

## INFORMATION TECHNOLOGIS IN ESTABLISHING MORPHOLOGICAL DIMENSIONS DETERMINED BY SEX

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**Abstract:** *Starting with the fact that the age and the sex of a child are essential factors at every development stage of a child, especially so for the development of morphological dimension, this research has reached two conclusions: based on the research results the influence of sex as a development factor to the physical development of the seven-year-old children has been established. The conclusion is that there are differences in physical development of children regarding their age. Morphological dimensions are determined by sex and the difference is statistically significant. The influence of the sex as a factor to the figures of a child's physical development can be expected regarding the fact that development rate and characteristics of physical development of boys and girls differ. The results of this research correspond to the results of similar research conducted in the past both at home and abroad.*

**Key words:** *morphological dimensions, sex, child age.*

### INTRODUCTION

Information technologies in sport and physical education are used nowadays to solve problems connected to bio-mechanical movements analyses, motor control assessment, nutrition status as well as processes of organising and management of sport institutions [1], [2].

Processes characteristic for general growth and development are generated by many different factors: internal (called endogen) and external (called exogenous). General growth of each individual is a result of related influence of the given factors. After birth, the development of a child depends on biological and neurological conditions, but then the environment becomes the decisive factor for the development of functions which are to be enriched and completed under certain conditions and influences in order to turn dispositions carried by a child into abilities. It is hard to distinguish what is inherited and what is acquired. The development of a child is a result of mingling effects of internal and external processes. Internal processes are connected with maturing and depend on the inheritance while external ones are mostly related to learning and are assumed under the influence of environment. Sex is a very important factor which determines growth and development. Sexual maturing is a complex side of physical development and, depending on it, both sexes experience visual changes of proportions and clear differences in the build of the body parts.

Morphological and physical changes are gradual, related to each other, with the variable beginning of changes for both groups and individuals. As for the children and youth of the same age we can see boys and girls of different biological maturation, different growth rate and visual differences in body development. Comparing the differences between boys and girls in development of morphological functional abilities we can notice certain sex differences. In many texts the data that deny the differences in quality of motor abilities between pre-school age boys and girls can be found [3], [4] while, at the same time, other authors claim that such differences exist. Physical development of boys and girls at the age of 5 and 6 is different in some basic morphological characteristics. Boys have much higher average values of body height, body mass, arms length and body volume.

## **METHOD**

### **Research subject**

Research subject is the sex as a factor assumed to be a determiner of pre-school children morphological dimensions development

### **Goal, tasks and hypotheses of the research**

The goal of the research was to collect data on the basis of which it would be possible to estimate physical development of pre-school children based on the tested indicators of morphological dimensions.

The task of the research was to collect data by measuring:

- Morphological dimensions-indicators of morphological growth: body height, body mass (bone, muscle and fat tissue);

Collecting data about age and sex as the factors assumed to have an effect on physical and motor abilities development.

### ***Hypotheses***

Based on the defined aim of this research the following hypothesis has been established:

- It was assumed that sex as a factor of development is a determiner of the pre-school children morphological dimensions development.

### ***Methods, techniques and instruments of the research***

The following kinesiology techniques were applied in this research:

- Techniques of estimation of morphological status (anthropometric measurements of morphological dimensions were done by the method recommended by the International biological program [5], [6] and measuring and estimations of body structure by Mateigki, which include measuring of 16 morphological parameters that are the base for calculating the indirect variable of body structure (muscle, bone, fat tissue, non-fat components and dry rest).

- In the phase of collecting data about sex as a factor of the physical

development of pre-school children, the questionnaire has been used.

### Sample subjects

The sample subjects for this research were taken from the population of the seven-year-old children. 141 healthy children without any body malformations were covered by this research. There were approximately the same number of boys and girls.

### Mode of data processing

The data obtained by the research (by listed instruments) were processed by a computer program. The basic descriptive statistic data of tested variables were established, and a t-test was used to test the differences between the two independent sample groups.

## RESULTS

Interpretation, analyses and discussion of indicators of physical development of the seven-year-old children.

Table 1. Descriptive statistical indicators of morphological dimensions

<b>Morph. dimensions</b>	<b>Nr. subject</b>	<b>M</b>	<b><math>\delta</math></b>	<b>SK</b>	<b>KU</b>	<b>Min. value</b>	<b>Max. value</b>
<b>BH (cm)</b>	1141	124,07	4,95	-0,006	0,542	108,00	139,30
<b>BM (kg)</b>	1141	23,550	3,85	1,061	1,514	16,00	36,50
<b>B (gr)</b>	1141	4951,51	682,70	0,339	0,274	3406,67	7159,19
<b>B (%)</b>	1141	21,16	1,78	-0,042	0,196	16,93	25,38
<b>F (gr)</b>	1141	4129,68	1952,03	1,870	3,694	1936,35	12538,86
<b>F (%)</b>	1141	16,98	5,30	1,420	2,536	8,84	39,80
<b>M (gr)</b>	1141	9555,61	1643,31	0,719	0,970	6127,12	14877,65
<b>M (%)</b>	1141	40,61	2,93	-1,861	11,766	22,00	49,43
<b>NFC (gr)</b>	1141	19403,27	2552,72	0,962	3,133	13764,22	31448,86
<b>NFC (%)</b>	1141	82,91	5,37	-1,369	2,257	60,20	91,16
<b>DR (gr)</b>	1141	4896,00	1245,80	1,339	9,263	625,40	11464,68

The estimation of developing level of morphological status of seven-year-olds shows that the obtained average values of the examined parameters (table 1) are as expected, that is they don't digress from the results of similar researches in our or foreign books. However, in the sample itself, there are deviations in average values of some morphological parameters and they are shown in the table.

### Sex of children and indicators of physical development

It was examined if there is a difference between boys and girls concerning the parameters of morphological dimensions. The results are shown in table 2.

Table 2: Sex and morphological dimensions of children

Anthropometric parameters	Sex	No. of samples	M	$\delta$	T-test	Degree of freedom	Threshold of significance
<b>Body height</b>	Female	72	123.93	5.22	-0.332	139	0.740
	Male	69	124.21	4.70			
<b>Body weight</b>	Female	72	23.319	4.24	-0.736	139	0.463
	Male	69	23.800	3.40			
<b>Bones</b>	Female	72	20.76	1.70	-2.705	139	<b>0.008</b>
	Male	69	21.56	1.78			
<b>Fat tissue</b>	Female	72	17.76	5.24	1.805	139	0.073
	Male	69	16.17	5.27			
<b>Muscles</b>	Female	72	40.97	2.47	1.480	139	0.141
	Male	69	40.24	3.33			
<b>Non-fat component</b>	Female	72	82.03	5.36	-2.001	139	<b>0.047</b>
	Male	69	83.27	5.26			
<b>Dry rest</b>	Female	72	463.22	1180.16	-2.622	139	<b>0.010</b>
	Male	69	5171.26	1261.16			

The average values of examined morphological dimensions are statistically considerably different for boys and girls. It is concluded that the components of body structure of children (percentage of bones, non-fat component and dry rest) are determined by the sex of a child. The difference is significant on the level of 0,01 for the bones; 0,01 for the dry rest and 0,05 for the non-fat component in favor of male sex, the percentage of fat tissue is close to statistical significance in favor of female sex.

By the series of research in our country and abroad [7], [8], [9] it was concluded that the sex of children can be an important factor affecting the general development of a child, his physical development. In our research, in order to check the hypothesis the sample is divided on two smaller samples to obtain the statistical analysis of results.

## CONCLUSION

From the shown results, their analysis and discussion we draw the most important conclusions.

The data we came to by the estimation of the morphological status of the seven-year-olds are similar to the results obtained by other similar researches on the samples from our or foreign children at indicators of body height and body weight. As for the components of body structure: bones, muscles and fat tissue (their values are examined for the first time at the age of 7) the obtained figures complete the estimation of morphological status of children.

The influence of sex as a factor to the indicators of children physical development could be expected considering the fact that boys and girls are different in tempo and characteristics of their body development. Between them (boys and girls) there are quantitative and qualitative differences which are established in bones, non-fat components and dry rest, whose indicators were higher at boys and the percentage of fat tissue at girls which came close to statistical significance. Besides, the strength of

upper and lower limbs, was higher at boys, but concerning the slimness girls were better, but not so much to reach the statistical significance.

Observing the influence of sex to the components of physical development we can conclude that this hypothesis is partially confirmed. Morphological dimensions are determined by the sex of a child and there is a statistically significant difference between them.

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