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Level of Posture of Pupils in the Age of Elementary Schools

[1] Elena Bendíková
[2] Lukáš Šmída
[3] Robert Rozim

[1-3] Matej Bel University, Slovakia
Tajovského 40, 974 01 Banská Bystrica
[1] Dr (Philosophy), PhD, Assistant Professor
E-mail: Elena.Bendikova@umb.sk
[2] Magister
E-mail:lukas.smida@gmail.com
[3] Dr (Pedagogy), PhD
E-mail: Rober.Rozim@umb.sk

Abstract. The article presents primary information about conditions and qualities of posture of pupils in the 4th grades in the cities L. Mikuláš and Ružomberok. In terms of method of data collection, we have chosen standardized method of evaluating posture for clinical and pedagogical practice. We have found that girls (Chí = 12,132; $p < 0,1\%$) as well as boys (Chí = 10,283; $p < 0,1\%$) have poor postures which we define as III. qualitative group of posture evaluation. Significantly ($p < 0,1\%$) problematic areas are already defined of the period of life include areas of arms and position of the shoulder blades, as well as the head. Listed partial discoveries are included in the grant: VEGA no. 1/0376/14 Intervention as physical activity as health prevention of Slovak population.

Keywords: posture; musculoskeletal system; age of pupils in elementary schools.

Introduction.
One of the areas of the health is musculoskeletal system where postures have become negative syndromes, respectively diseases of civilization nowadays.

Véle (2006) understands musculoskeletal system holistically which performs its basic functions such as: a) locomotion, b) postural, c) communication, d) manipulation (creative), e) as a basic life function (respiration, nutritional). What is more, it seems to be a sensitive mirror in which reflects dysfunction of the various systems of the whole organism such as viscerovertebral and vertebrovisceral syndromes (Vaňasková, Tošnerová, 2006).

The posture is a result of certain shape and function of the spine (especially work of the postural muscles, postural reflexes). It is a feature of every activity and what is more it is activity, motion habit which we are largely able to control by our own willpower (Čermák et al., 2005; Velé, 2006).

According to Kubáta (1993) at the average of 50 % of school youth have poor postures. Current research results of posture but also of muscular system are alarming. In more than a half of monitored pupils in age of elementary school was found poor postures and its evidence is increasing with age Kováčová (2003), Kopecký, 2004; Bekö, Medeková (2006), Šeráková (2006), Bartík (2006, 2007, 2013), Kopecký, Ely (2007), Hubinák (2007), Medeková, Bekö (2009), Mikuľáková, Trusová (2010).

Kinesiology understands posture as momental results of mutual arrangement of its various parts of the body (any change in one´ s locomotive segment invariably determines the entire chain of other changes). Proper posture is defined more as economical rather than aesthetic. It is optimal position of vectors in centred of the joints with the minimal of muscle activity in that posture (Buran, 2002).

Rýchliková (1997) characterizes proper posture as the most optimizing layout of the various parts of human body in space in order to maintain balance, function of various organs and system of the body. While Kolářet al (2009) believes that posture is like a sign of human being, a concrete way of realizing of postural stereotype.

The opposite of the proper posture is poor posture which signs are reflecting in typical defects of postures (Čermák et al., 2005).The poor posture Labudová, Vajcziková (2009) understands as contravention of proper posture in which occurs wide variations of transitory nature (if they are of a permanent nature, it is a deformation of areas such as spine, joints, muscles and ligaments) which interfere into optimal vertical axis of body. Poor posture is not possible to offset by spontaneous movements therefore to left the posture toits natural development is very unreliable.

Incorrect, poor posture back pain, defects of movement stereotypes, premature development of degenerative joints (Janda, 1985; Thurzová, 1993a,b) most often occur during disruption and change in muscle balance which is often accompanied by muscle shortening which is based on the concept of functional disorders of movement system of muscle imbalance which reflects variations in posture and limited range of motion in the joints (Janda 1985 and Velé 2006).

The lack of primary prevention in childhood is often the result of vertebrogenic prevalence of disorders in adulthood in which it is sometimes impossible to remedy weakening. Furthermore, they are involved in the other functional and structural health disorders (Blizzard et al., 2000).

Aim.

To expand knowledge, find and point out level of musculoskeletal system with the intention posture for pupils in age of elementary school. In consideration of the prevalence of poor posture we assumed occurrence of functional disorders in posture for pupils in age of elementary school.

Materials and methods.

The examined group consisted of 229 pupils in age of elementary school from the central parts of Slovakia, areas around Liptov, which were willing to participate with their parents and teachers on this survey. They were the pupils in 4th grade in elementary school- 116 girls and 113 boys whose age average was- for girls 10.4 years old and boys 10.6 years old. The primary characteristics are showed in table 1.The survey was conducted in four primary stages in which during 2nd stage we asked for assistance of orthopedic doctor, parents and teachers. It was organized in the school year 2013/2014 during the 1rd- 3rd week of February. We implemented evaluation of musculoskeletal system with the intentions of posture by Thomas- Klein method modified by Mayer in orthopedic clinic (Hošková, Matoušová, 2005).

Table 1. Group characteristics (n = 229)

n=229/ factors	Girls (n = 116)		Boys (n = 113)	
	Height	Weight	Height	Weight
	138,6 cm	36,5 kg	141,6 cm	39,2 kg
Age	10,4 years old		10,6 years old	
BMI	21,6		22,5	

Posture is divided into 4 stages: 1. Excellent, 2. Good, 3. Poor, 4. Incorrect where each stage of posture has 5 characters and each is rated by mark (1-4): 1. Posture of head and neck
2. Shape of chest
3. Shape of abdomen and pelvis inclination
4. Overall curvature of spine
5. Height of shoulders and positions of shoulder blades

Classification of posture:
I.   Excellent posture   5 points
II.   Good posture   6- 10 points
III.   Poor posture   11- 15 points
IV.   Incorrect posture   16- 20 points
* Classification of lower limbs is written as index in the form of fraction. I + II + III + IV/ V = total points

To evaluate the qualitatively stages of posture of pupils in age of elementary school, we have used Chí – quadrat test on 1 % (p < 0,01) and 5 % (p < 0,05) level of statistical significance. Furthermore, we have been using methods of logical analysis and synthesis with usage of inductive and deductive methods, comparison and generalization. All data have been percentually processed, differentiated by the sex of the students and compared with the available literature.

Research results and discussion.
According to partial targets and tasks of the work, we are presenting part of the subjects which are parts of other monitoring and processing of the project. Stated results cannot be generalized therefore they must be understood in the overall context, as tentative and basis according to lifestyle and health of pupils in age of elementary school.

Overall posture. The level and quality of posture of pupils in age of elementary school shows table no. 2a, b where we found out following. Only 15 % of girls have excellent posture, 28 % have good posture and to 57 % have poor posture. Boys have 52 % poor posture, while good posture has 30 % and excellent posture have 18 %. Neither girls nor boys had been identified with incorrect posture which determines IV. qualitative stage. What is more, it has told us similar for girls (Chí = 12,132; p < 0,1 %) as well as for boys (Chí = 10,283; p < 0,1 %) that poor posture which is reflecting to III. qualitative group of posture. At the same time, we found 5 % difference between girls and boys in the evaluation of posture in III. qualitative group of disadvantage of girls.

Table 2a. Evaluation of posture of girls (n = 116)

Level of posture/ points	5 points	6-10 points	11-15 points	16-20 points
I. Excellent posture	15 %	-	-	-
II. Good posture	-	28 %	-	-
III. Poor posture	-	-	57 %**	-
IV. Incorrect posture	-	-	-	-

Legend: ** level of significance p < 0,01

Table 2b. Evaluation of posture of boys (n = 113)

Level of posture/ points	5 points	6-10 points	11-15 points	16-20 points
I. Excellent posture	18 %	-	-	-
II. Good posture	-	30 %	-	-
III. Poor posture	-	-	52%**	-
IV. Incorrect posture	-	-	-	-

Legend: ** level of significance p < 0,01

According to evaluations of posture individual segments, we have found the following.

The area I. Posture of head andneck. We have found out that the highest percentage was equally for boys (47 %) and girls (43 %) which was rated by mark 3. 27 % of girls and 20 % boys have been rated by mark 3 whose view has been with forward direction and the lower part of the jaw has been inserted. However the axis of the neck was slightly inclined forward and has been found in 30 % of girls and 33 % boys. We believe that it is related with muscular imbalances in individual reference sections as states Velé (2006). Therefore, in terms of prevention, we recommend to choose the appropriate positions at work, at school and at home, etc.

The area II. Shape of chest. We define a normal chest as symmetrical, its axis is vertical, well-sprung, ribs contain with spine 30° degree angle, symmetrical movement during breathing and thoracic kyphosis. This has been physiological found in 35% of girls and 31% of boys. Small variations from normal of the axis of the chest, has been found in 47% of girls and 53% of boys. Rated by mark 3 have been 8% of girls and 16% boys, representing only 2% difference of disadvantage of girls.

In the area III.Shape of abdomen and pelvis inclination. We have found that girls rated with mark 1- 17 %, mark 2- 34 % and mark 3- 49 % (Chí = 9,795; p < 0,01). For boys it have been mark 1- 21 %, mark 2- 45 % and mark 3- 34 %. Level mark 4 has not been detected neither in girls nor boys. Abdominal area has been for boys and girls at that time prominent character of the transitional type. This condition refers to weakened muscle groups in that area (m. rectus abdominis and m. transverzusabdominis), but also poor postural stereotype, which is reflected in lumbar lordosis Velé (2006). As we can see pelvic inclination and its controlling is important for the upper surface of the sacrum, which is the base for the above stored vertebrae. From its inclination in vertical position it depends on formation of lumbar lordosis and thus the upper parts of spine (Kolář et al., 2009).

In the area IV.Overall curvature of spine. We rated with mark 1- 20 % of girls and 29 % of boys. Small variations from normal have been presented in 37 % of girls and 39 % of boys. Obviously round, but also flat back has been observed 32 % of boys and 43 % of girls. The variation of children in age between 7-16 is very common (Wojcicka, 2002). Serious variations from normal have not been found in examined group.

In the area V. Height of shoulders and positions of shoulder blades. We have found complete symmetry, the same height of arms, released shoulders, not released shoulder blades and the inner axis parallel in 22 % of girls and 20 % boys. Slight variations have been found in girls (29 %) as well as in boys (38 %). Permanent protrusion of one side of asymmetry of figure, one arm above the other has been found in 49 % (Chí = 9.010, P <0.01) of girls and 42 % (Chí = 8.772, P <0.1 %) of boys. Moreover, significant gapping of shoulder blades, ejecting of large hips, asymmetry of thoracic-abdominal triangles in our group has not been found. Our results correspond with the results of Kania - Gudzio, Wiernicka (2002), Kováčová (2003), in which pupils

in age of elementary school have found that the highest rates are in the wrong posture involved by protruding shoulder blades, hips, shoulders and abdominal area, which is confirmed in its research Kováčová (2004).

We have specifically evaluated **the area of the lower limbs VI.**where we have recorded a significant difference between the sexes, in which we have found flatfoot II. - III. qualitative level. By mark 1 we have rated 42 % of girls and 39 % boys. The axis of the lower limbs has been correct in which the center of the hip joint, knee and ankle create vertical, arch feet have been perfect as well as longitudinal and transverse arches. By mark 2 we have rated 25 % of girls and 26 % boys, where varus or valgus knees has been greater (less) than 3 cm which mean thatdistance between the knee joints and ankles has been bigger that 3 cm. Feet has been slightly flat therefore mark 4 for which is characteristic of varus of knees 5 cm, 6 cm of valgus of knees while flat feet have been found in 2 % of girls and 4 % of boys. In conclusion, it is important to note that these findings are related to weight, but also the genetic components among pupils in age of elementary school stated Vojtaššák (2000).

Table 3 presents the percentage of functional disorders of posture for pupils in age of elementary school.

Table 3. Functional disorders of posture in pupils in age of elementary school (n = 229)

Sex/disorders	Kyphosis posture	Hyperlordoticposture	Hypolordoticposture	Scoliosisposture
Boys (n = 113)	32 %	24 %	5 %	39 %
Girls (n = 116)	33 %	32 %	4 %	31 %

We have found out that in boys (39%) and girls (31%) are the highest percentage occurrence scoliosis posture. Both findings are significant (boys - Chí = 7.021, p <0.01) and (girls - Chí = 6.636, p < 0.01). Other functional disturbances have been observed in boys (32%) and girls (33%) are kyphosis posture. Hyperlordotic posture has been found in 32% of girls and 24% boys. Hyperlordotic posture has been found in 5% of boys and 4% of girls, which represent the lowest percentage in our study group.

Conclusion.
We can conclude a confirmation of the unfavourable tendency in condition and development of body posture, therefore in level of functional relations of muscles. Thereof we can infer reserves in adequacy and suitability of musculoskeletal load. Diagnosis of body posture rating proved increased share of disturbance of functional disorders among pupils in age of elementary school which is thus characterized and signified by (p<0,01) III. qualitative degree – poor body posture in both sexes. Measured rates and their comparison with other rates presented as physiologically correct confirmed our hypothesis as well as this generally noted unfavorable trend. Especially alarming is an index proving the high occurrence of combined type of wrong body posture, which demonstrates bond of deviatons, therefore fact which we mentioned above – one functional failure is usually compensated and conditional by another functional failure.

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Формирование осанки у учеников младшего школьного возраста

[1] Елена Бендикова
[2] Лукаш Шмида
[3] Роберт Розим

Университет им. Матея Бела, Словакия
974 01, г. Банска Быстрица, ул Тайовскехо 40
[1] Доцент, магистр, доктор философии
E-mail: Elena.Bendikova@umb.sk
[2] Магистр
E-mail: lukas.smida@gmail.com
[3] Доктор педагогики, доктор философии
E-mail: Robert.Rozim@umb.sk

Аннотация. В статье приведены первичные данные о состоянии и формировании осанки у учеников младшего школьного возраста, в четвертыхклассах г. Липтовский, Микулаш и г. Ружомберок. В качестве метода определения данных был избран стандартный метод квалификации осанки для клинической и педагогической практики, с его помощью было установлено, что как девочки (Chí = 12,132; p < 0,1 %), так и у мальчики (Chí = 10,283; p < 0,1%) имеют слабые осанки, относящиеся к III. квалитативной группе осанок. К сигнификативным (p < 0,1%) проблемным областям, в указанном возрасте,относятся области плеч и положение лопаток и головы. Приведенные первичные показатели являются составной частью проекта-гранта ВЕГА: No. 1/0376/14.

Ключевые слова: осанка; двигательный аппарат человека; младший школьный возраст.