition, the frequency and intensity of student physical activity are enhanced by minimizing the proportion of class time devoted to classroom management (Bevans et al, 2010).

Given the small number of studies, moderate-to-high risk of bias, and the heterogeneity of results, caution is warranted regarding the

strength of available evidence. However, one review indicates that interventions can increase the proportion of time students spend in moderate-to-vigorous physical activity during physical education lessons. As most children and adolescents participate in physical education, these interventions could lead to substantial public health benefits (Lonsdale et al, 2013).

REFERENCES

1. Bala, G. (1977). Structure of anthropometric dimensions of female population. [Struktura antropometrijskih dimenzija kod osoba zenskog pola]. *Kinesiology,* (7)1-2: 13-22.
2. Bala, G. (1980). *Structure and development of morphological and motor dimensions of children in SAP Vojvodina*. [*Struktura i razvoj morfoloških i motoričkih dimenzija dece u SAP Vojvodini*]. Novi Sad: Faculty of Sport and Physical Education.
3. Bevans, K.B., Fitzpatrick, L-A., Sanchez, B.M. Riley, A.W. and Forrest, C. (2010). Physical Education Resources, Class Management, and Student Physical Activity Levels: A Structure-Process-Outcome Approach to Evaluating Physical Education Effectiveness. *J Sch Health*. 80(12): 573–580.
4. Hosek, A., Stojanovic, M., Momirovic, K., Gredelj, M., i Vukosavljevic, R. (1980). Strucure of anthropomethric variables' factors after fragmenation of social features. [Faktorska struktura antropometrijskih varijabli nakon parcijalizacije socioloških karakteristika]. *Kinesiology,* 10(1-2):21-25.
5. Celes, N., Hadzikadunic, M, Hadzikadunic, A, Kozic, V. (2007). Difference between morpholocial features of fifth graders in urban and rural areas of Sanski Most. [Razlike morfoloških karakteristika i motoričkih sposobnosti učenika petih razreda urbanih i ruralnih osnovnih škola Sanskog mosta]. *Journal of the Anthropological Society of Yugoslavia*, 42:376-387.
6. Kahn, E.B., Ramsey, L.T., Brownson, R.C. (2002). The effectiveness of interventions to increase physical activity: a systematic review. *Am J Prev Med*, 22(4S): 73–107.
7. Kann, L., Brener, N.D., Wechsler, H. (2007). Overview and summary: school health policies and programs study 2006. *J Sch Health,* 77(8): 385–397.
8. Katanic, M. (2010). *The impact of various material and technical conditions and methods of organisation on anthropometric and motor status of students*. [*Uticaj različitih materijano-tehničkih uslova i načina organizacije nastave na antropometrijski i motorički status učenika*]. Unpublished M. Sc thesis, Novi Sad: Faculty of Sport and Physical Education.
9. Krsmanovic, B. (1996). *Physical exercise class*. [*Čas fizičkog vežbanja*]. Novi Sad: Faculty of Sport and Physical Education.
10. Lee, S.M., Burgeson, C.R., Fulton, J.E., Spain, C.G. (2007). Physical education and physical activity: results from the School Health Policies and Programs Study 2006. *J Sch Health*, 77(8): 435–463.
11. Lonsdale, C., Rosenkranz, R.R., Peralta, L.R., Bennie, A., Fahey, P., Lubans, D.R. (2013). A systematic review and meta-analysis of interventions designed to increase moderate-to-vigorous physical activity in school physical education lessons. *Prev Med*, 56(2): 152-161.
12. McKenzie, T.L., Kahan, D. (2008). Physical activity, public health, and elementary schools. *Elem Sch J*, 108(3): 171–180.
13. Nader, P.R., Bradley, R.H., Houts, R.M., McRitchie, S.L., O'Brien, M. (2008). Moderate-to-vigorous physical activity from ages 9 to 15 years. *J Am Med Assoc*, 300(3): 295–305.
14. Pate, R.R., Davis, M.G., Robinson, T.N., Stone, E.J., McKenzie, T.L., Young, J.C. (2006). Promoting physical activity in children and youth. A leadership role for schools. A scientific statement from the American Heart Association Council on Nutrition, Physical Activity, and Metabolism (Physical Activity Committee) in collaboration with the Councils on Cardiovascular Disease in the Young and Cardiovascular Nursing. *Circulation,* 114(11): 1214–1224.
15. Protic, J. (2006). Responsibilities of the education system for proper development during growing up. [Odgovornost obrazovnog sistema u pravilnom razvoju tokom odrastanja]. In *Proceedings of the Interdisciplinary Scientific Conference "Anthropological status and physical activity of children and youth"* (297-300). Novi Sad: Faculty of Sport and Physical Education.
16. Stamenkovic, S. (2013). *The annual cycle of work youth team basketball club Partizan in the 2011/12 season* [Godišnji ciklus rada juniorskog tima košarkaškog kluba Partizan u sezoni 2011/12]. Unpublished diploma thesis, Beograd: Faculty of Sport and Physical Education.
17. Weiner, J.S., Lourie, J.A. (1981). Practical human biology. New York: Academic Press.