EXAMINATION OF THE DIFFERENCES IN THE REPRESENTATION OF DEFORMITIES OF INDIVIDUAL BODY PARTS IN INITIAL AND FINAL MEASURING

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Abstract

The main goal of this research was to determine the differences in the representation of deformities of individual body parts in initial and final measuring with students of classroom teaching. The research was conducted on a sample of 1105 students, of which 563 are boys and 542 are girls, at the age of 5 to 12. This research program includes the students from I to V grade in eleven elementary schools in Sarajevo:"Kovačići", "Behaudin Selmanović", "Sokolje", "Dobroševići", "Safet-beg Bašagić", "Zahid Baručija", "Fatima Gunić", "Aleksa Šantić", "Avdo Smailović", "Mehmedalija Mak Dizdar", "Hamdija Kreševljaković". The diagnosis of the state of body posture is conducted following the criteria of Napoleon Wolanski (1975), that are based on determining the segmentary dimensions in correlations, as follows: D1 – head posture (HP), D2 – shoulders posture (SHP), D3 – chest posture (CP), D4 – blades posture (BP), D5 – spine posture (SP), D6 – abdomen posture (AP), D7 – legs posture (LP), D8 – feet posture (FP). Examination of the differences in the representation of deformities of individual body parts in initial and final measuring is conducted with the help of descriptive statistics of Cochran's Q test. The significant value of statistical significance was researched on the level p<0.01. With the variable analysis of individual body parts posture of the examined sample with the help of descriptive statistics of Cochran's Q test, it is determined that Cochran's Q-expression is statistically significant on a level far lower than 1% both in initial and in final measuring. Based on the achieved results, it can be concluded that there is significant difference in the representation of individual body parts in both situations of measuring. Both in the initial and in the final measuring, the deformities that refer to feet and spine are most represented, and the least represented deformities are the ones considering the chest.

Key words: *Cochran's Q test, deformities, differences, students.*

Introduction

Statistic data shows that around 4% of the people has spine deformity in any degree, and the reason for that is the so called poor body posture that was not removed in time. The functional interference that are caused by poor posture are first reflected on the spine, and then also on the other parts of locomotor apparatus. The spine is the main factor of the upright posture and the weight carrier of all upper body parts. That is the reason why it is often exposed to the occurance of many deformities, that can move on to the whole spinal column or just certain parts. The foot carries the whole human body and is made of bones, muscles, joints, tendons, ligaments that successfully carry and move the body in all directions and on different grounds. Over 60% of the population has smaller or bigger foot anomalies, especially school children. The main reason for that is that the foot carries the biggest burden. Body posture is a moving habit that is formed and changed during the whole human lifetime and carries all the characteristics of the movement activity and the psychological state of the individual. Children's status is becoming ever more present, considering the lifestyle, so the teachers should be able to determine poor posture, and to suppress it in an adequate way. Because of that versatile significance, body posture is highlighted in Physical and health education of all ages, as the starting goal and the main element of

movement culture, because poor posture essentially represents an initial state of a certain deformity, such as: spine column deformities (scoliosis, lordosis, kyphosis), chest deformities (pigeon chest, funnel chest, flat chest), hip deformities (poor development, half-luxation, luxation), lower extremities deformity («O» legs, «X» legs, saber legs), feet deformities (flat, raised).

With the data analysis of the previous research and the numerous physical examinations, it can be concluded that the number of children with bad posture is constantly growing. Because of that, there is a growing need for the examination of this area. The deviations are classified by their size and are graded by the so called negative points, where 0 points means there is no deviation, 1 point means there is a slight deviation, 2 points mean there is extreme deviation. Keeping the normal upright posture is only possible if the locomotor apparatus is in good shape, properly and proportionally developed, without any mechanical damage. Disproportions in growth and development of the joint-bone system and muscle system are especially expressed in the adolescence period, especially in its most intense phase, puberty. Exactly in that period the organism is very sensitive and subjective to many negative influences. By lowering the phyical activity, we also lower the

resistance of the locomotor apparatus on the influence of the external factors. The increased organism sensibility in the adolescence period allows the occurrence and development of many postural disorders (Jovović and Marušić, 1996). That phenomena is now expressed more than ever before, for many reasons. First of all, today's youth lifestyle is characterized by the lack of movement, i.e. it becomes more sedentary. Almost one third of the children spends more than 4 hours a day sitting by the TV (Marshal and ass., 2006), not counting the time of sitting spent in the school, by the computer and video games. All this points to the fact that the number of hours spent sitting, at home and at school, including children and youth, is constantly growing (Lafond and ass., 2007). Because of that and the tiredness that occurs during a long period spent sitting, children often take improper positions that later grow into bad habits, and by time they turn into body deformities, milder or more serious form. Besides that, the way of coming to school and going from school has changed in the past years, mostly thanks to the ever growing number of cars. In contrast to the earlier generations of students that were going on foot to school, to training, to visit relatives etc., often several kilometers, the children in the 21st century spend very little time walking. The transport from one place to another is exclusively happening by cars, buses, vans, etc. That lifestyle, besides many comforts, has also certain consequences that have a negative effect on the motor capabilities, postural status, and also the aesthetic appearance and life quality of a young human being. This is supported by many researches that show that the percent of school children and youth with postural deformities goes over even 60% (Jovović and Čanjak, 2010, Radisavljević and ass., 1982).

The most endangered group is made of young adolescents (Jovović and Marušić, 1996; Leskošek, 1976; Medojević and Jakšić, 2007). A special problem is the fact that the number of children with posture problems is increasing over the years (Lafond and ass., 2007). Srđenović, (1971/72 to 1973/74.) in association with the physical and health education teachers in the excercise room of the academy of the educational sciences, realized a program for monitoring the body posture for two years, depending on the influence of planned and continuously applied shaping exercises during the teaching process, on a sample of 329 students from V to VIII grade. The grading of eight segments was done by the method (Wolansky, 1975), before and after the experimental treatment (initial-beginning) and (final-ending) examination. After the final examination, the total effects of the students, compared to the initial state, amounted to even 30% in the favor of the proper body posture. Paušić (2005) conducted a longitudinal study in duration of two years on a sample of seven year old children that started going to the first grade of the elementary school, and she monitored the children during three time points. The main goal of the research was to determine the state of the

anthropometric characteristics and parameters for the evaluation of the body posture of children that started going to the first grade of elementary school, and also the state of the changes made in the same parameters in the period until the third grade of elementary school. For the purpose of realization of the set goal, a sample of 224 children is taken, and two variables set. The first set was made of 17 anthropometric variables, the other one of 14 variables for the evaluation of body posture. All the obtained results indicated the existence of the connection of new school burdens to the inadequately prepared child's organism at the age of 7 to 8. At the age of 8 to 9, the adaptation of the movement system to familiar school burdens is noticed in a smaller degree. It is determined that in the first grade of elementary school 51,58% of children have asymmetry of the indicator of body posture. With those same children, after one year, the percentage has grown to 62,1%. In the first grade it is obtained that 28,4% of children has irregularities of the chest, and after one year there was an increase to 51,6%. Lowered foot with children is present in 47,3% in the first grade, and 60,07% in the second grade. From the shown data we can assume that the body posture deformities of school children take a growing part in the health status, which is very devastating considering the very age of the children. Kosinac and Katić, (1999), with the use of the visual method in their work have evaluated the body posture of boys and girls at the age of 10 to 14. The examination was conducted by positioning the examinees in dorsal and then in lateral position. The measurer examined with a subjective evaluation the postures of individual body segments.

The normal position is evaluated with 0, small deviations with 1, and extreme deviations with 2. The examination was conducted on the position of the head, shoulders, blades, Lorenzo's angle, and the kyphotic and lordotic components. The obtained data indicate the existence of significant deformities in the positions of evaluated body segments. Similar results were obtained by many authors in their research. For example, (Krsmanović and ass., 1995), states that 53% of the examines have a deviated body posture, while some authors point out that even more than 70% of school children has some physical deformities and certain troubles as a consequence of the lack of movement. Ristić and ass. (2002), state that the percentage of the representation of postural disorders of youth varies in big extent with different authors, and it depends on the specificity of the sample, the age, the life environment, applied methodology in the detection of the disorders etc.

Methods

Examinee sample
The research was conducted on a sample of N=1105 students of classroom teaching, of which 563 are boys and 542 are girls, at the age of 5 – 12 from 11 elementary schools in the area of the city of Sarajevo and its surroundings, with the average

age of M=8,2864. These are the students that go into I, II, III, IV and V grade.

Variable sample
The following measuring instruments/tests were applied:

- Description of body posture evaluation (BPE).
The criteria by Wolanski (1975) was applied for the evaluation of the correlations of 8 body segments by a visual projection of marked points. The deviations are classified by their size and evaluated by the so called negative points, where: 0 points means no deviation, 1 points means slight deviation, 2 points mean extreme deviation.

Head posture evaluation – HPE (0 – Lowered vertical from the base nose bone should fall to the upper half of the chest bone – sternum; 1 – The same vertical falls to the lower half of the chest bone; 2 – The same vertical falls in front of the chest bone).

Shoulder posture evaluation – SHPE (0 – The central point of the shoulder joint (top of the acromion) by projecting to the neck falls in the back half of the neck silhouette; 1 – The same point „falls" on the front neck silhouette; 2 – The same point „falls" in Adam's apple silhouette).

Chest posture evaluation – CPE (0 – The chest are harmonically, bell-shaped; 1 – The chest is flat; 2 – Deformity – „pigeon" chest).
Blades posture evaluation – BPE (0 – The blades are leaning on the chest with its whole surface; 1 – „Winged" blades, i.e. the blades are separated for one finger of examinee; 2 – The blades are separated for two fingers of examinee).
Spine posture evaluation – SPE (0 – Physiological curve normal both in sagittal and in frontal plane; 1

– First degree deviation: kyphosis, scoliosis or lordosis; 2 – Deviation combination or even individually, but on second degree).
Abdomen posture evaluation – APE (0 – Abdomen retracted behind the vertical, lowered behind the processus xiphoideus in the sagittal plane; 1 – Abdomen bulging in front of the lowered vertical; 2 – „Hanging" abdomen (pear-shaped) or loose muscles).
Legs posture evaluation – LPE (0 – Normal posture with heels together: knees vertically flat or at least approximately: 1 – Normal posture with heels together: knees tending to „X" shape and touching; 2 –Posture with heels together: significant knees tendence to „X" shape, i.e. significant tendence to „0" for more thickness 2 fingers of examinee).
 Feet posture evaluation – FPE (0 – Stepping foot surface only at 1/3 of transverse line. Evaluates by measuring the print; 1 – Stepping surface taking over the second third; 2 – Stepping surface taking over the third third).

Remark 8: The evaluation of the foot arch status is calculated following the Thomson's method. Thomson's foot index (%) is obtained when on the

plantogram we connect the most exposed parts of the heel and metatarsus on the inner part of the foot (line A-B). Then we found the middle of the heel and draw a line (Mayer line) from the middle of the heel to the outer edge of the III finger. From Mayer line to the narrowest longitudinal arch, on the plantogram, draw a normal and measure its value („a"). From the vertex of the normal („a") draw another normal towards the AB line and measure its value („b"). The index of the lowered foot will be obtained when these two values are set into a relation: I = (a/b) x 100 = % - the obtained percentage of the lowered foot of each foot of each individual, based on what are given points: 0 – points to 30%; 1 – point from 30 to 60%; 2 – points over 60%. Determining the general mark of body posture was done by Napoleon Wolanski's criteria (1975): excellent (0 points), very good (1-4 points); good (5-8 points); weak (9-12 points), very bad (13-16 points). The relation is 0 points (minimum) to 16 points (maximum). The evaluation of the foot arch status is realised by plantography method. The index of the lowered foot arch is determined by using the Thomsen's method. : I = (a/b) x 100 = % - the obtained percentage of the lowered foot of each foot of each individual, based on what are given points: 0 – points to 30%; 1 – point from 30 to 60%; 2 – points over 60%.

Statistic analysis
By applying the descriptive statistic of Cochran Q test, statistically significant differences in the representation of deformities in individual body parts were determined in both measuring situations, and are shown in a table. Significant value of the statistic significance is researched on a level far lower than 1% both in initial and in final measuring.

Results

In this chapter are shown and analysed the obtained data about the frequency distribution of grades considering individual body parts in initial and final measuring with students of classroom teaching, as well as the differences in the representation of the deformities of individual body parts in initial and final measuring.

Based on the displayed results in the Table 1 and its following graph in can be concluded that on the descriptive level there are differences in the representation of certain types of deformities. As it can be seen, the most represented are deformities of feet and spine and the least represented are chest deformities both in initial and in final measuring. The significance of these differences is examned with the help of Cochran Q-test. On a descriptive level in initial measuring exist statistically significant differences between men and women from urban and rural schools in representation and level of deformities of head, shoulders, blades, spine, abdomen, legs, feet, as well as in the grade of full body posture, while there are no differences in the grades for chest

posture. In the final measuring there were also determined significant differences between men and women from urban and rural schools in the level and representation of deformities of head, shoulders, chest, blades, spine, abdomen, legs, feet, as well as in the grade of full body posture. Hi-squares are statistically significant (Nikšić and ass., 2015b). Based on the table of average ranges it can be concluded that in the final measuring there was a change of value of deformity degree of individual body parts compared to the initial measuring, because the appliance of the elementary games in the classes of Physical and health education had a great significance in creating the habits for a healthy hygienic life and prevention of poor posture. Any elementary game activates the whole locomotor system crucial for the transformation of energy highly needed for the activity of all body cells, so the games and the physical activity can be treated as a benchmark for a harmonious development of all child's characteristics. The ranges of those values are smaller in the final measuring.

Every one of Wilcoxon's Z-expressions is statistically significant on a level far lower than 1%, so it can be concluded that for every body part there was a significant decrease of value of deformity degree in final measuring and compared to initial measuring (Nikšić and ass., 2015a).

Table 1. The display of the frequency distribution of grades considering individual body parts in initial and final measuring .

| Body part	Grade (number of points)	Body postur measuring			
		Initial		Final	
		F	%	F	%
Head	0	549	49,7	797	72,1
	1	440	39,8	308	27,9
	2	116	10,5	0	0,00
	Total	1105	100,0	1105	100,0
Shoulders	0	629	56,9	835	75,6
	1	429	38,8	270	24,4
	2	47	4,3	0	0,00
	Total	1105	100,0	1105	100,0
Chest	0	874	79,1	982	88,9
	1	16	1,4	11	1,0
	2	215	19,5	112	10,1
	Total	1105	100,0	1105	100,0
Blades	0	700	63,3	934	84,5
	1	380	34,4	171	15,5
	2	25	2,3	0	0,00
	Total	1105	100,0	1105	100,0
Spine	0	473	42,8	679	61,4
	1	422	38,2	426	38,6
	2	210	19,0	0	0,00
	Total	1105	100,0	1105	100,0
Abdomen	0	716	64,8	890	80,5
	1	221	20,0	215	19,5
	2	168	15,2	0	0,00
	Total	1105	100,0	1105	100,0
Legs	0	838	75,8	973	88,1
	1	149	13,5	76	6,9
	2	118	10,7	56	5,1
	Total	1105	100,0	1105	100,0
Feet	0	434	39,3	666	60,3
	1	416	37,6	436	39,5
	2	255	23,1	3	0,3
	Total	1105	100,0	1105	100,0
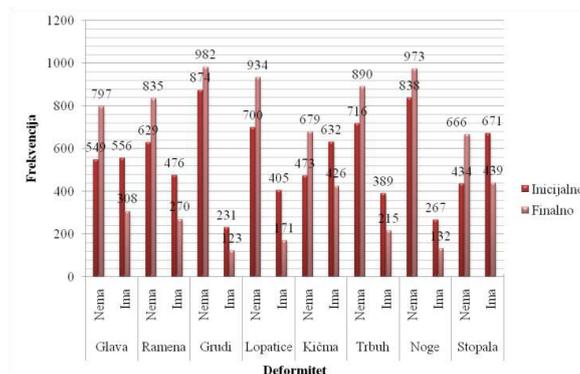
Figure 1. Display of representation of deformities of individual body parts in initial and final measuring.

Table 2. Cochran's test of differences in the frequencies of certain deformity kinds with examinees in initial and final measuring.

Measuring	N	Cochran's Q	Liberty degree	Level of significance p
Initial	1105	831,213	7	0,000 **
Final	1105	618,553	7	0,000 **

** Cochran's Q expression is statistically significant on a level lower than 1%

Based on the results displayed in Table 2, we can conclude that Cochran's Q-expression is statistically significant on a level far lower than 1% both in initial and in final measuring, and it can be concluded that there is a significant difference in the representation of deformities of individual body parts in both measuring situations. Both in initial and in final measuring, the most represented deformities are the ones referring to feet and spine, and the least represented are chest deformities.

Discussion

In table 1 the deviations are clearly displayed, and they are classified by their size and evaluated by the so called negative points, where 0 points means there is no deviation, 1 point means there is a slight deviation, 2 points mean there is extreme deviation. Based on the obtained results it can be concluded that for every body part a deformity is present in a certain percentage considering the students from I to V grade of elementary school. Also, those deformities are less exposed and less represented in the final measuring.

With the head posture evaluation of students from I to V grade of elementary school, there are obtained data that show that in initial measuring 549 (49,7%) students have a lowered vertical from the base nose bone falling on the upper half of the chest (sternum), which means there is no deviation. 440 students (39,8%) have the same vertical falling on the lower half of the chest, which indicates a slight deviation, and 116 students (10,5%) have an extreme deviation, because the same vertical falls in front of the chest bone. In the final measuring, 797 (72,1%) students have a lowered vertical from the base nose bone falling on the upper half of the chest (sternum), which indicates there is no deviation.

With 308 (27,9%) students, the same vertical falls on the lower half of the chest, which indicated a slight deviation, while an extreme deviation, where the same vertical falls in front of the chest bone, was not represented in the final measuring. High percent of pushing the head in front was caused by high bed head and too soft mattress, especially with the children sleeping on their back. Today's youth is maturing faster, biological development is accelerating, but the strength of their muscles does not follow the growth. Poor mobility and modern lifestyle affect the poor muscle development. Children with undeveloped musculature are forming a characteristically poor posture, and in puberty (from 11 to 14 years) because of the intense work of the sexual glands, increase in body weight and

lack of physical activity there is a frequency of functional posture disorders. It is necessary to point to the significance of exercising and appliance of games for the health of the children and in that way enable the students the necessary mobility.

Shoulder posture evaluation of students from I to V grade of elementary school obtained the data that shows that in the initial measuring 629 (56,9%) students have a central point of shoulder joint (top of acromion) by projection on the neck falls on the back half of neck silhouette, which points to proper shoulder posture. 429 (38,8%) students have the same point „fall" on the front silhouette of the neck, which indicates a slight deviation, and 47 (4,3%) students have the same point „fall" on the Adam's apple silhouette, which indicates an extreme deviation. In the final measuring 835 (75,6%) students have the central point of shoulder joint (top of acromion) by projection on the neck falls on the back half of the neck silhouette, which indicated a proper shoulder posture. 270 (24,4%) students have the same point „fall" on the front neck silhouette, which indicated a slight deviation, while an extreme deviation, where the same point „fall" on the Adam's apple silhouette, was not present in the final measuring.

High deformity percent of blades posture outcomes from the fast growth phase, bad sitting, inadequate furniture used home or in the school, inadequate bags that children carry on one or both shoulders, bas clothes pressing the body and the shoulders, as well as the inadequate shoes, bad nutrition and shyness of the children on the secondary changes that are happening.

Chest posture evaluation of students from I to V grade of elementary school obtained the data that shows that in the initial measuring 874 (79,1%) students have a harmonious, bell-shaped chest, which indicates there is no deviation. 16 (1,4%) students have a flat chest, which indicates slight deviation, and 215 (19,5%) students have a deformity („pigeon" chest), which indicates an extreme deviation. In the final measuring 982 (88,9%) students have a harmonious, bell-shaped chest, which indicates there is no deviation. 11 (1,0%) students have a flat chest, which indicates slight deviation, and 112 (10,1%) students have a deformity („pigeon" chest), which indicates an extreme deviation.

Blades posture evaluation of students from I to V grade of elementary school obtained the data that shows that in the initial measuring 700 (63,3%) students have blades that with their whole surface

stick to the chest, which indicates there is no deviation. 380 (34,4%) students have the blades separated for one finger of examinee, the so called „winged" blades, which indicates slight deviation, and 25 (2,3%) students have blades separated for two fingers of the examinee, which indicates an extreme deviation. In the final measuring, 934 (84,5%) students have blades that with their whole surface stick to the chest, which indicates there is no deviation. 171 (15,5%) students have the blades separated for one finger of examinee, the so called „winged" blades, which indicates slight deviation, while an extreme deviation, where the blades are separated for two fingers of the examinee, was not present in the final measuring.

Spine posture evaluation of students from I to V grade of elementary school obtained the data that shows that in the initial measuring 473 (42,8%) students have a normal physiological curve both in the sagittal and in the frontal plane, which indicates a proper body posture. Proper body posture should be at the very top, because it is the main precondition of good health, normal growth and development and nice appearance of every student. It is realized by regulation of muscle tone (neck, back, abdomen, thighs, lower legs, feet arch), so it would lower and neutralize the effect of the gravity. That is a movement habit that is formed and changes during the whole life, and it carries all characteristics of the movement activity and the psychological condition of an individual. Body posture provides the conditions of an efficient inner organs functioning (cardiovascular and respiratory).On the body posture mechanisms a movement regulation is built, from which depends the efficient exposure of possibilities of the whole movement apparatus. 422 (38,2%) students have a present first degree deviation: kyphosis, scoliosis or lordosis, and 210 (19,0%) students have a deviation combination or even individually, but on a second degree. Poor posture of students of classroom teaching is often an indicator of health problems. Those problems can become very serious if they are not solved in time.

In the final measuring 679 (61,4%) students have a normal physiological curve both in sagittal and in frontal plane, which indicates a proper posture. 426 (38,6%) students have a first degree deviation: kyphosis, scoliosis or lordosis, while an extreme deviation, deviation combination or individually, but on secon degree, was not present. The reason for these results was first of all obesity, musculature weakness, bad shoes, early forcing for walking, statistical burdening of feet, usage of motor transport, carrying or holding heavy objects etc. It is necessary to do feet exercises in school with children every day, because they are an important prevention of injuries and that way they can strengthen the muscles of feet and joints. In the initial measuring there are statistically significant differences between the examinees from urban and from rural schools in the representation and degree of the spine column deformity (scoliosis and lordosis), (Hi-square is statistically significant), on

a level lower than 1%, and there are no statistically significant differences in the representation and degree of the spine column deformity (kyphosis). In the final measuring there are also statistically significant differences between the examinees from urban and from rural schools in the representation and degree of the spine column deformity (kyphosis, scoliosis and lordosis), (Hi-square is statistically significant), on a level lower than 1%. In the initial measuring the cases with higher degree of spine deformity are more represented (scoliosis, lordosis and the examinees from urban and rural schools and kyphosis with examinees from rural schools), while the examinees from urban schools have a higher representation of kyphosis (I degree) in the final measuring compared to initial, and in the final measuring there is no cases identified with a second degree deformity with all three shapes of spine deformity (Nikšić and ass., 2015b).

Abdomen posture evaluation of students from I to V grade of elementary school obtained the data that shows that in the initial measuring 716 (64,8%) students have the abdomen retracted behind the vertical, lowered behind the processus xiphoideus in the sagittal plane which means there is no deviation. 221 (20,0%) student have abdomen bulging in front of the lowered vertical, which indicates a slight deviation, and 168 (15,2%) students have a „hanging" abdomen (pear-shaped) or loose muscles, which indicates an extreme deviation. In the final measuring 890 (80,5%) students have the abdomen retracted behind the vertical, lowered behind the processus xiphoideus in the sagittal plane which means there is no deviation. 215 (19,5%) students have abdomen bulging in front of the lowered vertical, which indicates a slight deviation, while the extreme deviation, a „hanging" abdomen (pear-shaped) or loose muscles, was not present.

Legs posture evaluation of students from I to V grade of elementary school obtained the data that shows that in the initial measuring 838 (75,8%) students have normal posture with heels together: knees vertically flat or at least approximately, which means there is no deviation. 149 (13,5%) students have normal posture with heels together: knees tending to „X" shape and touching, which indicates a slight deviation, and 118 (10,7%) students have posture with heels together: significant knees tendence to „X" shape, i.e. significant tendence to „0" for more thickness 2 fingers of examinee, which indicates an extreme deviation. In the final measuring 973 (88,1%) students have normal posture with heels together: knees vertically flat or at least approximately, which means there is no deviation. 76 (6,9%) students have normal posture with heels together: knees tending to „X" shape and touching, which indicates a slight deviation, and 56 (5,1%) students have posture with heels together: significant knees tendence to „X" shape, i.e. significant tendence to „0" for more thickness 2 fingers of examinee, which indicates an extreme deviation.

In the initial measuring the biggest number of students who don't have deviations in legs posture is in the IV grade, while the highest representation of slight and extreme deviation with legs posture have the students from I grade, in the initial measuring and this difference is statistically significant on a level lower than 5%, which is indicated by the Hi-square from the previous analysis (Hi-square=16,168 and p=0,040). Also in the final measuring the biggest number of students who don't have deviations in legs posture is in the IV grade, while the highest representation of slight and extreme deviation with legs posture again have the students from I grade, and this time this difference is statistically significant on a level lower than 1%, (Hi-square=24,216 and p=0,002). Deformities such as O-legs, X-legs of I degree and saber legs are less represented in the final measuring in comparison to the initial measuring with students who go to different classes, except X legs of II degree, and saber legs that are not represented with students of IV grad niether in initial nor in the final measuring, while in the final measuring there is higher representation of normal legs (Nikšić and ass., 2015c).

Deformities such ad O-legs, X-legs of I degree and saber legs are also with the examinees from rural and urban schools significantly more represented in the initial measuring, in comparison to the final measuring, and X legs of II degree with the examinees from rural schools, while deformity like X-legs of II degree is not present niether in the initial, nor in the final measuring with the examinees from urban schools, while in the final measuring there is higher representation of normal legs (Nikšić and ass., 2015b).

Feet posture evaluation of students from I to V grade of elementary school obtained the data that shows that in the initial measuring 434 (39,3%) students have a well formed foot, i.e. the stepping foot surface only at 1/3 of transverse line. It is evaluated by measuring the print. 416 (37,6%) students have a stepping foot surface taking over the second third of transverse line, while 255 (23,1%) students have a stepping foot surface taking over the third third of transverse line.In the final measuring 666 (60,3%) students have a well formed foot, i.e. the stepping foot surface only at 1/3 of transverse line. 436 (39,5%) students have a stepping foot surface taking over the second third of transverse line, while 3 (0,3%) students have a stepping foot surface taking over the third third of transverse line. From the obtained results we can conclude that for the students from I to V grade the most endangered is feet posture and spine column posture, and the least endangered is chest posture.

Deformities such as raised foot (I and II degree) and flat foot (II degree), with the examinees from rural and urban schools, are much more represented in the initial measuring, in comparison to the final measuring, while the flat foot deformities (I degree) are less represented in the initial measuring in comparison to the final

measuring, and in the final measuring there is no cases of flat foot of II degree for both the examinees from rural and urban schools (Nikšić and ass., 2015b). Similar results were obtained by many authors in their research. For example, (Krsmanović, 2007) states that 53% of the examinees has a disrupted body posture, while some authors say point out that even more than 70% of the school children have some physical disorders and certain trouble as a consequence of the lack of movement (Ristić and ass., 2002; Velitčenko, 1993).

The percentage of representation of postural disorders of youth in significant measure varies with different authors, and it depends on the specificity od the sample, age, life environment, applied methodology in detecting disorders etc. For example, that is how (Ulić and ass., 1995), on a sample of rowers of ages from 14 to 22, determined poor posture, even with 87% of the examined cases. The results (Jovović and Čanjak, 2012) have shown that the postural status is very neglected with a great number of examinees of both genders. It is determined that the highest number of examinees have a deviated spinal column and blades status. High frequency was shown by the disorders of the lower extremities of „O" legs and flat foot. The presence of other deviations is lower, whereas funnel chest and pigeon chest are the least represented disorders, considering the examined cases, especially girls, which coincides with my obtained results. It is shown that far highest percentage of deviations have functional disorders, that can be successfully corrected with adequate appliance of physical treatment, which coincides also with the results of some earlier researches.

It is interesting to highlight that winged blades, scoliosis and kyphosis show significantly higher frequency with the examinees of male gender. Insufficient capacity of muscle strength leads to faster tiredness, and then most often occur the disorders on the spinal column and blades, which is a result of the insufficiency of the ligamentous-muscular apparatus in the conditions of accelerated growth. The research results have shown that girls more frequently have lordosis that is, as supposed, connected to the body posture characteristic for a high number of females. Postural disorders of the lower extremities, especially „O" legs and flat foot, are represented in a great number with the examinees of both genders.

Feet deformities are present in a great measure with preschool children, especially right before going to school, where the total percentage of the children with present feet deformities is 74,24%. They need a serious and versatile approach for solving this problem. Only 17 children of total 66, that are examines, does not have a present feet deformity of any kind. Feet deformity is more represented with boys (51,52%) in comparison to girls (48,48%) (Bjeković and ass., 2011). Research on the school children population, of grades I-VIII

of elementary schools, confirm my research, that there is a great number of students with changes on their feet. The number of students with a deviation (lowered foot arch and flat feet) i 62,6%, while there is only 37,3% of the students without any changes. The obtained data point out to a high percentage of deviations on the longitudinal foot arch (Živković and ass., 2011).

The frequency of the other physical disorders is a bit lower. It is shown that the pigeon chest and funnel chest are the least represented disorders with the examinees of both gender. Based on the more detailed analysis it can be noticed that the frequency, structure and the level of representation of postural disorders are in a great measure different with boys and girls, at this age. The research results have shown that the „X" legs, concave foot and concave chest are the least represented body disorders with the examinees of both genders. However, chest disorders are in a higher percentage represented with boys than with girls (Bogdanović and Milenković, 2008; Jovović, 1999; Karaleić, 2006; Medojević i Jakšić, 2007).

In comparison to the data obtained for the school children of V, VI, VII and VIII grade of elementary school in Tuzla (Musić 1999), it can be stated that the girls in V grade have the most endangered abdomen posture, and the least of chest posture, while later it changes. Boys have the most endangered abdomen and blades posture, and the least chest posture, which partially coincides with my obtained results. It is a fact that the highest percentage of postural disorders is refered to the functional shape, where with the adequate program of corrective excercises, the further progress of the physical deviation into a worse stadium can be prevented, and in a great measure it can be corrected and brought into a normal position.

There is obviously a lower representation of incompletely- fixated and structural deformities (Jovović and Čanjak, 2012). However, there is still a concerning fact that the percentually worse shapes of disorders are in a great measure present with the students that are younger adolescents.

From Table 2 based on the obtained results we can conclude that there are statistically significant differences in the representation of deformities of individual body parts both in initial and in final measuring. Most common are feet deformities and spinal column deformities, and the least common are chest deformities. Weak back of school children are overburdened with school books, and the parents lack time to wash and prepare a fruit for their children's snack, but instead they buy a big pack of chips, a hamburger and a Coca-cola, and when they return home, they allow them to rest by the TV and the computer, instead of doing some sports. That is how we turn healthy children into sick ones, ones with diabetes, high blood pressure, kyphosis, scoliosis or lordosis, flat feet and a predisposition for everything except a healthy normal life.

Conclusion

based on the obtained results we can conclude that there are statistically significant differences in the representation of deformities of individual body parts both in initial and in final measuring. In initial and also in final measuring, most common are feet deformities and spinal column deformities, and the least common are chest deformities. This research has shown that the highest percentage of disorders refers to a disrupted status of the spinal column and feet, which coincides with the results of some earlier researches (Jovović, 1999; Krsmanović and ass., 1995). There is a great number of information dealing with the present state of the postural status of the examinees of both gender, of a younger adolescent age in Montenegro. Winged blades are the most common disorder of the examinees, and after them are the postural disorders on the spinal column: scoliosis, lordosis and kyphosis, and the feet (Jovović and Čanjak, 2012). Statistics say that around 4% of the people have a spine deformity at some degree, and the reason is the so called poor posture that was not removed in time.

The functional disturbances caused by the poor posture are first reflected to the spine, and later to the other parts of the locomotor apparatus. The spine is the main factor of the upright position and the weight carrier of all upper body parts. That is exactly why it is often exposed to the occurence of numerous deformations, that can take over the whole spine or just some parts. In the development of the spine deformations we can distinguish 3 stages, that are conditioned by the damage of individual parts of the human organism that are responsible for the maintenance of the normal posture. I stage is imperceptible. There are loose deformations where only the musculature is damaged. Here occures the weakness of the muscles, where the relation between individual muscle groups and body parts is lost. This stage is called „stage of loose deformation". II stage is characterized by the fact that the damaged body parts are maintained by the ligaments, and the cooperation of the muscles is distorted. Here, besides the musculature, comes to loosening on the ligaments. This stage is called „stage of precontracted deformation". III stage is fixated deformation, where with the damage of the first two elements, the change appeared also on the bone system of the spine, i.e. certain discs are deformed. This stage is called „stage of fixated deformation".

With the development of these three stages comes to the deformation of the spinal column. The spine curves to three sides and then we notice three kinds of curvature of the spinal column: kyphosis, scoliosis and lordosis. Weak back of school children are overburdened with school books and when they return home, they allow them to rest by the TV and the computer, instead of doing some sports. The foot carries the whole human body made of bones, muscles, joints, tendons, ligaments, that successfully carry and move the body in all

directions and on different grounds. Over 60% of the population has smaller or bigger feet anomalies, especially school children. The main reason is that the foot carries the heaviest burden. We turn healthy children into sick ones, ones with diabetes, high blood pressure, kyphosis, scoliosis or lordosis, flat feet and a predisposition for everything except a healthy normal life. Healthy lifestyle, including proper exercising and good nutrition can affect the optimum growth and usage of the maximum genetic potential for development of nerve system, bone system, hormonal and cardiac-respiratory system. Sport and play in school have a great significance, because besides the preservation of health, prevents the poor posture, offers support and help in the natural growth and development, in accordance to their possibilities and interests, to lead them to a healthy lifestyle, and to create a habit for the daily usage of value of movement activities. The stated data in the tables point to the differences in the representation of deformities of individual body parts in both measuring situations, as well as the high percentage of the deviations on all body parts,

and mostly on the longitudinal foot arch and spinal column. Considering the seriousness and the consequences that these disorders can cause, parent, teachers and children still don't have enough developed conscience about the necessity of undertaking certain measures with the goal of prevention and correction of this disorder. However, only educated teachers can contribute to the making of correct, hygienic habits and exercise habits with the goal of proper body posture. Students, besides the regular classes of physical and health education, should regularly exercise at home in order to positively affect their growth and development. So, with the right cooperation with the teachers of physical and health education, parents and medicinal institutions, we can very efficiently affect the decrease of frequency of these deformities. The cause of this state to the fullest extent lies in the insufficient movement activity, inadequate nutrition and definitely the uncomfortable and inadequate shoes. Children need to be provided with movement. That is one of the basic needs that a child has to fulfill in order to develop properly.

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