



# FREQUENCY OF FEET DEFORMITIES IN PUPILS ATTENDING JUNIOR GRADES OF ELEMENTARY SCHOOL

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## ABSTRACT

The examination of feet by plantograph was performed in 552 pupils of first, second and fourth grades of elementary school "Harmani II" in Bihać. Examination revealed 201 children (36,42%) with satisfactory condition (pedes recti) while 351 pupils were diagnosed with certain form of feet deformity. Frequencies of feet deformities in girls are 60,00% in first, 65,19% in second and 66,30% in fourth grade. Average frequency of feet deformities in the examined girls is 64,90%. Pedes plani was found in 24,91% pupils. Frequencies of feet deformities in boys are 61,29% in first, 65,54% in second and 52,54% in fourth grade. Average frequency of feet deformities in the examined boys is 62,17%. Pedes plani is the most frequent deformity (23,83%).

KEY WORDS: feet, deformity, walk, school child.

## INTRODUCTION

In order to realize all the assignments set by modern curriculum, today's teacher must understand his/her pupil better. Currently, in B&H elementary education system, one teacher covers several educational areas, which makes the teaching job even more difficult. Teacher's interest in physical and health education lies in enhancing the psychophysical abilities of the pupil. In order to be able to objectively plan kinesiological procedures that will help transformation of a young person teacher needs exact indicators, which will serve as a foundation for his/her work. In realization of regular classes of physical and health education, teacher must also solve other assignments set by the existing curriculum. Posture is one of basic postulates of good health and normal growth and development of every child. Therefore, it is necessary to address this issue in pupils population in order to identify defects that may timely be repaired. The teacher needs to recognize improper posture, spine deformities (skoliosis, kyphosis, lordosis, kypholordosis, distorted neck), pectus carrinatum, irregular shoulders, deformities of pelvis and hips, deformities of lower limbs as \*O\* legs, \*X\* legs and feet deformities. Foot, as a terminal part of lower limb has statical and dynamical functions, which make it adoptable to all new life conditions. Its development is not completed at this point in life and its function cannot be substituted. Despite its importance and function complexity the foot was less favored for centuries. Hohmann, Lievra, Morton and others initiated researches into feet pathology approximately 50 years ago. Negative legacy of civilization development is primarily reflected on psychophysical sphere of school age children and youth. Long-lasting sitting in school benches, carrying heavy schoolbags, non-physiological footwear, poor-insufficient nutrition, infectious diseases cause weakening of young organism and favor the development of locomotor's system deformities, in particular feet deformities. Schoolchildren and youth are privileged age group in sense that, by systematic examinations and preventive-corrective gymnastics, appearance of deformities may be prevented or present mild deformities corrected (2). School is an institution that should work, by proper organization of physical education, on the prevention and therapy of mild forms of deformities. Cooperation between school and doctor-parent-teacher of physical education needs to attain certain level of closeness (3,4,5). The role of feet muscles is very important for the maintenance of normal shape, function and flexibility of feet. When the muscles are weak due to lesions or

diseases, the foot losses its function. Maintenance of foot arch largely depends on the short muscles of sole, which are able to sustain load of 200 kilopond. Transversal arch is extra protected by transversal head of thumb adductor. Other important muscles, by number and effect, are foot flexion muscles (8 muscles with 18,5 kp/m) over dorsal muscles (4 muscles with 4,25 kp/m), which support lunge, climbing, lifting, etc. Musculus tibialis anterior et musculus tibialis posterior and musculus peroneus longus are keepers of longitudinal arch (6).

Acquired feet deformities influence working abilities of an individual, which, in return, directly influences the quality life. Human feet cannot be observed as an isolated segment and thus it should be observed as an integral part of the organism. This highly specific organ, which acts as an active carrier of body force to the surface, also conducts the reactions from the ground that affect the body thus ensuring adequate stability and body coordination. In standing, upright position the feet support the total body weight and transfer the weight to the ground. While walking, running and jumping the feet lift the body from the ground and alleviates the impact of the ground. The foot adjusts itself dynamically to the ground and acts as an elastic regulator of walk.

## GOAL OF RESEARCH

The goal of this research was to determine frequency, structure and type of feet deformities in pupils of lower grades (I, II and IV) of elementary school "Harmani II" in Bihac.

## MATERIAL AND METHODS

### *Structure of examinees*

Within this study, total of 552 pupils of age 6 to 10 years ( $\pm 6$  months) were examined. At the moment of this research, they attended first, second and fourth grade of Elementary school "Harmani II" in Bihać. From the total number of examinees; 271 were boys and 281 were girls. Number of examinees classified by grades is given in Table 1.

Grade	Number of pupils by sex		Total
	M	F	M+F
I	35	31	66
II	177	158	335
IV	59	92	151
<b>Total</b>	271	281	552

TABLE 1. Number of examinees-pupils of I, II and IV grade of Elementary school "Harmani II" in Bihać.

I grade	Sex	Pedes recti 1	Pedes plani 2	Pedes Planovalgii 3	Ped. tr. planovalgii 4	P:transversoplani 5	P:Excavati 6	P: Valgii 7	P: Adacuti 8	Regular	Irregular
35	F	14 40,00%	10 28,57%	1 2,85%	4 11,44%	1 2,85%	4 11,44%	0	1 2,85%	14 40,00%	21 60,00%
31	M	12 38,71%	9 29,03%	1 3,22%	2 6,45%	5 16,14%	2 6,45%	0	0	12 38,71%	19 61,29%
66	F + M	26 39,41%	19 28,79%	2 3,03%	6 9,09%	6 9,09%	6 9,09%	0	1 1,50%	26 39,41%	40 60,59%

TABLE 2. Overview of the feet regularity status in the first grade pupils

## RESULTS

Of the 35 examined female pupils 14 (40,00%) had normal finding – pedes recti while 21 (60,00%) girls were diagnosed with feet deformities. Pedes plani - flat feet were established in 10 (28,57%) girls, pedes transverso planuvalgii- twisted and transversally flat feet were found in 4 (11,44%), pedes excavati – concave feet in 4 (11,44%), pedes planovalgii – twisted flat feet in 1 (2,85%), pedes transversoplani – too extensive feet in 1 (2,85%) and pedes adacuti- inside position of the front part of feet in 1 (2,85%) female pupil. Of the 31 examined male pupils; 12 (38,71%) had normal finding – pedes recti while 19 (61,29%) boys were diagnosed with feet deformities. Most of the 19 boys with feet deformities had pedes plani- flat feet - 9 boys (29,03%). Other deformities include pedes transversoplani – too extensive feet in 5 (16,14%), pedes transverso planuvalgii- twisted and transversally flat feet in 2 (6,45%), pedes excavati – concave feet in 2 (6,45%), pedes planovalgii – twisted flat feet in 1 (3,22%) boys. In male pupils no feet deformities of grades 7 and 8, pedes valgii-twisted feet and pedes adacuti- inside position of the front part of feet, were found. Greater abundance of feet deformities, by percentage, is found in male pupils for 1,29. In both groups, pedes plani- flat feet was the most frequently en-

countered deformity. There is a difference between male and female group on second position. Pedes transverso planovalgii- twisted and transversally flat feet and pedes excavati – concave feet were more frequently encountered in female pupils. On the other hand, pedes transversoplani – too extensive feet was encountered more frequently in male pupils. Total deformity frequency in the examined group of first grade children is 60,59%. Of the 158 examined female II grade pupils; 55 (34,81%) had normal finding – pedes recti while 103 (65,19%) girls were diagnosed with feet deformities. Pedes plani- flat feet was found in 44 (27,85%) girls, pedes excavati – concave feet in 28 (17,72%), pedes planovalgii – twisted flat feet in 16 (10,13%), pedes valgii-twisted feet in 9 (5,70%), pedes adacuti- inside position of the front part of feet was found in 4 (2,53%) and pedes transversoplani – too extensive feet in 2 (1,26%) female pupils. Pedes transverso planuvalgii- twisted and transversally flat feet was not encountered in this group. Of the 177 examined II grade male pupils; 61 (34,46%) had normal finding – pedes recti while 116 (65,54%) male pupils were diagnosed with feet deformities. The most frequent deformity was pedes plani- flat feet, which was found in 45 (25,43%) boys. Other deformities include pedes excavati – concave feet in 33 (18,65%), pedes planovalgii – twisted flat feet in 18 (10,17%), pedes transversoplani – too extensive feet

II grade	Sex	Pedes recti 1	Pedes plani 2	Pedes planovalgii 3	Ped. tr. planovalgii 4	P:transversoplani 5	P:Excavati 6	P: Valgii 7	P: Adacuti 8	Regular	Irregular
158	F	55 34,81%	44 27,85%	16 10,13%	0	2 1,26%	28 17,72%	9 5,70%	4 2,53%	55 34,81%	103 65,19%
177	M	61 34,46%	45 25,43%	18 10,17%	0	11 6,21%	33 18,65%	5 2,82%	4 2,26%	61 34,46%	116 65,54%
335	F + M	116 34,63%	89 26,57%	34 10,15%	0	13 3,88%	61 18,21%	14 4,81%	8 2,38%	116 34,63%	219 65,37%

TABLE 3. Overview of the feet regularity status in the second grade pupils

IV grade	Sex	1 Pedes recti	2 Pedes plani	3 Pedes planovalgi	4 Pedi. tr. planovalgi	5 P.transversoplani	6 P. Excavati	7 P. Valgi	8 P. Adacuti	Regular	Irregular
92	F	31 33,69%	17 18,48%	8 8,69%	3 3,26%	4 4,35%	25 30,48%	3 3,26%	1 1,08%	31 33,69%	61 66,31%
	M	28 47,46%	10 16,95%	10 16,95%	0	0	7 11,86%	4 6,78%	0	28 47,46%	31 52,54%
151	F	59	27	18	3	4	32	7	1	59	92
	M	39,07%	17,88%	11,92%	1,99%	2,65%	21,19%	4,64%	0,66%	39,07%	60,93%

TABLE 4. Overview of the feet regularity status in the fourth grade pupils

in 11 (6,21%), pedes valgi-twisted feet in 5 (2,82%) and pedes adacuti- - inside position of the front part of feet is found in 4 (2,26%) male pupils. Total frequency of deformities in the examined second grade children was 65,37%. Comparing with the first grade, the frequency of deformities in the second grade is increased for 4,93%. This study involved 151 pupil, of the above mentioned age, and 92 of them were girls and 59 were boys. Of the 92 examined female pupils; 31 (33,69%) had normal finding – pedes recti while feet deformities were found in 61 (66,31%) girls. 25 (30,48%) examinees had pedes excavati – concave feet, pedes plani- flat feet was found in 17 (18,48%) girls, pedes planovalgi – twisted flat feet in 8 (8,69%), pedes transversoplani – too extensive feet in 4 (4,35%), pedes transverso planovalgi- twisted and transversally flat feet in 6 (6,52%) and pedes adacuti- inside position of the front part of feet was found in 1 (1,08%) girl. Of the 59 examined male pupils; 28 (47,46%) had normal finding – pedes recti while feet deformities were found in 31 (52,54%) boys. Pedes plani- flat feet was the most frequently found deformity - it was found in 10 (16,95%) boys. Other deformities include pedes planovalgi – twisted flat feet in 10 (16,95%), pedes excavati – concave feet in 18 (11,86%) and pedes transverso planovalgi- twisted and transversally flat feet in 4 (6,78%) male pupils. Pedes transversoplani – too extensive feet and pedes adacuti- inside position of the front part of feet were not found in this group of examinees. Total frequency of deformities in the examined fourth grade children was 60,93%.

## DISCUSSION

Comparison of the results of the analyzed deformities in first grade 60,59%, second grade 65,37% and fourth grade 60,93 reveals that the largest frequency of deformities was found in second grade. In both the

examined groups the most frequently encountered deformity was pedes plani- flat feet. This information suggests that pupils wear footwear that is anatomically not suited to their feet. Also, it suggests that their parents are not aware of the children's feet deformity, which explains why they take no measures to fix it (7). Comparison of the results between sexes also reveals certain differences. In female pupils pedes excavati – concave feet and pedes plani- flat feet are more frequent while equal number of pedes plani- flat feet and pedes transverso planovalgi- twisted and transversally flat feet was found in male students. The reason behind the decrease in deformities frequency in the fourth grade lies in the fact that these pupils increase level of their movements (8). Pupils of this age show interest in different sport activities which include ball such as football and basketball. Also, joining miscellaneous sport clubs helps them to train their body which influences the reduction in feet deformities, even if they are not aware of this. In 1956, Institute of hygiene in Croatia carried out systematic orthopedic examination of school children and youth in Zagreb, which included 20 schools (elementary, general secondary schools, trade schools and business schools) and 9311 pupils. Flat feet of I degree were found in 51,65% examinees and II degree at 12,2%. According to authors, it is essential to impose a prophylactic gymnastics within regular classes of physical education (1). Prosinčeki-ovak J., in 1982., performed examination of 200 pupils in order to confirm relation between feet deformities in pupils from rural and urban population. This study indicated normal finding in only 46 while 54 pupils had certain anomalies of grade I and II; respectively 46% when it comes to children from urban population. 55 children from rural population had normal finding while 45 pupils or 45% of them had one of the above mentioned deformities of grade I or II. The following three levels of deformity were taken into consideration: pedes valgi, pedes plano-valgi and pedes excavati. The

previous researches have shown that feet deformities are the most frequent leg deformities. Normal shape and function of feet are the results of proper body struc-

ture and relation between its bones, muscles and ligaments. Feet deformities of different form are the results of disproportion between muscle strength and load.

## CONCLUSION

Upon the examination of 552 pupils of Elementary School "Harmani II", 201 (36,42%) children were found with normal feet (*pedes recti*) while 351 (63,58%) children had some form of feet deformities.

In I grade of Elementary School "Harmani II" in Bihać we found 60,59% pupil with feet deformities (60,00% female and 61,29% male pupils). In II grade 56,37% pupil had feet deformities (65,19% female and 65,54% male pupils). Percentage of feet deformities found in children of IV grade is 60,93% (66,31% female and 52,54% male pupils).

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