

Risk factors of postural defects in children at school age

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Abstract

Introduction and objective: Postural defects increasingly more often concern children and adolescents at school age. The lack of prophylaxis and neglecting adequate procedures may lead to limitations of physical and motor abilities, back pain, or the development of severe spinal deformities. Recognition of the risk factors conducive to the occurrence of the disorder allows the creation of adequate conditions for the psychomotor development of children, as well as the elaboration and implementation of specified educational schemes directed at schools and parents.

The study concerned determination of the risk factors for the development of postural defects in school age children.

Material and methods: The study was conducted by means of a diagnostic survey. The study group covered 380 children aged 14 (175 girls (46.1%) and 205 boys (53.9%)) – selected at random from schools in eastern Poland and the Czech Republic.

The significance of the relationships between variables was investigated by means of chi-square test for independence. The differences between the empirical and theoretical sample distribution was examined by means of chi-square goodness-of-fit test. The significance level was set at $p=0.05$.

Results: The BMI in the population examined was 20.2, on average (from 14–39). Respondents living in rural areas and small towns constituted 57.63% of the study group, while inhabitants of medium-size and large cities – 42.37%. The majority of children in the study had been previously examined for the occurrence of postural defects (74.2%), whereas nearly every tenth child had never undergone such an examination. As many as 16.3% of adolescents did not know whether they had ever participated in a screening test. A defect was detected in 14.7% of children, in 56.6% no asymmetry was detected, while approximately 30% were not aware if their body posture was normal or not.

Conclusions: 1. There is a relationship between physical activity of the child and the occurrence of postural defects. 2. There is a relationship between the economic standard of the family and awareness of own state of health. 3. There is a need for the creation of a system of education for parents and children concerning postural defects and risks resulting from these defects.

Key words

postural defects, risk factors, scoliosis, children, habits, primary prevention

INTRODUCTION

Human physical posture is a motor habit shaped on a specified morphological and functional background. It is a manifestation of the physical and psychological status of an individual. Thus, it is an indicator of the mechanical efficacy of the kinetic sense, as well as muscular balance and nerve-muscle coordination. Throughout the entire life, human body posture is subject to changes. This is most clearly seen during the period of dynamic development [1, 2]. Rapid changes of the environment, sedentary style of life, limitation of physical activity, and inadequate nutrition are inseparably associated with the progress of civilization [3].

Despite developing protective-adaptive mechanisms, humans are unable to keep pace with the dynamics of changes in the contemporary world, which is evidenced, among other

things, by postural defects. These defects constitute an increasingly greater health problem for society [4, 5].

OBJECTIVE

The objective of the study was determination of the risk factors for postural defects in children at school age. In addition, the relationships were presented between the occurrence of postural effects and selected demographic characteristics, including evaluation of the material standard and place of residence. Subsequently, the level of children's awareness of their body posture was determined.

MATERIAL AND METHOD

The study was conducted during the period from January to September 2012. Three schools were selected in eastern Poland and the Czech Republic, respectively. The study group

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were 380 children aged 14 (175 girls (46.1%) and 205 boys (53.9%))

The study was conducted by the method of a diagnostic survey. All respondents were interviewed by a physical therapist. The survey was based on a self-designed auditory questionnaire evaluating demographic and social data, as well as information concerning habits and ways of spending leisure time by the child. The replies of all the respondents were introduced into the calculation sheet during the interview. Completion of the questionnaire lasted approximately 10 minutes, on average. All information was covered by a confidentiality clause.

Analysis of data Statistical analyses were carried out by means of computer software Statistica v. 8. Significance of relationships between the variables was investigated with the use of chi-square test for independence. Due to the considerable number of tests, the Bonferroni correction was applied. The differences between the empirical and theoretical sample distribution was examined by means of chi-square goodness-of-fit test. The p values $p < 0.05$ were considered statistically significant.

RESULTS

Body Mass Index (BMI) of the population examined was 20.2, on average (14 – 39, SDev=3.399) (Fig.1).

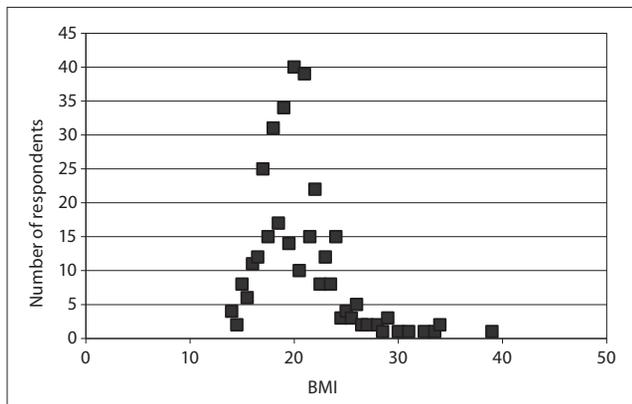


Figure 1. Scatter of respondent's BMI values.

According to its value, the respondents were qualified into 5 types of body weight (Fig. 2).

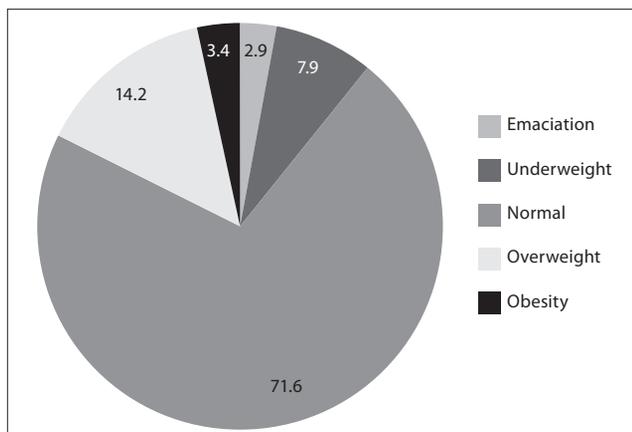


Figure 2. Respondent's BMI qualified into 5 types of body weight.

Figures 3–5 present data concerning the place of residence, ways of spending leisure time and preparation of place for homework.

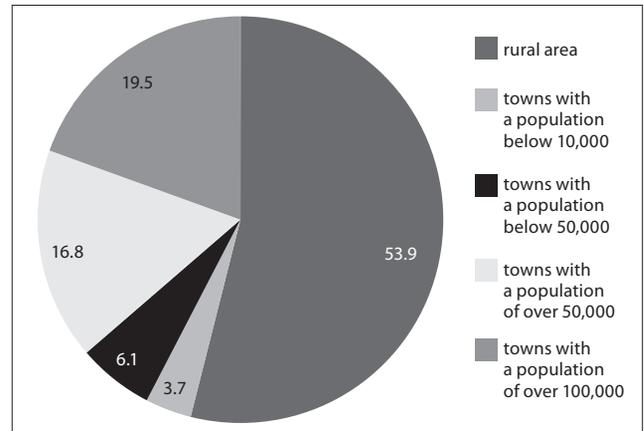


Figure 3. Respondent's place of residence.

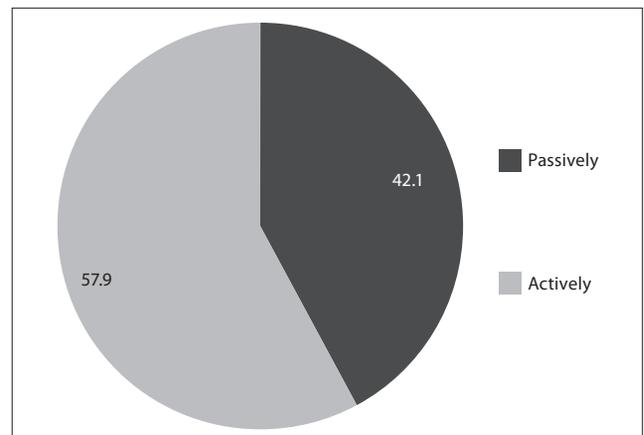


Figure 4. Respondent's ways of spending leisure time.

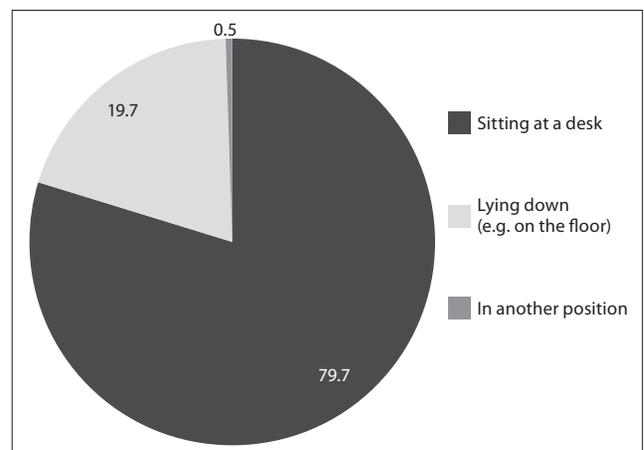


Figure 5. Respondent's preparation of place for homework.

The majority of children had been examined earlier for the occurrence of postural defects (74.2%), whereas nearly every tenth child had never undergone such an examination. As many as 16.3% of adolescents did not know if they had previously participated in a screening test. Postural defect was detected in 14.7% of children, in 56.6% no asymmetry was found, while nearly 30% were not aware whether they had a normal posture or not.

Relationships were analyzed between individual variables. Table 1 presents relationships between the respondents' gender and the BMI, presence of postural defect, ways of spending leisure time, types of physical activity and habits when doing homework.

Table 1. Relationships between respondent's gender and BMI, presence of postural defects, ways of doing homework and spending leisure time, types of physical activity and nutritional habits.

		Gender (row %)		chi-square	p
		Female	Male		
BMI	Emaciation	72.7	27.3	12.21	0.016(*)
	Underweight	40.0	60.0		
	Normal	49.3	50.7		
	Overweight	35.2	64.8		
	Obesity	15.4	84.6		
Do you have a postural defect diagnosed by physician?	Yes	62.5	37.5	8.60	0.014(*)
	No	45.6	54.4		
	I do not know	38.5	61.5		
How do you most frequently spend your leisure time?	Passively	53.8	46.3	6.59	0.010(*)
	Actively	40.5	59.5		
In what position do you most often do homework?	Sitting at a desk	43.6	56.4	6.30	0.043(*)
	Lying down (e.g. on the floor)	57.3	42.7		
	In another position	0.0	100.0		
Do you consume meals regularly?	Yes	40.6	59.4	10.61	0.001(*)
	No	58.8	41.2		
Are you dieting?	Yes	69.9	30.1	28.17	0.000(*)
	No	38.3	61.7		
Do you regularly exercise during PE classes?	Yes	40.3	59.7	20.39	0.000(*)
	No	69.3	30.7		

Table 2. Relationship between family economic situation and selected variables examined.

		Material standard (row %)			chi-square	p
		very good	good	mediocre & poor		
Do you have a postural defect diagnosed by physician?	Yes	32.1	55.4	12.5	11.21	0.024(*)
	No	32.1	51.6	16.3		
	I do not know	27.5	42.2	30.3		
How do you most frequently spend your leisure time?	Passively	26.3	48.1	25.6	6.81	0.033(*)
	Actively	34.1	50.5	15.5		
Preferred forms of spending leisure time when the weather is nice.	Trip out of city	26.7	60.0	13.3	7.26	0.298(-)
	Riding bicycle	33.3	49.4	17.2		
	Walk	35.7	37.5	26.8		
	Other forms	25.8	52.5	21.7		
Preferred forms of spending leisure time when the weather is bad.	Watching television	28.9	49.6	21.5	5.63	0.466(-)
	Computer games	28.3	49.7	22.0		
	Reading books	38.2	47.1	14.7		
	Other forms	38.9	55.6	5.6		
Do you consume meals regularly?	Yes	33.8	47.4	18.8	3.86	0.145(-)
	No	23.7	54.4	21.9		
Do you snack between meals?	Yes	29.6	52.2	18.1	1.80	0.406(-)
	No	32.5	45.5	22.1		
Are you dieting?	Yes	34.4	47.3	18.3	0.77	0.680(-)
	No	29.6	50.2	20.2		

Table 2 shows relationships between the economic situation of a family and the detected postural defect, form of spending leisure time, and the regularity of consumption of meals. Table 3 presents the relationships between the detected postural defect and form of spending free time, habits at school and outside school.

Table 3. Relationship between the occurrence of postural defect diagnosed by a physician and selected variables examined.

		Do you have a postural defect diagnosed by a physician (row %)			chi-square	p
		Yes	No	I do not know		
How many hours daily do you use computer?	half-an-hour	15.2	56.5	28.3	4.40	0.620(-)
	1 hour	13.8	61.5	24.8		
	2-3 hours	17.2	55.0	27.8		
	4 and more	10.8	52.7	36.5		
How many hours daily do you spend watching TV?	half an hour	17.9	51.8	30.4	6.71	0.568(-)
	1 hour	15.3	58.4	26.3		
	2-3 hours	14.5	56.6	29.0		
	4 and more hours	7.4	48.1	44.4		
I do not watch		13.3	73.3	13.3		
How do you most frequently spend your leisure time?	Passively	15.0	48.8	36.3	8.52	0.014(*)
	Actively	14.5	62.3	23.2		
In what position do you most often do homework?	Sitting	15.2	57.4	27.4	1.69	0.000(*)
	Lying down	13.3	53.3	33.3		
	Other position	0.0	50.0	50.0		
Do you consume meals regularly?	Yes	12.8	58.6	28.6	2.97	0.226(-)
	No	19.3	51.8	28.9		
Do you snack between meals?	Yes	18.1	49.7	32.7	13.08	0.001(*)
	No	9.7	67.5	22.7		
Are you dieting?	Yes	12.9	60.2	26.9	0.71	0.702(-)
	No	15.3	55.4	29.3		
How do you wear your satchel or rack-sack?	On both shoulders	11.9	56.8	31.4	2.88	0.237(-)
	On one shoulder	17.4	56.4	26.2		
Have you ever experienced back pain or discomfort?	Yes	17.5	48.7	33.8	14.47	0.001(*)
	No	10.5	68.4	21.1		
Are school desks and chairs adjusted to your height?	Yes	14.6	59.2	26.3	2.13	0.345(-)
	No	15.0	52.1	32.9		

DISCUSSION

Normal body posture is a relative term. Undoubtedly it exerts a great effect on life comfort related with the statics and dynamics of human functioning. The type of posture depends on many factors, such as race, somatic type, gender and age.

The posture of a man changes throughout the entire life. The greatest changes take place during the period of growth. This is explained not only by changes in the body dimensions, but primarily in its proportions. At that time, disorders may occur which cause a non-harmonious development of the motor organ which, in consequence, lead to postural defects. When neglected and untreated these defects may develop in the direction of scoliosis. An increasing deformity in the spine and chest affects the psyche of a child, and is associated with the lack of acceptance of own body image [6]. In addition, in the course of time, there occur pain complaints, which frequently limit daily physical activity [7].

Obesity and overweight are increasingly more common in contemporary society [8], and lead to a reduction in physical activity [9], inability to cope in sports [10], and problems related with the motor organ, such as juvenile slipped capital femoral epiphysis [11], or Blount disease [12]. Whether obesity and overweight are also factors which may result in the development of postural defects remains an open question. Alternative ways are being developed for the assessment of body weight according to the silhouette [13]. However, the classical BMI evaluation still remains the most common type of examination reflecting the synthetic measure of a patient's body weight and height. Considering slight differences in percentile scale for boys and girls aged 14, the adoption of separate scales for boys and girls does not affect the BMI results, therefore, for simplification, a common scale for both genders was used for data analysis [14]. A statistically significant relationship was observed between the respondents' gender and the BMI. The girls were slimmer than the boys, who were more frequently overweight and obese (Tab. 1). This is consistent with data previously published in Poland and Sweden, and data from other European countries, including the Czech Republic [15, 16, 17, 18]. Nevertheless, no statistically significant relationship was noted between overweight and the occurrence of postural defects.

Opposite observations were made by Nery et al. [19] who, based on the studies conducted in Brazil among more than 1,300 children, found a relationship between overweight and the occurrence of asymmetry of shoulders and shoulder-blades, and asymmetry of the scalene muscles. The researchers suggested that there is a need for preventive actions in the area of health care, body weight control, and maintenance of balance of the trunk.

It is noteworthy that girls were more often dieting, despite their being slimmer than boys, and consumed meals irregularly, which may also be the cause of the lower BMI in girls. This is consistent with the studies by Wojtyła et al. [20]. Also, postural defects were more frequent among girls than boys. Although male and female infants are to an equal degree at risk of scoliosis; however, with age, the deformity more often concerns girls, at the age of over 10 reaching the ratio 6:1 [21]. The question arises whether a higher frequency of occurrence of postural defects in girls is related only with the genetic predisposition, or also with the shaped behavioural habits at school age. Physical activity of children varies according to gender. Boys prefer active leisure and team games, while girls appreciate peace and quiet, they read books or go for a walk (Tab. 1). McMaster et al. have suggested the lack of physical activity as a factor predisposing to the occurrence of spinal deformity [22]. The habits also differ – boys at school willingly participate in physical exercise classes, and complete homework while

sitting at a desk, while girls perform physical exercises at school irregularly, and more often than boys complete their lessons at home in a prone position.

The relationship between the economic situation in a family and the detected postural defect is very interesting. Children from families with a good and very good economic standard were either healthy or had a postural defect diagnosed, whereas children from families with a poor material standard had no knowledge concerning their state of health. This confirmed earlier information that scoliosis, which is the consequence of neglecting the treatment of postural defect, more frequently concerned children from families with a higher economic status [23]. The habits with respect to spending leisure time also differed. Children from families with a mediocre and poor family situation considerably more often spend their free time passively, mainly watching television, while those from families with a good and very good situation preferred active leisure or reading a book. Thus, it seems that the lack of awareness and proper health education is not accompanied by an adequate care for own health. Opposite to the studies by Sygit et al. [24], in the presented investigations no statistically significant difference was observed in the regularity of meals and other nutritional habits, and economic situation in a family.

Also, no statistically significant relationships were confirmed between the detected postural defect and habits at school and at home. Time spent at the computer or television had no effect on the occurrence of postural defect, and similarly the body position during completing homework at a desk, in bed or lying on the floor. Despite the common opinion concerning the wearing of a school satchel on one arm only, in the presented study no statistically significant relationship was found between such a habit and the occurrence of postural defect. The situation was similar with respect to the maladjustment of school desks to the children's height. This more frequently concerned children with an existing postural defect; however, this relationship was not statistically significant. Back pain was more frequent in children with a detected postural defect. This defect probably predisposes to the feeling of discomfort and back pain in adulthood with a sedentary style of work [25]. The way of spending leisure time was also important. In active children no postural defects were found, opposite to those who spent their time passively. The subsequent relationship concerned nutritional habits. In the studies by Kapka-Skrzypczak et al., in a population of 14,500 children, 87% of the children admitted that they snacked between meals [26]. In the presented study, 59.5% admitted to this habit, and the fact that this concerned children with a postural defect diagnosed was statistically significant (Tab. 3).

Identification and recognition of risk factors may facilitate their elimination. Simultaneously, the application of proper prophylactic actions may provide an adequate quality of life without pain, and limitation of physical and motor capabilities. Adolescence in children is the time of shaping health behaviours, the majority of which remain unchanged throughout the entire life [27]. The younger generation possesses an insufficient knowledge concerning not only adequate nutrition, but also other health promoting behaviours. This knowledge is shaped by habits and the socio-economic status of the family in which children grow up, and is modified by information transmitted by the media and press (advertisements, trends, diets in fashion) [26]. At the

same time, it is also known that the skill of leading a healthy life style depends on many environmental factors, physical activity and nutritional habits [28, 29, 30]. It is, therefore, important to consider the implementation of a system of education for parents and children which would provide information about correct patterns of health behaviours and consequences of not observing these patterns.

CONCLUSIONS

1. There is a relationship between the physical activity of a child and occurrence of postural defect.
2. There is a relationship between the economic status of a family and awareness of the state of own health.
3. There is a need for creating a system of education for parents and children concerning postural defects and risks resulting from these defects.

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