

BACK SCHOOL AS AN OPTION TO PREVENT POOR BODY POSTURE OF 11 – 14 YEARS OLD CHILDREN

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ABSTRACT

Postural function to some extent reflects the overall health of the child and is one of the major factors involved in the quality of health. High incidence of functional disorders of the musculoskeletal system in children of school age reflects changes to current lifestyle of modern population, characterized by a significant decrease in the volume and intensity of physical activity, increased static activity in improper working positions. The quality of postural functions in childhood is considered to be a sensitive indicator of external stress factor, accompanying the vast majority of school-age children.

The objective of the research was to evaluate body posture of 11 to 12 year olds at one of the Bratislava's primary schools. In collaboration with physiotherapists, we focused our attention on the detection of posture with scoliosis, poor posture and incidence of flat feet. The body posture was evaluated according to visual aspects and the foot scanner was used to examine their feet. After evaluating postural functions of children the parents and teachers were informed on the results of the measurements. Another part of the project was illustrative presentation of the back school and ergonomic seating directly in the classroom.

Key words: body posture, postural function, functional disorders of the musculoskeletal system, back school, ergonomic seating

INTRODUCTION

The movement is one of the human essential characteristics and its irreplaceable part. Its absence or deficit can be a reason for development of various musculoskeletal disorders. Dynamic and hectic lifestyle causes an essential disproportion in the quality of physical activity of genetically encoded movement abilities in previous generations and current demands. The proportion of dynamic muscular work has been decreasing at the expense of the static one and its quality changes as well. The organism of a child perceives the above mentioned changes and reacts to them differently than the organism of an adult. A critical period in the development of children, in terms of a significant decrease in spontaneous physical activity, is when starting school. Long-term enforced static load of movement system caused by sitting, the demand to maintain an unchanging position for a longer time, causes decrease in proper body posture. The negative influence of sitting for long periods of time during an educational process, which is similar to computer games or watching TV, is deepening in most of the children.

Kristiníková and Dobešová (2004) focused their research on dynamic sitting of first grade pupils. During a four year project the authors observed and compared the level of body posture of two classes at primary school. The children of the control group did not use any option of dynamic sitting during educational process and the children of the experimental group changed in one hour intervals sitting on classic school chair and on fit ball. The reason for choosing fit ball for optimal sitting was active use of postural muscles for maintaining position. In this case the deep muscles are continuously in action and in comparison to regular passive sitting on a chair, the same muscles and tissues are not overloaded. A number of authors discuss the problem of increasing trend of functional disorders in musculoskeletal system of children. Bekö (2008, 2010, 2011) even described high occurrence of functional disorders in preschool children. After starting school the lifestyle of children changes considerably with restricting a spontaneous physical activity. A lot of observations in school population document a lack of physical activity in major part of the population (Medeková, 1997, Medeková – Havlíček, 2002; Frömel – Novosad – Svozil, 1999; Sigmund – Mikláňková – Frömel, 2006). Insufficient physical activity can cause not only lower level of physical performance but also negative physical development and occurrence of functional disorders in musculoskeletal system (Thurzová – Medeková – Kováčová, 1993; Vařeková, 1999; Kolenčíková, 2000; Kanášová, 2006; Kováčová – Medeková 2006; Bekö – Medeková, 2006). With growing age the time spent in static positions at home or at school increases. Following this, it comes to lower activity of phasic muscles and greater activity of tonic muscles. In this context Hnízdil, Šavlík and Chvátlová (2005) point out the importance of school equipment, because only healthy and ergonomic furniture enables the children to maintain good posture in sitting. On the other hand unsuitable working position of children, caused by improper furniture, increases the load for children. The author stress that improper school load causes various health disorders of children. Disorders in spinal shape and function are usually not painful in child's age and therefore they are often underestimated and overlooked. The above mentioned changes can be unidentified for relatively long time and can be without evident symptoms. They show themselves functionally during dynamic movement and are mostly diagnosed when certain damages and pain arise. There are very often not only somatic disorders, psychic problems, changes in child's emotions and behaviour but mostly disorders of musculoskeletal system. The musculoskeletal system with postural function disorders is apart from lower adaptability to physical load also risky to painful experience (Thurzová, 2003), that negatively influences quality of life, lowers physical and psychical performance and increases risk of injuries. Also it creates a potential for later vertebrate problems. A high occurrence of health problems or difficulties and pain of children in younger school age are presented in the results of scientific literature in the field of myoskeletal medicine. Lewit (2003) says that children with headaches belong to the biggest group of patients in general and are considered as a real medical problem. A very often form of children's headaches is called "school headache". It had been described as psychogenic problem for a long time until Guttman found that the real cause is anteflex head posture during school work performed over horizontal school bench and nowadays also during work with computers. The disorders of functions in musculoskeletal system in children cause even more problems. They are very often clinically silent (with no symptoms) or they present themselves as so called growth pain. Functional disorders of neck and hip spine affect almost the half of children population. Kolisko (2003) also points out in his work the results of unbalanced load of musculoskeletal system. He says that the increase of poor body posture in the period of older school age is tripled in comparison to 20% occurrence of poor body posture in preschool children. The problem of correct ergonomic sitting during work and in school was analysed by Gilbertová and Matoušek (2002). According to the author a long-term sitting of children can considerably decrease the quality of body posture (round back, scoliosis, shoulder blades sticking out etc.) and can lead to backache. The poor body posture is also caused by insufficient lightening, sight problems, sitting far from the working table and others.

A worsening of postural functions of children and youth calls for need of targeted intervention. Conclusions of various researches reveal the possibilities of exercise programmes for improving body posture and point out the positive influence on functional movement disorders. The results of authors (Kanášová, 2005, Kanášová, 2006; Kopřivová 1999, Kopřivová – Zachrla – Dohnalová, 2001; Kováčová, 2003) showed the possibilities of positive influence by means of exercise programmes included in compulsory school physical education. The results of an experiment performed by Kanášová (2006) in children of the sixth grade in lower secondary education showed statistically significant improvements in all parts of muscle imbalance and body posture only by application of special exercise for good body posture in PE lessons for one year. The particular parts of body posture showed significant improvements in head posture, in the shape of spine, in

the position of shoulders and hips, in shoulder blades and abdomen of boys. The girls improved significantly in the shape of spine and the position of shoulders and hips. The aim of the research was the evaluation of body posture and basic spine screening of 67 children at the age of 11 to 14 years.

METHODS

In cooperation with physiotherapists from a non-state healthcare facility Revitalis, we focused on the detection of scoliosis, scoliotic posture and the incidence of flat feet. The body posture was evaluated by aspection, a foot scanner was used to examine the feet and the electronic record was processed in a podocam system. The measurements took place in morning hours. Another part of the project was an illustrative presentation of the back school and ergonomic sitting directly in a classroom. After having evaluated the posture of children, parents and teachers were informed about the results of measurements. The presented topic is being dealt with the support of VEGA project "Influence of physical activity in prevention and improvement of incorrect body posture, overweight in children and youth".

Research group

67 children, 37 /55, 2%/ boys and 30 /44, 8%/ girls participated in the research. The average age of the children was between 12 and 15 years / min. 11, 28 – max. 14, 19/. The measurements took place in June 2013 at two secondary schools in Bratislava. The choice of schools was based on the convenience of a location and children were selected on the basis of parents' approval. The average weight of children was 48, 95 kg in boys and 47, 42 kg in girls. The average height of boys was 157, 9 cm and of girls it was 157, 3 cm. There were 26 children regularly visiting the orthopaedic specialist.

RESULTS

The most common postural disorders besides sagittal deviations are lateral deviations of the spine. Scoliotic posture is a lighter disorder which is possible to influence by an active effort if detected in advance. In case of insufficient professional therapy it can develop to scoliosis. A diagnosis of lighter forms of scoliosis, on the grounds of clinical examination, is hard to be determined. If it is a postural scoliosis it will correct itself while bending forward. In case of structural scoliosis, changes are visible in all positions. The total number of children with a spine disorder (Table 1) was in the group of 42 (29 cases of scoliosis and 13 cases of scoliotic posture).

Table 1 Incidence of spinal disorders, flat feet in a specialist's clinic

Age	Amount (n)	Registered in special clinic		Scoliosis		Scoliotic posture		Flat feet	
		(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
11	20	7	35.0	7	35.0	3	15.0	11	55.0
12	27	12	44.4	11	40.7	7	25.9	22	81.5
13	8	3	37.5	5	62.5	2	25.0	4	50.0
14	12	4	33.3	6	50.0	1	8.3	10	83.3
Together	67	26		29		13		47	

In the group of 11 year old children (n=20) we recorded the most significant intersexual differences. Scoliosis was diagnosed in case of one boy and six girls /Figure 1/. Similarly, also in case of scoliotic posture, we recorded more girls /15%/ than boys /10%/ in the same age category. Although differences were negligible /Figure 2/. In the category of 12 year (n=27) and 13 year (n=8) old children we recorded a higher incidence of scoliosis in the group of boys rather than girls. In the group of 14 year old children (n=14), in terms of scoliosis incidence, more girls /33,3%/ than boys /16,7%/ had spinal disorders. In all age categories, the incidence of scoliotic posture was higher in boys (Figure 2).

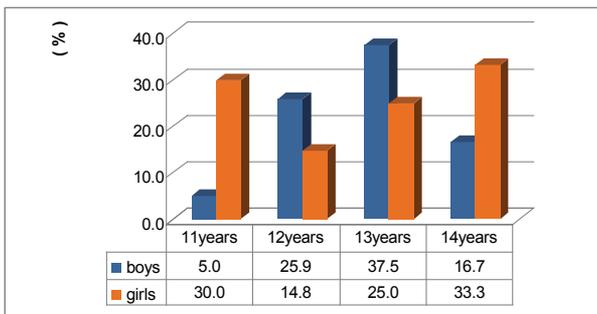


Figure 1 Scoliosis incidence in terms of gender (n=67)

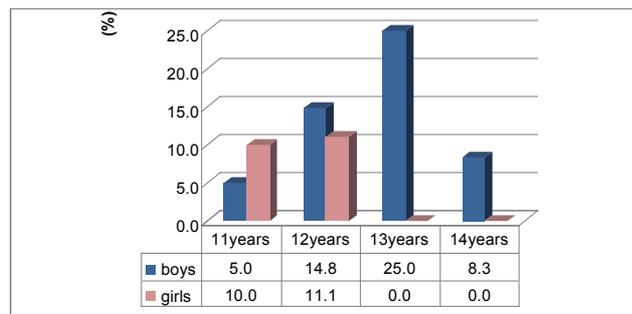


Figure 2 Scoliotic posture incidence in terms of gender (n=67)

We have diagnosed flat feet (Table 1) in 47 children (72%) of the whole group. The highest incidence was recorded in the group of 14 years old (83,3%) and 12 years old children (81,5%). We considered the appearance of flat feet to be a collapse of the transverse arch and/or the longitudinal arch of the foot. Children with unilateral or bilateral flat feet were categorized in this group (Figure 3).

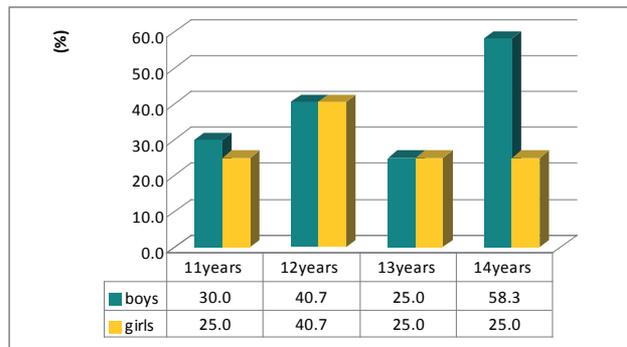


Figure 3 Flat feet incidence in terms of gender (n=67)

DISCUSSION

We realize the informative character of the results due to a low number of children and a different number in individual age categories. Regarding the high incidence of spinal deformities and flat feet, we recommended several parents to see a specialist clinic. A workshop and a presentation of the back school as well as a correct ergonomic sitting were part of our pilot project.

Within individual presentations, we presented the possibilities of the back school to children, their parents and teachers as a prevention of poor body posture in the following areas :

- ergonomic sitting ways focused on the proper support of the pelvis and hip spine,
- illustration of an alternative and dynamic form of sitting – short-term sitting on special PC pillows, fit balls, etc.,
- information on options of chairs and desks with variable heights,
- to support an adjustable tilt of a working board, or use an ergo board,
- to pay attention to education of proper sitting, the length of sitting and other ergonomic and rehabilitative aspects of children's motor system load (schoolbags, compensative movement program, etc.).

Kolář (2006) points out the negative influence of incorrect and long lasting work in sitting position on the quality of postural behaviour. He speaks about the posture in relaxed sitting in front of the computer, when through hypoafferentation it comes to "overhead posture", straightening neck spine and disfunctioning deep neck flexors. This postural disorder is influenced by the overload of neck and chest transfer and lower straightening of medium part in chest spine and also by decreased rotation that at the same time disable proper fixation of blades by middle and lower blade fixators. This results in dominant function of the upper blade fixators participating on inner rotation of the shoulder and protraction of shoulders. In similar cases there is often diagnosed upper chest breathing. The rate of each particular disorder is highly individual and it is conditioned by organism's ability to compensate. Věle (1997) agrees and says that it is not possible to recommend any kind of sitting a permanent but only as a dominant, because every position maintained for longer time starts a fatigue process.

The most sensitive period for scoliosis is the period of younger school age. Lewit (2003) registered asymmetric blockades of head joints (atlas) that influence the axis muscles as soon as in infants. These blockades without therapeutic intervention may be fixed and may cause dysfunction of musculoskeletal apparatus, mostly a left side scoliosis (Tošnerová – Vaňásková – Petrová, 1996).

The incidence of scoliotic posture was observed by Chudá (1999), who presented in her experiment the success of conservative treatment. In a group of 89 children in the age of 6 to 10 years, the scoliotic posture was registered in 24 children (12 boys and 12 girls). Then the children were divided into two homogenous groups, whilst one group participated in lessons with correction and health exercises 2 hours per week and the second group only one hour per week. The exercises were led by teachers with qualification for healthy physical education and children were examined by orthopaedic specialist. The experiment showed significant improvements in children participating in lessons twice a week. In both groups better results were achieved by boys, who were then moved from the group with "poor body posture" to the group "good body posture". The author also explains improvements by higher interest in sport and exercise.

Satisfactory results of the suitable compensatory programme for children with scoliosis were presented also by Stochová (2004). The best improvement after intensive two weeks long rehabilitation programme was observed in a group of children with light scoliosis (from the average Cobb's angle 8,5° to 5,3°). This was a group with the youngest children (average 9,8 year) and with the slowest growing speed. The results of above mentioned researches suggest, that the best effects were reached by children with light scoliosis and therefore this methods are suitable as the first choice of early diagnosed scoliosis rehabilitation. The positive effect of spa treatment of idiopathic scoliosis in a group of 255 children aged 12-15 years was also confirmed by Bílková and Pavlů (2012).

One of the basic preventive measures in terms of functional disorders of the musculoskeletal system is physical activity, which is specifically important for children when starting school. These children are going through growth acceleration, change of lifestyle, change of physical regimen, learning new movements and stereotypes. We agree with Janda, that "if we want to speak about correction, we do not know anything more sophisticated than continuous explanation and education of children". Creating new conditions and motivating children to be physically active requires sustained effort of all the participating parts – family, school, out of school organisations offering physical activity. A very special role belongs to school physical education, new ideas and approaches in terms of knowledge about the functional disorders of musculoskeletal system, all these implemented into preparation of PE teachers (Thurzová, 1999).

CONCLUSIONS

In the context of the research results of authors dealing with similar issues, we emphasize the need to diagnose not only motor abilities and physical development but also postural functions from the lowest age categories. We assume, based on above shown facts in observed age categories that to a certain extent it is possible to predict the further progress of functional motor system disorders. Detected changes also indicate a certain amount of prediction with a possibility of a particular location of functional disorders. When functional motor system disorders are early diagnosed, it is possible to purposefully proceed with the prevention of these disorders, draw up methodical processes within the school physical education and within physical activity of preschool children. Diagnostics of postural functions of children should be included in the assessment in physical education classes. In this context, the preparation of PE teachers should be strengthened, not only at the level of theoretical knowledge about functional disorders of motor system but also in terms of the principles used when choosing and applying compensative exercises for postural functions correction and gaining practical skills at diagnosing functional muscular disorders as well as incorrect body posture.

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