

Spine pain among the secondary school youth in the Silesia Province of Poland – scale of the problem and reasons

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Abstract

Introduction. Spine pain is an important social problem concerning the majority of the adult population, it is also the main cause of disability. Numerous research conducted on different populations suggest that it is also a significant problem among children and youth.

Objectives. The aim of the study was to examine: the frequency of spine pain occurrence in high school youths and the scale of this problem. Also examined was on which parts of the spine the back pain occurred, and how it related to the study subjects. Selected potential risks and implemented counter-measures were also subjected to analysis.

Materials and method. The study involved a group of 499 participants: 290 girls, 209 boys who were secondary school students aged 16–18. The study consisted of a questionnaire concerning spine pain, the frequency, location, reasons, risk factors and remedies.

Results. Only 37.9% girls and 45% boys did not have pain incidents. No age or morphological parameters were found with the incidence of pain. The most frequent reason for pain was sitting for long periods – 35.5% girls and 34.2% boys. Gender differentiated reasons for pain were physical activity ($p < .001$) – declared more often by boys and lack of reasons ($p < .01$), and declared more often by girls.

Conclusions. Spinal pains are common and affect more than a half of high school students in the Upper Silesian of Poland. The most common location is the lumbar section. Factors affecting the frequency of pain are: susceptibility to stress, vision and postural defects.

Key words

risk factors, epidemiology, youth, spine pain

INTRODUCTION

Complaints of spinal pain, in particular of the lumbar region, have been a clinically and socially relevant problem of developed societies for many years, problematic also for economic reasons [1]. It is currently one of the key challenges for public health [2]. There are various estimates of the epidemiology of this problem, ranging from 50–90% of the adult population [3]. It is estimated that at some point in life about 80% of the population will struggle with back pain, and its prevalence increases with age, reaching its apogee in the sixth decade of life [4]. According to the World Health Organization (WHO), back pain is the most common cause of disability [5]. The etiology of these ailments is complex; therefore in terms of epidemiology, they should not be treated as specific disease entities, but rather as sets of symptoms, among which pain is the leading one [5]. Therefore, “unspecific pain” or “non-specific pain” are the most commonly used terminologies. There are many reasons for their formation, as well as social groups in whom the pain occurs [6]. The consequences of these ailments are: withdrawal from daily activities, absenteeism from school and work, disability, and increased use of health services [7, 8, 9].

The problem of spinal pain in adults has already been examined for at least several dozen years. The history of examinations of this issue in children and teenagers is much briefer, and the first notifications occurred at the end of the 20th century [10, 11]. The scale and social significance of these problems are cause for the rapid development of examinations at many centres around the world [7, 8, 12]. This development should be considered in terms of a process aimed at seeking all risk factors for spine pain in young people. Despite many studies in various centre worldwide, uniform views on this subject have not been agreed [13, 14]. Controversies concerning, for example, connections with smoking and backaches, in physical activity – peculiarly planting some sports disciplines, or connections with pain appearing in morphological parameters [7, 15, 16]. A wide spectrum of potential causes of spine pain induces the search for those risk factors that have not yet been identified, or the views on them are ambiguous. These include the occurrence of chronic diseases, postural defects, and resistance to stress. The importance of this research seems to be emphasized by reports that the occurrence of back pain in children and adolescents is associated with the risk of chronic pain during adulthood [17]. Full awareness of the risk factors can constitute the basis for developing preventive strategies.

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OBJECTIVE

The aim was to investigate the occurrence of spinal pain in secondary school students aged 16–18 in the Upper Silesian Province of Poland, and examine the scale of the frequency of occurring pain, the spinal sections, and the extent to which the subjects were affected. Potential risk factors were also analyzed: the occurrence of chronic diseases, eye defects, postural defects, susceptibility to stress, and the methods of pain management used.

MATERIALS AND METHOD

The selection of participants for the research was intentional – they were students of six arbitrarily selected secondary schools of the Upper Silesian Province. In order to ensure the highest possible representation of the research area, the heads of the schools in Częstochowa, Bielsko-Biała, Katowice Bytom, Zabrze and Chorzów were asked for their cooperation in carrying out the study.

The purpose of the research and the research questionnaire were presented. After obtaining the consent of the management – they were asked to provide parents and students with information about their full voluntary and anonymous status. The study design was approved by the Bioethics Committee of the Silesian Medical University in Katowice (No. KNW / 0022 / KB / 105/17). A pilot study of 46 people was carried out to determine the reliability of the tool to be used. The Kappa coefficient ranged from 0.82 (question about the cause of pain) to 0.95 (question about the painful section of the spine). 540 research questionnaires were distributed, of which 499 (92.4%) met the criterion of relative completeness of the filling-in. Finally, 290 girls {G} and 209 boys {B} were examined. The survey consisted of a metric part where data on gender, age, height and body weight were collected. BMIs for the subjects were calculated based on the height and weight of the body (Tab. 1).

Table 1. Descriptive statistics age and morphological parameters – disaggregated by gender

Variable	G			B		
	Me	x (SD)	Min-max	Me	x (SD)	Min-max
Age	17.00	16.86 (0.87)	15.00– 18.00	17.00	16.96 (0.92)	15.00– 18.00
Height	166.00	166.54 (5.77)	150.00– 190.00	180.00	179.43 (7.41)	151.00– 198.00
Body Weight	56.00	57.35 (10.93)	40.00– 125.00	70.00	70.21 (10.64)	44.00– 104.00
BMI	20.08	20.65 (3.69)	14.36– 44.82	21.48	21.79 (2.87)	16.37– 34.65

The division of respondents by place of residence was as follows: 167 girls (57.58%) and 108 boys (51.67%) lived in the village, 123 girls (57.58%) and 101 boys (48.33%) in the city.

The main part of the survey contained closed questions concerning:

- occurrence of back pain; possible answers with their assigned rank:
 - 1 – never, maybe once or twice in a lifetime;
 - 2 – It happens that my spine hurts – several times a year;
 - 3 – I feel spine pain from time to time;

- 4 – I often (systematically) feel spine pain.
- The section of the spine affected (if the pain occurred): cervical, thoracic, lumbar, whole spine.
- Subjective assessment of the causes of pain: long-term sitting; lifting a heavy load; high physical effort; physical exercise, performing sports; psychological stress; other (e.g. in women – menstruation); I can not give reasons.
- Measures to relieve pain: you did nothing, waited until it passed; took painkillers; you have used other means (e.g. ointment, wraps, etc.); you visited a doctor's surgery.

In order to diagnose variables that may be related to the studied problem, questions were asked regarding:

- prevalence of chronic diseases (yes/no);
- existence of an eye defect requiring wearing corrective glasses (yes/no);
- self-esteem vulnerabilities:
 - 1 – more resistant than others;
 - 2 – average resistant;
 - 3 – less resistant than others.
- Defects of posture (1 – I do not have, 2 – I do not know if I have – no one has ever examined it, 3 – I was diagnosed with a posture problem in my childhood, I went to corrective gymnastics)

Statistical analysis. For the purposes of statistical analysis of variables the frequency of occurrence of pain, self-assessment of susceptibility to stress, and the occurrence of faulty postures were assigned arbitrarily to the above-mentioned ranks. Descriptive statistics were compiled: numerical and percentages. The median {Me}, mean and standard deviation {x (SD)} were calculated. Percentages in groups were compared using the chi2 test. In other cases, analysis was performed using non-parametric tests. Correlations were calculated using Spearman's rank of correlation coefficients. Differences in inter-group comparisons: in the case of two groups determined by the Mann-Whitney U test, with more groups – using the Kruskal-Wallis ANOVA test. The assumed statistical significance level was set at $p < 0.05$.

RESULTS

The numerical and percentage combinations of the potential predictors of the occurrence of spinal pain, pain-related variables and comparison, according to gender, are presented in Table 2

The next stage of the analysis concerned the frequency of occurrence of back pain according to the adopted scale with the variables studied. The place of residence did not differentiate the occurrence of pain ($p = .1837$). Regardless of gender or age – D: $r = -.020$ ($p > .05$), CH: $r = .013$ ($p > .05$); or morphological parameters: height – D: $r = .019$ ($p > .05$); CH: $r = .053$ ($p > .05$); body weight – D: $r = .086$ ($p > .05$), CH: $r = .096$ ($p > .05$); BMI – D: $r = -.110$ ($p > .05$), CH: $r = .079$ ($p > .05$) did not correlate with the incidence of pain.

Analysis of the differences in the frequency of pain (according to the adopted scale), due to the occurrence of chronic diseases, visual defects, postural defects and self-esteem of stress susceptibility are presented in Table 3.

The division of respondents adopted in the methodology according to the occurrence of postural defects (grouping variable) differentiated the subjects as to the incidence of

Table 2. Summation of numbers and percentages of investigated variables and the comparison – disaggregated by gender

Variable	G		B		Chi2	G-B: p			
	n	%	n	%					
chronic diseases	37	12.8	23	11.0	.35	.5523			
eyesight defect	80	27.6	54	25.4	.19	.6636			
Predictors back pain	faulty posture	there is no	122	42.1	98	46.9	2.77	.2498	
		does not know if it has	44	15.2	37	17.7			
		he has, corrective gymnastics have been used	124	42.8	74	35.4			
	resistance for stress1		more resistant than others	79	27.5	105	50.7	37.74	***
			average resistant	99	34.5	69	33.3		
		less resistant than others	109	38.0	33	15.9			
		no data	3	1.05	2	1.0			
Back pain	Incidence	never, once maybe twice in a lifetime	110	37.9	94	45.0	4.84	.1842	
		several times a year	70	24.1	54	25.8			
		from time to time	81	27.9	48	23.0			
		systematically	29	10.0	13	6.2			
	Location 1,2	cervical	47	18.4	43	23.1	1.50	.2100	
		thoracic	33	12.9	14	7.5	3.26	.0709	
		lumbar	142	55.5	113	60.8	1.23	.2670	
		whole spine	34	13.3	16	8.6	2.35	.1252	
		no data	34	13.3	23	12.4			
	Reason1,2	long-term sitting	92	31.7	64	30.6	.07	.7933	
lifting a heavy load, high physical effort		57	19.7	53	25.4	2.30	.1294		
physical exercise, doing sports		31	10.7	73	34.9	43.25	***		
psychological stress		17	5.9	6	2.9	2.47	.1159		
other (eg injury, in women – menstruation)		25	8.6	12	5.7	1.47	.2259		
I can not give reasons		55	19.0	20	9.6	8.40	**		
used remedies 1,,2		nothing, waiting until it passes	171	65.8	131	70.1	.91	.3399	
		use of painkillers	33	12.7	13	7.0	3.88	*	
		oiling, wraps	36	13.8	24	12.8	.10	.7569	
		medical advice	21	8.1	26	13.9	3.92	*	
	no data	30	11.5	22	11.8				

Legend: 1 there were missing data; 2 multiple choice options; * P <.05; ** p <.01, *** p <.001

Table 3. The frequency of spine pain and investigated predictors of their occurrence

Variable	The frequency of spine pain					
	n	Me	x(SD)	Z-corr	Chi2 (df)	p
Chronic diseasesI	Yes	60	2.00	2.23 (1.11)	-1.557	0.1194
	No	444	2.00	1.99 (0.99)		
Eyesight defects I	Yes	134	2.00	2.20 (0.98)	-2.628	**
	No	370	2.00	1.95 (1.00)		
Faulty posture II	There is no	223	1.00	1.74 (0.87)	24.38 (2)	***
	Does not know if it has	81	2.00	2.16 (0.98)		
	It has	200	2.00	2.27 (1.07)		
Resistance for stress II	More resistant	186	1.00	1.81 (0.96)	16.89 (4)	***
	Average resistant	169	2.00	1.96 (0.95)		
	Less resistant than others	144	2.00	2.35 (1.05)		

Legend: I- Mann-Whitney U test; II – Kruskal-Wallis ANOVA; ** p <.01; *** p <.001

pain. Multiple comparisons (two-sided) showed “there are none” – “does not know if it exists” – p <.01; “there are none” – “exists” – p <.0001. The results are presented in Figure 1.

Comparisons of groups according to stress-tolerance self-assessment (grouping variable) showed “more resistant” – “average resistant”: p =.4748; “more resistant” – less resistant: p <.0001; “average resistant” – “less resistant” – p <.01 (Fig. 2).

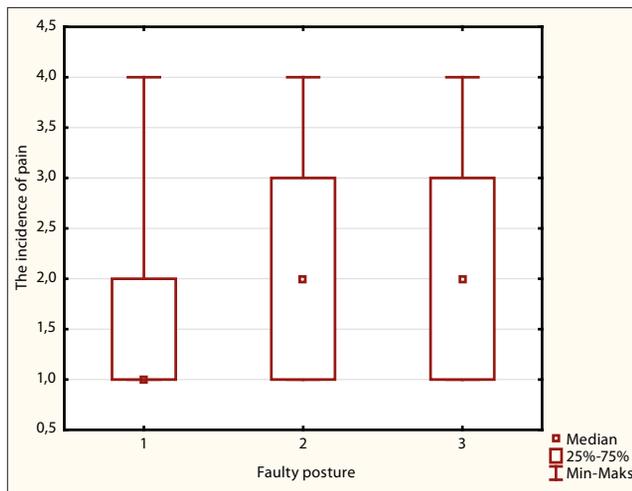


Figure 1. The incidence of back pain – differentiating variable: the occurrence of postural defects

Legend: the frequency of pain: 1- never, maybe once or twice in life, 2- It happens that my spine hurts – several times a year, 3- I feel spine pain from time to time, 4- I often (systematically) feel spine pain; Faulty posture: 1 – There is no, 2 – Does not know if it has, 3 – It has

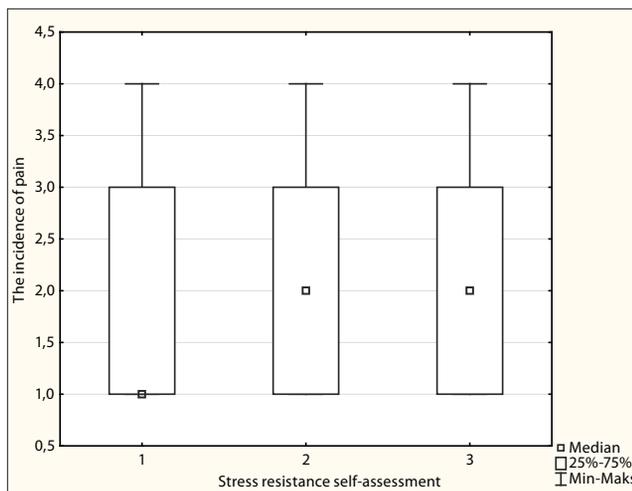


Figure 2. The incidence of back pain – groups determined by stress resistance self-assessment

Legend: the frequency of pain: 1- never, maybe once or twice in life, 2- It happens that my spine hurts – several times a year, 3- I feel spine pain from time to time, 4- I often (systematically) feel spine pain; Stress resistance self-assessment: 1- more resistant, 2 – Average resistant, 3 – Less resistant than others

DISCUSSION

The presented data confirms the scale of the problem of back pain in adolescents as presented in the medical literature. In the first, more widely known studies devoted to this issue, Balagué et al., after examining more than 1,700 young people, found that on average this problem concerned about 33% of respondents. These authors noted a growing trend with age, from 1% in 7-year-olds to 38/71% in adolescents aged 12–15 [11]. Drozd et al. on a group of 1,475 adolescents found pain incidents in 67% of respondents and recurrent pain in 49% [18]. In turn, Kędra and Czaprowski presented in the results of their research, higher data on the occurrence of pain in more than 76% of respondents [19]. Discrepancies regarding the estimates of young people who have back problems may result from differences in measurement

methods and the time when the study was performed. The methodology for examining the occurrence of spinal pain may refer to both the entire life span and the specific time interval preceding the examination. It is also important to select the study group, especially considering exposure to potential risk factors.

Regardless of the percentage differences in the results of individual researchers, the scale of this problem is very serious, covering more than a half of the population. Observers of contemporary lifestyle changes, also concerning (and maybe above all) young people, they can significantly modify the risk factors and the incidence of spinal pain [20].

Risk factors for back pain in children and adolescents are complex. Jones grouped them into four categories: anthropometric variables, lifestyle elements, joint overloading and psychosocial and behavioural factors [8]. This division can be discussed in the lifestyle, where there occur behaviours in the social context. Irrespective of the critical approaches to the methodological basis of divisions, the literature most often mentions: biological (structural), anthropometric, psychological factors and lifestyle elements [21, 22, 23].

In the presented study, no correlation was found between age and morphological parameters with the frequency of pain. According to the literature, the prevalence increases with age [18]. The presented results, however, do not confirm this. This can be explained by the age range of the respondents. From the biological point of view, it can be assumed that the majority of the respondents had a puberty jump behind them, and its consequences in the form of spinal pain, resulting from disturbances of body proportions during this period, are individual in nature, and not reflected in population studies [8]. It should also be added that the data on height and body weight were given by the subjects themselves, which suggests some margin of error, which constitutes some limitation in this study, typical for population studies. In turn, taking into account the psychological and behavioural conditions, the results suggest a certain homogeneity of the subjects due to their age.

Analysing the variation of the risk factors assumed in the methodology of this study – due to gender there were differences only in the self-assessment of resistance to stress. It seems that this is a natural manifestation of gender dimorphism. Gender, however, was not a differentiating variable at the level of statistically significant prevalence of pain (Tab. 2), although the percentages for systematic pain sensation among girls were higher. In medical literature, the results of research and views on the relationship between genders and the incidence of back pain are varied. However, the results indicating the lumbar region as the most frequent location of pain (Tab. 2), are also confirmed in this case, the already known epidemiological studies and the focus of researchers on this problem [8, 20].

However, there were various reasons for the occurrence of pain in girls and boys. A much larger percentage of girls than boys could not give reasons, also more girls than boys gave psychological stress as the reason, which corresponds to the data on self-esteem of stress susceptibility (Tab. 2). The importance of psychological factors in the expression of pain is widely known and has also been confirmed by the results of the presented study [24]. These factors may also be associated with the occurrence of pain in people who cannot clearly indicate the reasons for its occurrence. Among boys, the dominant reason proved to be sports and physical exercise.

The views of researchers on the activity or lack thereof with the occurrence of pain are not conclusive [11, 20].

The problem seems to be very complex, if only because of the vastness of the area of physical activity itself (conditions, types, intensity, frequency, various types of consequences, and a number of others), and the formulation of unambiguous conclusions regarding the relationship with pain is at least risky. In the presented study, the cause of pain most frequently given by boys – activity, was probably related to differences regarding the intensity of activity and its type [25].

Analysis of pain predictors clearly indicated three basic elements related to the sensation of back pain. These are eye defects, postural defects and stress susceptibility analysed above (Tab. 3). Association of the occurrence of eye defects with spinal pain has not been studied extensively. The zero-one division adopted in the methodology of this study concerning the occurrence of defects indicates only the existence of a problem. Its background can be much wider and can be related to the general perception of health, habits regarding body posture, or the preferred lifestyle, especially in the context of activity. This subjective perception of health can be crucial, regardless of the occurrence of chronic diseases (Tab. 2). The results seem to indicate that the sense of non-dysfunction clearly differentiates the positive variable – the frequency of pain (Tab. 3). This also applies to faulty posture (Fig. 1). The problem of posture defects in children and adolescents is a vast issue, mainly in the preventive context. It seems that in addition to finding a defect and taking appropriate measures, it is important to present the meaning and consequences of this problem to the perceptual capabilities of young people.

Each cross-sectional study, in addition to a number of advantages, also brings with it some weaknesses. The weaknesses include, for example, the lack of possibility of timing analysis, including sometimes detailed risk factors, or interrelations between them. The advantages, it seems, are an outline of the scale and social significance of the problem, as well as variables related to the discussed problem. The determinants of the occurrence of spinal pain in young people seem to be more complex than assumed in previous studies. Therefore, it is suggested that categorical classification presented in meta-analyses should be approached with some caution. The statements about “superiority” of interventional observations over cross-sectional investigations also appear to be debatable; others are their premises. There is no reason to undermine the principle that “... prevention is better than cure”. To prevent – “you need to know the risk...”

CONCLUSIONS

Spinal pains are common and affect more than a half of high school students in Upper Silesia. The most common location was the lumbar section. Factors affecting the frequency of pain are: susceptibility to stress, vision defects and postural defects.

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Ból kręgosłupa wśród młodzieży szkół średnich województwa śląskiego skala problemu i jego przyczyny

■ Streszczenie

Cel pracy. Bóle kręgosłupa są istotnym problemem społecznym dotyczącym większości populacji osób dorosłych, stanowiąc główną przyczynę niepełnosprawności. Liczne badania prowadzone w różnych populacjach pokazują, że jest to również znaczący problem wśród dzieci i młodzieży. Postanowiono zbadać częstość występowania bólu kręgosłupa u młodzieży szkół średnich – zarówno skalę tego problemu, jak i to, które odcinki kręgosłupa obejmuje i w jakim stopniu dotyczy badanych. Analizie poddano również wybrane ewentualne czynniki ryzyka oraz stosowane środki zaradcze.

Materiał i metody. Zbadano 499 osób: 290 dziewcząt i 209 chłopców w wieku 16–18 lat – uczniów sześciu szkół średnich województwa śląskiego. Zastosowano zweryfikowany autorski kwestionariusz ankiety. Pytania dotyczyły występowania bólu kręgosłupa: częstości, lokalizacji, przyczyn, czynników ryzyka oraz stosowanych środków zaradczych.

Wyniki. Tylko 37,9% dziewcząt i 45% chłopców nie miało incydentów bólowych. Nie stwierdzono związków wieku i parametrów morfologicznych z częstością występowania bólu. Za najczęstszą przyczynę bólu podawano długotrwałe siedzenie – 35,5% dziewcząt i 34,2% chłopców. Płeć różnicowała przyczyny bólu: na ćwiczenia fizyczne ($p < 0,001$) jako źródło bólu częściej wskazywali chłopcy, zaś brak określenia jego przyczyn ($p < 0,01$) częściej deklarowały dziewczęta.

Wnioski. Bóle kręgosłupa mają charakter powszechny i dotyczą ponad połowy uczniów szkół średnich Górnego Śląska. Najczęstszą lokalizacją bólu jest odcinek lędźwiowy. Czynniki wpływające na częstość występowania bólu to: podatność na stres, wady wzroku oraz wady postawy.

■ Słowa kluczowe

młodzież, czynniki ryzyka, epidemiologia, bóle kręgosłupa