

SCHOOL DESKS AND INCORRECT LORDOTIC BODY POSTURE

UDC: 616.711-007.53-056.25
(Preliminary communication)

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Abstract

The subject of this research is to determine the amount of patience and correlation of postural disorders in the sagittal plane - irregular kifotic posture and the adequacy of school desks. Conducted with a population of a fifth grade pupils (12 years + / - 6 months), in Kragujevac, a number of respondents was 299. For the evaluation of irregular kifotic posture, we used the method of somatoscopy and somatometry, and adequacy of school desks, was evaluated by a questionnaire completed by the students covered by the program. When asked "Are the school benches suitable for reading and writing?", we offered the answers: yes, I don't know and not. Based on the subjective assessment of the students, we were carried out further analysis. Based on the research, the findings shows that there is no statistically significant association between the irregular and poor kifotic posture school desk comfort for writing and reading. Obtaining these results can be attributed to the subjective perception of respondents about the school desk comfort for writing and reading without going into the analysis of the level of information the respondents in this age group on the ergonomic requirements of the school desks, the optimal physiological position of the body, and therefore the spinal column while sitting.

Keywords: *students, good body posture, somatoscopy, somatometry, questionnaire, anthropometric characteristics, χ^2 -test*

INTRODUCTION

Poor posture of the body does not always mean a disease and, on the other hand, a good posture helps the body to function perfectly in everyday life. It is well known that the human body functions best when its parts are well balanced in sleeping positions, while sitting, walking, standing, or within any other activity. Hitherto, many studies addressing the assessment of bodily posture, selecting the best indicators, and evaluating the reliability of these procedures (Stefanović, Finogenov, Tasić, Rašić, Nikolić, Jovanović, Kolarić, Ikonić, Milutinović, & Stanisavljević, 1972; Watson and Mac Donncha, 2000; Straker and Mekhi, 2000; Paušić, 2005). All these studies, as well as the

unlisted ones, were carried out in order to detect irregularities in bodily attitude of children and the adults.

Disturbances in body posture in children, based on previous research and statistical data, mainly were caused by a muscle weakness of the region back, chest or abdomen. Also, the weakness of the pelvic muscles waist and lower extremities can lead to secondary disturbances in the upper parts. The primary changes usually occur at first within the muscles, and then there is a change in ligament apparatus, and at the end, within the bone system. Poor posture of the body in the essence represents one initial stage of a potential particular deformity. Fast and asymmetrical growth in the children's age, along

with other elements of the particular school age (carrying school bags, working conditions in schools, conditions at home: bed and sleeping pillow, chairs and table for school seating, etc.), are very important elements in the emerging deformation of the spine. Research shows a worrying percentage of these disorders where appropriate correction or medical treatment has been required and if there is no action on time, it can have far reaching consequences both for the individual and for the whole community.

Lordosis is increased physiological spine curvatures in the sagittal (anterior-posterior) plane in the lumbar part, which convexity is facing forward. Characterized by the fact that the head slightly backwards from the vertical line, the chest is flat or bulging, physiological lordotic curve in the lumbar part is increased, the pelvis as a whole moved forward and down, the belly is flabby and bulging, hips are slightly moved forward, knees are in strengthened extension (hyperextension), and feet are often insufficient.

A large number of registered poor posture kifotic types talk about the process of rapid growth and development of the skeleton, loss of spinal muscular endurance, lack of bodily hygiene, lack of physical activity and preventive-corrective model of exercise - Jovovic, V. (2003), Bogdanovic, Z. (2008).

Correct position while sitting is essential for normal functioning of the organism, and of inestimable importance. Classroom desks, is one of the most important exogenous factors that have a direct impact on the proper or improper growth and development, which continuously affects on the loco motor apparatus of the child every day 4-5 times, with a 45 minutes duration. Ergonomic science is concerned with the design of products so that they are best adapted to the human body, the ergonomists, physiotherapists and health professionals, indicates that the dimensions of school furniture have to accommodate children of different heights and sizes, and were not changed in the past 30 years.

Many studies shows that the ergonomics plays an important role in the design and implementation of an appropriate designed school furniture, including studies conducted in Taiwan, relates to the ergonomic design of desks and chairs for elementary students, based on anthropometric

characteristics of students (Rungtai, L., Yen-Yu, K.).

The subject of this research is to determine the stability and high correlation of postural disorder in the sagittal plane - lordotic bad posture of the body, the adequacy of school benches, and the students' population of younger school age. The aim was to determine the number of students with lordotic body posture, to determine the presence of disorder, depending on their gender, and to determine the existence and degree of connectivity, and the inadequacy of school desks with lordotic bad posture of the body

METHODS

The study was conducted on school age students of the fifth grade (12 years + / - 6 months), on the territory of the city of Kragujevac. The survey included 299 students from several elementary schools from urban and suburban areas.

For the assessment of body posture lordotic we used the method of somatoscopy and somatometry. Toward determining the bad posture we used the mean value of more lenient criteria. All respondents who had a higher value of 45 mm. are registered as participants with lordotic bad posture of the body.

The impact of adequacy of the school desks, as one of the exogenous factors that affects the poor posture of the body, has been evaluated based on a questionnaire completed by pupils included in this program. When asked " Whether the school tables are suitable for writing and reading?", the offered answers were: YES, I DO NOT KNOW and NO. Based on subjective student's assessment questionnaire results, a further analysis has been conducted. Based on the statistical significance between categories of respondents according to the indicators of control variables, it has been calculated the chi-square test of independence, which explores the relationship between the two categorical variables, which are based on the cross-table, the table where the category one variable is crossed with other categories.

The existence and size of the correlation between the researched data scope was calculated by Pearson chi-square test and contingency coefficient as a measure of association based on the X square test. All analyzes were performed on a personal computer using statistical package

for data analysis (SPSS 8.1 Statistical Package of Social Sciences - For Windows).

RESULTS

Within the 299 subjects (Table 1), on the question: "Whether the school tables are suitable for writing and reading?", 64.88% responded positively, 22.74% of which the school tables does not suit for them, and 12.37% were neutral.

Table 2. presents the results of lordotic bad postural body depending on whether the school table is suitable for writing and reading. We noticed that the largest presence of poor posture was present within the category where respondents answered positively toward the school table suitability for writing and reading (58.88%), followed by respondents that they do not match (27.77%), while the lowest

Table 1. Whether the school tables are suitable for writing and reading?

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	194	64,88	64,88	64,88
I do not know	37	12,37	12,37	77,25
No	68	22,74	22,74	100
Total	299	100	100	
	299	100		

Table 2. Lordotic posture / Whether the school tables are suitable for writing and reading?

Lordotic posture		Whether the school tables are suitable for writing and reading?			Total
		Yes	I do not know	No	
Good posture	Count	140	25	43	208
	%	67,30	12,01	20,67	100
Poor posture	Count	53	12	25	90
	%	58,88	13,33	27,77	100
Total	Count	27,46	32,43	36,76	30,20
	%	193	37	68	298
	%	64,76	12,41	22,81	100
		100	100	100	100

percentage (13.33%) is within the group of undecided respondents.

If we analyze lordotic bad posture within the group of respondents, the largest percentage

Table 3. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2,16	2	0,33
Contingency Coefficient	0,08		0,33
N of Valid Cases	298		

of bad posture we noticed within the respondents' category where they negatively mark the school tables suitability (36.76%).

Within the Table 3., the 2.16 value of Pearson square test, and contingency coefficient of 0.08, within the level of significance at 0.33, indicates the absence of statistically significant

association of lordotic postural calf and comfort of the school desk for reading and writing.

Table 4. presents the results of the respondents belonging to their gender. Within the male subjects, most notably was the percentage of poor body posture (66.66%) in the category of subjects that the school desks are suitable for writing and

*Table 4. Lordotic posture / Whether the school tables are suitable for writing and reading?/
Gender of respondent*

Gender of respondent	Lordotic posture	Whether the school tables are suitable for writing and reading?			Total		
		Yes	I do not know	No			
Male	Good posture	Count	67	15	21	103	
		%	65,04	14,56	20,38	100	
	Poor posture	Count	22	1	10	33	
		%	66,66	3,03	30,30	100	
	Total	Count	89	16	31	136	
		%	65,44	11,76	22,79	100	
	Female	Good posture	Count	73	10	22	105
			%	69,52	9,52	20,95	100
		Poor posture	Count	31	11	15	57
			%	54,38	19,29	26,31	100
Total		Count	29,80	52,38	40,54	35,18	
		%	100	100	100	100	
Total		Count	104	21	37	162	
		%	64,19	12,96	22,83	100	
		Count	100	100	100	100	

reading, followed by respondents with negative answered the question (30.30%), and finally the subjects with neutral opinion (3.03%).

If we analyze the results of the group responses, then we can see that the highest percentage of poor posture (32.25%) is within the group where respondents answer that the school desks are not suitable for the school, followed by a group of subjects that they positively mark the desk suitability with 24.71% and at the end consisted of neutral respondents with 6.25%.

For the female respondents also we can see that most of them with bad posture were in the group of responses which were satisfied with the school desks (54.38%), with a much smaller

percentage of respondents which they do not match the school desks suitable (26.31%).

When analyzing the results of the group responses, then we can see that the highest percentage of poor posture (52.38%) is present in a group of neutral respondents, followed by a slightly smaller percentage (40.54%) of a group of girls to whom the school desks that does not suit.

The Pearson's chi square test values of 3.91 within boys and 4.5 for girls, as well as contingency coefficient of 0:16 for boys and 0.16 for girls in Table 5. show the level of significance of 0:14 and 0.10, indicating that there was no statistically significant association

Table 5. Chi-Square Tests - Lordotic keeping the body / Whether the school tables are suitable for writing and reading? / Gender of respondent

Gender of respondent		Value	df	Asymp. Sig. (2-sided)
Male	Pearson Chi-Square	3,91	2	0,14
	Contingency Coefficient	0,16		0,14
	N of Valid Cases	136		
Female	Pearson Chi-Square	4,5	2	0,10
	Contingency Coefficient	0,16		0,10
	N of Valid Cases	162		

of lordotic poor posture and comfort of a school desk for writing and reading, regarding the half of the respondents' gender.

DISCUSSION

The largest poor posture presence was in the category where the respondents positively evaluated the school tables for writing and reading, followed by the subjects which claim that the desks does not suit them, while the lowest percentage of poor posture was within the group of neutral respondents.

The Chi squared Pearson's test value and the contingency coefficient, together with the level of significance, indicates the absence of a statistically significant association of lordotic bad posture, calf and comfort of the school desk for reading and writing.

Within respondents both male and female, most of the notably percentage of poor body posture were within the category of subjects that positively marks the school desks for writing and reading, following by the subjects who negatively marked the benches, and as the last subject group, the neutrals.

The results analysis within the male group subjects responses, shows that the highest percentage of poor posture was within the group where respondents answered that the school benches does not suit for them, which followed by a group of subjects which is consistent of a positively marked school benches suitability for writing and reading, and at the end, followed by the neutral respondents.

The results within the female students shows that the highest percentage of poor body posture are in the group of neutral

respondents, followed by a group with a slightly smaller percentage which evaluated as non suitable for writing and reading the school benches.

The values of Pearson's chi-square tests and contingency coefficient, within the boys and the girls, with a level of significance, indicates that there was no statistically significant association of the lordotic poor body posture and comfort of a school desk for writing and reading, within the half of the respondents.

CONCLUSION

Based on this study, these results indicates that there was no statistically significant association between the lordotic poor body posture and comfort of a school desk for writing and reading. Obtaining these results can be attributed to the subjective assessments of respondents about the comfort of a school desk for writing and reading rather than going into an analysis of the level of awareness of respondents of this age on the ergonomic requirements of a school desk, the optimal physiological position of the body, and therefore the spine, when sitting.

To obtain more quality data, it's needed to carry out an analysis of the level of awareness of respondents about the ergonomics of the school desks, and the criteria that the school desks need to meet. It is also necessary to analyze the individual anthropometric indicators, body posture while sitting, and at the end to make a biomechanical analysis of the spine in correlation with all these variables.

A Taiwan study (Rungtai, L., Yen-Yu, K.) shows that based on studies of anthropometric characteristics of Taiwanese students identified

different types of body figures of students. It has been established 10 types of tables and 5 types of chairs, which should have every school, varying by their surface and by their height. This study could be an indication of how the anthropometric and ergonomic characteristics together could participate in designing and manufacturing of the school furniture.

A research study conducted in Brazil (Rocha de SIQUEIRA, G. Bezerra de Oliveira, A., Guerra Vieira, R., A. 2008), shows that school chairs and tables outside the technical standards prescribed by the Brazilian Association for Standards and Technology, as well as the anthropometric measures are not quite adequate for the students.

The paper of Jeong In. and Park Ks. (1990), on 1248 Korean respondents, aged from 6 to 17 years were researched the relationship between the body posture and the school furniture. Research has shown that there is a significant difference in attitude towards school furniture depending on the gender and the student's affiliation.

Saarni L, Nygård CH, Kaukiainen, Rimpelä. (2007) at their study on 145 respondents in Finland, aged 12-14 years, has been explored how sitting at school desk and chair influences on the students. The study showed that the tables were average 13 cm above their elbow, the height between the floor and the chair was 2 cm below the popliteal level. The results showed that there was a mismatch between the school furniture dimensions and the anthropometric dimensions. They were concluded that the students were sitting in a wrong position for the greater part of the school time.

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УЧИЛИШНАТА КЛУПА И ЛОРДОТИЧНОТО ЛОШО ДРЖЕЊЕ НА ТЕЛОТО

УДК: 616.711-007.53-056.25
(Прелиходно соопштение)

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Апстракт

Целта на истражувањето беше да се утврди постоењето и степенот на поврзаноста на постуралното нарушување во сагитална рамнина – лордотичното држење на телото со приспособеноста кон училишната клупа. Истражувањето е реализирано врз популацијата ученици од петтите одделенија (12 години ± 6 месеци) на територијата на градот Крагуевац. Примерокот на испитаниците беше дефиниран со 299 ученици од машки и женски пол. За проценување на лордотичното држење на телото, користена е методата на соматоскопија и соматометрија. Адекватноста на училишната клупа е проценувана врз основа на анкетен Прашалник кој беше пополнет од примерокот на учениците. Прашалникот го содржеше прашањето: „Дали училишната клупа ти одговара за читање и пишување“. Прашањето имаше три алтернативни одговори: „да“, „не знам“ и „не“. Одговорите беа основа за натамошната анализа. Врз основа на добиените резултати е утврдено дека не постои статистички значајна поврзаност меѓу лордотичното лошо држење и приспособеноста на училишната клупа за пишување и читање. Ваквите резултати може да се препишат на субјективната проценка на испитаниците за приспособеноста на таквата училишната клупа, не навлегувајќи и во анализата за нивото на информираноста на испитаниците од оваа возраст за ергономските барања на училишната клупа, за оптималната физиолошка положба на телото, а со тоа и на рбетниот столб при седењето во училиште.

Клучни зборови: *ученици и ученички, добро држење на телото, соматоскопија, соматометрија, анкетен прашалник, антропометриски карактеристики, χ²-тест,*

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