



5th INTERNATIONAL SCIENTIFIC CONFERENCE ON KINESIOLOGY

“KINESIOLOGY RESEARCH TRENDS AND APPLICATIONS”

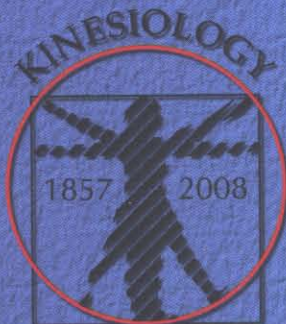
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Physical Education

5th INTERNATIONAL SCIENTIFIC CONFERENCE ON KINESIOLOGY

**"KINESIOLOGY RESEARCH
TRENDS AND APPLICATIONS"**

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INFLUENCE OF SPECIALLY PROGRAMMED PE LESSONS ON MORPHOLOGICAL CHARACTERISTICS CHANGES OF 7-YEAR-OLD PUPILS

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Abstract

In this research the effect of specially programmed PE lessons on morphological characteristics of 7-year-old pupils is being considered. The control group (140 boys and 138 girls) attended regular PE lessons while the experimental (185 boys and 172 girls) attended specially programmed PE lessons in duration of 9 months. Morphological characteristics are estimated by means of 14 measures at the beginning and at the end of treatment. Significant differences have been noticed among experimental groups in relation to control groups and that is in higher values of stature and body mass, leg length, biacromial and biiliocristal diameter, and in lower values of abdomen and subscapular skinfold. More expressed transversal skeleton measures, chest circumference, total arm length and stature have been evidenced at boys while at girls more expressed measures are those of adipose tissue and lower leg circumference.

Key words: *physical education, first graders, morphological dimensions*

Introduction

Fundamental biological characteristic of a child organism are growth and development, whereat under the influence of dispositional factors and of environment, as well as of self-activity, it develops into a more mature organism. Age in which child starts elementary school is relatively quiet phase of growth and development. Stature and body mass demonstrate an insignificant, but constant progress. Child bones are soft and elastic, because soft cartilaginous tissue is gradually being replaced by bone tissue. Musculature gains on weight and muscular fibres are being reinforced.

Beginning of the institutional education is a crucial phase in child life. Game, which dominated by that point, cedes its place to learning. Long and systematical educational commitment, decline of motor activity and increased static load represent great difficulties to first graders. Reduced physical effort and insufficient movement impoverish motor function which has negative influence on child development and health, since movement is positive stimulus for development of the organism as a whole. When it is good organised, physical activity has positive effect on body growth, and especially on skeletal muscle and circular system growth as well as on the body composition (Katić et al., 1997). Body composition changes occur during the growth and ageing, connected to health, nutrition and body activity (G. Russo et al., 1992). Positive effect of PE lessons on health status improvement of general population is nowadays very important (Sallis and McKenzie, 1991). There is a great number of clues which indicate that PE lessons in Croatia do not stimulate sufficiently the development of basic morphological dimensions or the development of motor abilities. PE lessons should be institutionally conducted with more quality, which includes the increase of lessons number as well as the improvement of work conditions. There are numerous opinions according to which PE lessons during the first years of education should be conducted by qualified PE lessons pedagogues, which would also lead to significantly better effects.

Aim of this research are the effects analysis of specially programmed PE lessons in morphological characteristics transformation of first graders from elementary schools in relation to lessons, realized according to the official curriculum.

Methods

Sample of 635 pupils was constituted by 325 boys and 310 girls, 7-year-old first class attendants of elementary schools in Split. Boys sample was divided into control (N = 140) and experimental group (N = 185), while the girls sample was divided into control (N = 138) and experimental group (N = 172). All examinees were without expressed cognitive, morphological, motor or other aberrations, capable of following the anticipated first grade elementary school curriculum. Control groups of examinees attended PE lessons according to the current curriculum, conducted by the primary education teachers, while experimental groups attended specially programmed PE lessons realized by the PE lessons teachers.

The official curriculum of physical education is realized by the use of teaching topics from the following teaching units: walking and running, jumping, throwing and catching, climbing, crawling, lifting and carrying, rolling, hanging and

pushing, dancing structures, games, general preparatory exercises. The experimental program was consisted of elements from athletics, sports gymnastics, games, competitions and general preparatory exercises (Table 1). Both programs were conducted within the framework of a year fund (105 lessons).

With a view to data collection, a group of 14 morphological measures which estimate virtual four-dimensional morphological area has been applied in the following order: stature (mm), leg length (mm), total arm length (mm), biacromial diameter (mm), biiliocrista diameter (mm), wrist width (mm), biocondylar femur diameter (mm), body mass (dkg), forearm circumference (mm), lower leg circumference (mm), chest circumference (mm), triceps skinfold (1/10 mm), subscapular skinfold (1/10 mm) and abdomen skinfold (1/10 mm). Measurements were conducted at the beginning and at the end of the eksperimental treatment by the use of standard anthropometric techniques as recommended by IBP.

Descriptive statistics parameters were defined on the obtained results, and the results differences of the first and the second measurement were tested by the application of SSDIF algorithm, which analyses quantitative changes in two time periods under the differences model.

Table 1. Year plan of the physical education lessons experimental program.

Contents		Months										Total
		IX	X	XI	XII	I	II	III	IV	V	VI	
Measurements		4									4	8
Track-and-field	Walking and running	1	2	1	1	1	1	1	2	1		11
	Jumping	1	2	1	1	1	1	1	1	1		10
	Throwing		2	1	1	1	1	1	1	1		9
Sport gymnastics	Floor exercises	1	2	2	1	1	1	1	2	1		12
	Apparatus exercises		1	2	1	1	1	1	1	1		9
	Jumps		1	2	1	1	1	1	1			8
Games	Basic sp. games tech.s		1	1	1	1	1	1	1	1		8
	Elementary games	1	1	1			1		1		1	6
	Relay games	1		1	1	1		1	1	1		7
	Team games				1	1	1	2	1	2	1	9
Competitions	Sp. gymnastics						1			1		2
	„Between two fires“						1			1		2
	Track-and-field							2			2	4
General preparatory exercises		On every PE lesson										
Total		9	12	12	9	9	11	12	12	11	8	105

Annotation: Plan demonstrates the duration of certain lesson contents of school classes that was obtained by the multiplication of frequencies and durations for each single lesson content in particular.

Results

Variance analysis of morphological measures between boys and girls of the total examinees sample (Table 2) demonstrated that the boys had at the beginning of academic year more expressed diameters, chest circumference, stature, total arm length and body mass, while the girls had more expressed measures of adipose tissue and lower leg circumference.

On the level of variables means and standard deviations, in both measurements, for each subsample of examinees it can be assumed it came to significant changes in morphological characteristics of both male and female subjects (control and experimental groups) (Table 3 and 4). Changes from the initial to the final condition imply on the development of morphological characteristics. Some more expressed changes refer to the increase of body mass and of the skeleton dimensionalities measures as well as to the decrease of adipose tissue.

Variance analysis of variable differences among the groups demonstrated that the programmed PE lessons, conducted by the PE lessons teachers, had positive influence on the development of pupils of both sexes. This way there are significantly more expressed changes of stature, leg length, biacromial diameter, biiliocrista diameter, body mass, subscapular and abdomen skinfold at experimental groups in relation to control groups. Although seemingly it did not come to significant

changes in the measures of circumference (muscular mass), it is a fact that it came to the reduction of adipose tissue (especially on the abdomen), which means that the muscular mass increased at the examinees of the experimental groups on the account of adipose tissue, which witnesses the characteristics restructuring. The differences of body mass changes which is significantly more saturated with muscular tissue at the experimental groups indicate the same conclusion.

Discriminative function of differences variables at both sexes demonstrates that at the examinees of the second measurement, in relation to the first, came to significant changes, especially in stature and body mass, following in measures for the assessment of transversal skeleton dimensions and body volume. Positive changes of adipose tissue are expressed to a smaller extent (negative sign is the reflection of adipose tissue reduction). Changes of experimental group male i.e. female pupils are primarily responsible for the obtained discriminative function structure inside each sex. Discriminative functions among two periods of measurement in relation to the sexes also demonstrate to a certain extent specificity in the development of transversal skeleton dimensionalities i.e. biacromial diameter at boys and biiliocrystal diameter at girls. Also faster development of lower extremities, as well as more harmonious development, can be perceived at girls in relation to boys.

Table 2. Mean values (\pm SD) of morphological indices measured twice in boys and girls

Measurement:	Boys (n=325)		Girls (n=310)	
	1	2	1	2
Stature (cm)	128.4 \pm 5.4	131.9 \pm 5.5	127.0 \pm 5.4 ^b	130.6 \pm 5.6 ^b
Leg length (cm)	71.4 \pm 3.7	73.6 \pm 3.8	71.2 \pm 3.9	73.6 \pm 4.2
Total arm length (cm)	53.0 \pm 3.0	54.1 \pm 2.9	52.2 \pm 2.9 ^b	53.3 2.9 ^c
Biacromial diameter (cm)	27.2 \pm 1.5	28.3 \pm 1.5	26.9 \pm 1.5 ^a	28.0 1.4 ^a
Biiliocrystal diameter (cm)	20.3 \pm 1.4	21.4 \pm 1.3	19.9 \pm 1.4 ^b	20.9 1.4 ^c
Wrist width (cm)	4.2 \pm 0.3	4.3 \pm 0.3	4.0 \pm 0.2 ^c	4.2 \pm 0.2 ^c
Biocondylar femur diam. (cm)	7.7 \pm 0.5	7.9 \pm 0.5	7.4 \pm 0.5 ^c	7.6 0.5 ^c
Body mass (kg)	27.0 \pm 4.4	29.8 \pm 4.5	26.1 \pm 4.6 ^b	28.9 \pm 4.8 ^a
Forearm circumference (cm)	17.8 \pm 1.5	18.6 \pm 1.5	17.6 \pm 1.6 ^a	18.4 1.6
Lower leg circumference (cm)	25.8 \pm 2.2	26.8 \pm 2.2	26.3 \pm 2.2 ^b	27.2 2.3 ^a
Chest circumference (cm)	60.8 \pm 4.1	62.1 \pm 4.0	59.4 \pm 4.7 ^c	60.9 4.7 ^c
Triceps skinfold (mm)	11.5 \pm 3.7	10.6 \pm 3.5	12.9 \pm 4.0 ^c	12.2 4.2 ^c
Subscapular skinfold (mm)	7.0 \pm 3.0	6.6 \pm 2.7	8.2 \pm 3.9 ^c	7.7 3.7 ^c
Abdomen skinfold (mm)	7.6 \pm 5.0	6.4 \pm 4.0	8.6 \pm 5.7 ^a	7.8 5.3 ^c

Significant differences between boys and girls: ^aP<0.05; ^bP<0.01; ^cP<0.

Table 3. Mean values (SD) of morphological indices measured twice at boys from the control and experimental groups and the structure of the discriminant function (F)

Measurement:	Control group (n=140)		Experiment. group (n=185)		F
	1	2	1	2	
Stature (cm)	128.2 \pm 5.8	131.4 \pm 5.7 ^d	128.5 \pm 5.2	132.3 \pm 5.3	0.52
Leg length (cm)	71.3 \pm 3.9	73.3 \pm 3.8 ^d	71.5 \pm 3.5	73.9 \pm 3.7	0.38
Total arm length (cm)	52.5 \pm 3.2	53.8 \pm 3.2	53.4 \pm 3.2 ^a	54.4 \pm 2.6	0.19
Biacromial diameter (cm)	27.1 \pm 1.7	28.0 \pm 1.6 ^d	27.3 \pm 1.4	28.5 \pm 1.4	0.37
Biiliocrystal diameter (cm)	20.5 \pm 1.5	21.3 \pm 1.2 ^d	20.2 \pm 1.5	21.4 \pm 1.4	0.33
Wrist width (cm)	4.2 \pm 0.3	4.3 \pm 0.3	4.2 \pm 0.3	4.3 \pm 0.3	0.43
Biocondylar femur diam. (cm)	7.7 \pm 0.5	7.9 \pm 0.5	7.8 \pm 0.5	7.9 \pm 0.5	0.42
Body mass (kg)	26.0 \pm 4.5	29.2 \pm 4.5 ^d	27.2 \pm 4.4	30.2 \pm 4.4 ^a	0.47
Forearm circumference (cm)	17.3 \pm 1.5	18.1 \pm 1.5	18.2 \pm 1.6 ^b	18.9 \pm 1.5 ^b	0.35
Lower leg circumference (cm)	25.7 \pm 2.4	26.6 \pm 2.3	25.9 \pm 2.2	26.9 \pm 2.2	0.28
Chest circumference (cm)	59.6 \pm 3.8	60.8 \pm 3.7	61.7 \pm 4.0 ^b	63.1 \pm 4.0 ^b	0.29
Triceps skinfold (mm)	11.4 \pm 3.5	10.7 \pm 3.6	11.5 \pm 3.7	10.5 \pm 3.4	-0.12
Subscapular skinfold (mm)	6.8 \pm 2.8	6.6 \pm 2.5 ^c	7.2 \pm 3.2	6.6 \pm 2.9	-0.08
Abdomen skinfold (mm)	6.7 \pm 4.1	6.6 \pm 4.0 ^d	8.3 \pm 5.5 ^a	6.2 \pm 4.0	-0.13

Significant differences between boys and girls: ^aP<0.05; ^bP<0.01; ^cP<0.001

Table 4. Mean values (\pm SD) of morphological indices measured twice at girls from the control and experimental groups and the structure of the discriminant function (F)

Measurement:	Control group (n=140)		Experiment. Group (n=170)		F
	1	2	1	2	
Stature (cm)	127.2 \pm 5.4	130.4 \pm 5.7 ^d	126.9 \pm 5.4	130.8 \pm 5.6	0.56
Leg length (cm)	71.4 \pm 4.0	73.2 \pm 4.0 ^d	71.1 \pm 3.9	73.9 \pm 4.3	0.44
Total arm length (cm)	51.7 \pm 2.8	53.0 \pm 2.8	52.6 \pm 3.0 ^a	53.6 \pm 2.9 ^a	0.38
Biacromial diameter (cm)	27.0 \pm 1.5	27.9 \pm 1.4 ^d	26.9 \pm 1.5	28.2 \pm 1.4 ^a	0.27
Bilioocrystal diameter (cm)	20.2 \pm 1.2	20.9 \pm 1.3 ^d	19.8 \pm 1.6 ^a	20.9 \pm 1.4	0.36
Wrist width (cm)	4.0 \pm 0.2	4.2 \pm 0.2	4.0 \pm 0.3	4.1 \pm 0.2	0.42
Biocondylar femur diam. (cm)	7.4 \pm 0.5	7.5 \pm 0.5	7.4 \pm 0.5	7.6 \pm 0.5	0.38
Body mass (kg)	26.3 \pm 4.5	28.7 \pm 4.7 ^d	26.0 \pm 4.8	29.1 \pm 4.9	0.44
Forearm circumference (cm)	17.1 \pm 1.4	18.0 \pm 1.5	18.0 \pm 1.6 ^c	19.0 \pm 1.7 ^c	0.30
Lower leg circumference (cm)	25.9 \pm 2.1	26.9 \pm 2.2	26.6 \pm 2.3 ^a	27.4 \pm 2.4 ^a	0.34
Chest circumference (cm)	58.4 \pm 4.4	59.8 \pm 4.4	60.3 \pm 4.7 ^c	62.0 \pm 4.7 ^c	0.34
Triceps skinfold (mm)	12.7 \pm 3.4	12.2 \pm 4.0	13.0 \pm 4.4	12.2 \pm 4.3	-0.08
Subscapular skinfold (mm)	8.1 \pm 3.7	7.9 \pm 3.6 ^d	8.4 \pm 4.0	7.5 \pm 3.9	-0.07
Abdomen skinfold (mm)	7.8 \pm 5.2	8.1 \pm 5.3 ^d	9.2 \pm 6.0 ^a	7.5 \pm 5.4	-0.08

Significant differences between boys and girls: ^aP<0.05; ^bP<0.01; ^cP<0.001

Discussion and conclusion

Results indicate the moderate development of morphological characteristics at elementary school first graders. Morphological characteristics development at eight takes place almost identically at boys and at girls. At experimental groups, in relation to the control groups, came to greater morphological changes, which is evidence that specially programmed PE lessons of higher work volume, conducted by PE lessons teachers, have positive effects on skeleton development, adipose tissue reduction and muscular tissue incensement. These differences imply on the influence of differently programmed physical exercises on the development variability of morphological characteristics (Katić et al., 1994).

It is obvious that nine month treatment has significant repercussions on the total morphological children status. Namely, more complex and higher body engagement, at this age, will aspire firstly to optimize somatic-biomechanical demands within the meaning of limiting factors elimination and that is equally of somatic bars and of their vertexes, adipose tissue reduction and quality of firm points of support i.e. joints. Without embedding nutritive substances into supporting and other tissue, it is not possible to achieve adequate base for more complex and more demanding movements and activities. This process is simplest to support with quality kinesiological stimuli as well as quality programmed and realized treatment, with sufficient load which provokes adaptation.

The obtained results in morphological measures among first grade elementary school pupils should be respected in programming of PE lessons. So, boys, in relation to girls, have more expressed transversal skeleton measures i.e. thicker bones, more muscular and less adipose tissue, which enables them to master greater loads. As opposed to this, gracious skeleton constitution (thinner bones) and significantly more expressed adipose tissue with insufficient muscular tissue at girls, in relation to boys, will reduce their motor efficiency, especially in motor tasks in which dominates strength (Katić, 1996). The research especially implies the importance of forming qualitative educational programs as preconditions to optimal development of morphological characteristics in primary education pupils.

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