DOI: http://dx.doi.org/10.1590/1413-785220152305148842

LOW BACK PAIN IN SCHOOLCHILDREN: A CROSS-SECTIONAL STUDY IN A WESTERN CITY OF SÃO PAULO STATE, BRAZIL

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ABSTRACT

Objective: To determine the prevalence of low back pain in children and its relationship with gender, age, exercise practice and sedentary activities (time on TV and on computer and/or video game). Methods: We conducted a cross-sectional study with a sample of 1,461 students, being 754 males and 707 females enrolled in the 5th to 8th grades of all five local elementary schools of urban Ourinhos, SP, Brasil, aged 10-14 years old, from whom sociodemographic data, time spent on sedentary activities such as TV and computer and/or video game were collected. We conducted a descriptive, bivariate and multivariate binary logistic regression. Results: The results showed that the prevalence of low back pain in the sample was 18.5%, being 15.5% in boys and 21.6% in girls. Low back pain was associated to the female gender, age range between 12-14 years and the habit of watching TV more than three times a week and over 3 hours per day. Conclusion: The students analyzed showed high prevalence of low back pain related to gender, age and habit of watching TV. Appropriate interventions should be implemented to reduce the occurrences of back pain in schoolchildren. ***Level of Evidence III, Cross Sectioning.***

Keywords: Low back pain. Students. Adolescent. Risk factors.

Citation: Fernandes JAA, Genebra CVS, Maciel NM, Fiorelli A, Conti MHS, De Vitta A. Low back pain in schoolchildren: a cross-sectional study in a western city of São Paulo State, Brazil. Acta Ortop Bras. [online]. 2015;23(5):235-8. Available from URL: http://www.scielo.br/aob.

INTRODUCTION

Low back pain has been recently identified as a public health problem in many countries. In a systematic review which included 30 studies between 1980 and 2011, the average low back pain rate was 38.5%;[1] in Finland[2] it is 12.0%, in São Paulo (SP, Brazil) 19.5%,[3] in Pelotas (RS, Brazil) 13.7% and 31.6% in southern Brazil.[4]

The main risk factors for low back pain are gender, obesity, decreased flexibility and mobility of muscles, hypermobility, depression, level of education, competition sports, type and way of carrying and transporting weight, postural habits, level of physical activity and smoking, occupational and ergonomic factors and domestic factors such as watching TV and computer/videogame.[2,4]

The relevance of this type of study lies in the fact that adolescents in general will likely use the computer and its technologies in their professional activities and therefore will be exposed to risk factors that influence their quality of life, besides helping to understand its global causes, and may determine whether the factors differ among sociocultural characteristics.

Thus, the objective of this study was to verify the prevalence of low back pain in schoolchildren and its relationship with gender, age, exercise practice and sedentary activities (TV, computer and/or video game).

MATERIALS AND METHODS

An observational, cross-sectional, epidemiological study was performed in the 2009 school year and approved by the Ethics Committee (Process N° 119), in the city of Ourinhos, SP, Brazil. According to the Department of Education, there were 6,650 elementary school students, of which 4,005 (60.1%) enrolled in the state public system, 898 (13.5%) in private schools and 1,693 (25.4%) in the municipal public system.

Considering these percentages, all schoolchildren attending every municipal public elementary school (5th to 8th grades) in the city (six units) were enrolled in the study. This option was due to the availability of access to the municipal school network due to an agreement between the University and the City Department of Education (Secretaria Municipal de Educação). This situation did not occur in private and state public schools. Data collection occurred from February to May 2009, with the collaboration of class teachers, which sent one student at a

All the authors declare that there is no potential conflict of interest referring to this article.

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Article received in 04/22/2015, approved in 06/12/2015.

time to answer a questionnaire. The objectives of the study were explained to each student and then the researcher performed a structured interview question by question. Each individual approach took approximately twenty minutes.

The criteria adopted for exclusion were: age below 10 or over 14 years; failure to present the Free and Informed Consent form signed by parents/guardians or refusal to participate.

The researchers were trained based on a standardized protocol of data collection procedures (theoretical and practical) previously established to minimize possible mistakes intra and inter evaluator. The technical error of measurement among the collection team was not determined, but 10% of the schoolchildren sample was measured in duplicate to control the quality of the questionnaires.

The variables considered independent (age, gender, school year and level of sedentary activities - time on TV and computer and/or video game), were collected through the questionnaire, consisting of the following questions: Age (10, 11, 12, 13 and 14 years old); gender; "In a normal school week do you watch TV?" (Yes No); "In a normal school week, how often do you watch TV?" (Once, twice, three times, four times, five times or more per week); "On a normal school day, how many hours do you watch TV?" (Less than one hour, two hours, three hours, four hours, five hours or more per day); "In a normal school week, how often do you use computer or video games at home?" (Once, twice, three times, four times, five times or more per week); "On a normal school day, how many hours do you use computer or video game at home?" (Less than one hour, two hours, three hours, four hours, five hours or more per day).

The dependent variable - low back pain - was observed through the Nordic questionnaire, adapted to the Brazilian culture by Barros.[5] Pain was defined as pain or discomfort in the last twelve months, not related to trauma or menstrual cramps. At the time of the interview the following question was asked to students: "Did you experience pain in the lumbar spine (lower back) last year?". For the sake of specificity about the location of the pain, in addition to verbal questioning, a picture of the spine in different colors was presented in order to identify the lumbar spine region. This type of tool is valid and reliable to measure pain in schoolchildren, since it enables them to be very specific about the location of pain.

Data were entered into a database and submitted to SPSS (version 10.0). In the descriptive approach distributions of absolute and relative frequencies for categorical variables were made. For continuous variables, mean standard deviation was measured. A bivariate analysis was made using the chi-square test and then, a multivariate binary logistic regression using hierarchical analysis. The method of introducing variables in the models adopted was the "backward stepwise". A significance level of 5% was considered and a confidence interval (CI) of 95% was used to calculate the adjusted "odds ratios".[6]

RESULTS

The total population enrolled was 1,693 schoolchildren. Of these, 1.461 answered the questionnaire, 48 (2.8%) refused to participate and 184 (10.9%) were aged above 14 years. Therefore, 1,461 schoolchildren answered the questionnaire, 754 male and 707 female. Table 1 shows that 31.6% of boys and 29.3% girls were fourteen years old, 68.8% of boys practiced sports and 62.4% of girls did not, 98.6% of boys and 99.0% of girls watched TV and 65.0% of male adolescents and 73.5% of female adolescents spent more than three times a week and up to 3 hours per day using this equipment.

Regarding computer, 74.4% of boys and 59.7% of girls used it, and 35.7% of boys and 30.6% of girls reported using it more than twice a week and over 3 hours per day.

The prevalence of low back pain in the schoolchildren sample was 18.5% of the students, representing 15.5% of boys and 21.6% of girls. Table 2 shows that there was an association between gender and sports practiced outside school with lower back pain.

Table 3 shows statistical significance with the number of times per week spent watching TV, hours using computer and the combination of hours and frequency of watching TV.

Factors associated with low back pain were female gender, age 12-14 years and the students who watched TV more than three times a week and up to 3 hours a day. (Table 4)

Table 1. Distribution of absolute and relative frequencies of age range, sports practice and sedentary activities, according to gender. (Ourinhos, SP, Brazil, 2009).

Variables	Response	Gender	
		Masculine (n = 754)	Feminine (n = 707)
Age (years old)	10	41 (5.4%)	55 (7.8%)
	11	111 (14.7%)	111 (15.7%)
	12	161 (21.4%)	153 (21.6%)
	13	202 (26.8%)	182 (25.7%)
	14	238 (31.6%)	207 (29.2%)
Sports practice outside school	No	235 (31.2%)	441 (62.3%)
	Yes	518 (68.8%)	267 (37.7%)
Watches TV	No	10 (1.3%)	7 (1.0%)
	Yes	743 (98.7%)	701 (99.0%)
Number of times per week watching TV	Up to 2	253 (33.6%)	181 (25.6%)
	More than 2	490 (65.1%)	520 (73.4%)
Hours watching TV per day	Up to 2	175 (23.2%)	169 (23.9%)
	More than 2	568 (75.4%)	532 (75.1%)
Number of times per week and hours per day watching TV	Less than 2 times per week and 2 hours per day	101 (13.4%)	95 (13.4%)
	Up to 2 times per week and 2 hours per day	152 (20.2%)	86 (12.1%)
	More than 3 times per week and 3 hours per day	480 (65.0%)	520 (73.5%)
Uses computer	No	193 (25.6%)	285 (40.3%)
	Yes	560 (74.4%)	423 (59.7%)
Number of times per week using computer	Up to 2	203 (27.0%)	206 (29.1%)
	More than 2	357 (47.4%)	217 (30.6%)
Hours using computer per day	Up to 2	301 (40.0%)	274 (38.7%)
	More than 2	259 (34.4%)	149 (21.0%)
Number of times per week and hours per day using computer	Less than 2 times per week and 2 hours per day	148 (19.7%)	174 (24.6%)
	Up to 2 times per week and 2 hours per day	55 (7.3%)	32 (4.5%)
	More than 3 times per week and 3 hours per day	357 (47.4%)	217 (30.6%)

Table 2. Distribution of absolute and relative frequencies of gender, age range and sports practice according to lumbar pain. (Ourinhos, SP, Brazil, 2009).

Risk factors		Lumbar pain		Test
		No	Yes	
Gender	Masculine	636 (53.4%)	117 (43.3%)	$\chi^2 = 8.925$ $p = 0.002$
	Feminine	555 (46.6%)	153 (56.7%)	
Age (years old)	10	80 (6.7%)	16 (5.9%)	$\chi^2 = 5.389$ $p = 0.06$
	11	184 (15.4%)	38 (14.1%)	
	12	263 (22.1%)	51 (18.9%)	
	13	317 (26.6%)	67 (24.8%)	
	14	34 (29.1%)	98 (36.3%)	
Sports practice	No	532 (44.7%)	144 (53.3%)	$\chi^2 = 6.643$ $p = 0.006$
	Yes	659 (55.3%)	126 (46.7%)	

Table 3. Distribution of absolute and relative frequencies of sedentary activities according to lumbar pain and statistical test. (Ourinhos, SP, Brazil, 2009).

Factors		Lumbar pain		Test
		Não	Sim	
Watches TV	No	17 (1.4%)	0 (.0%)	$\chi^2 = 3.897$ $p = 0.03$
	Yes	1174 (98.6%)	270 (100.0%)	
Number of times per week watching TV	Up to 2	366 (30.7%)	68 (25.2%)	$\chi^2 = 7.680$ $p = 0.01$
	More than 2	808 (67.8%)	202 (74.8%)	
Hours watching TV per day	Up to 2	289 (24.3%)	55 (20.4%)	$\chi^2 = 6.100$ $p = 0.04$
	More than 2	885 (74.3%)	215 (79.6%)	
Number of times per week and hours per day watching TV	Less than 2 times per week and 2 hours per day	163 (13.7%)	33 (12.2%)	$\chi^2 = 11.040$ $p = 0.02$
	Up to 2 times per week and 2 hours per day	203 (17.0%)	35 (13.0%)	
	More than 3 times per week and 3 hours per day	708 (67.9%)	182 (74.8%)	
Uses computer	No	391 (32.8%)	87 (32.2%)	$\chi^2 = 0.037$ $p = 0.45$
	Yes	800 (67.2%)	183 (67.8%)	
Number of times per week using computer	Up to 2	336 (28.2%)	73 (27.0%)	$\chi^2 = 0.311$ $p = 0.63$
	More than 2	464 (39.0%)	110 (40.7%)	
Hours using computer per day	Up to 2	464 (39.0%)	111 (41.1%)	$\chi^2 = 0.472$ $p = 0.79$
	More than 2	336 (28.2%)	72 (26.7%)	
Number of times per week and hours per day using computer	Less than 2 times per week and 2 hours per day	260 (21.8%)	62 (23.0%)	$\chi^2 = 2.535$ $p = 0.63$
	Up to 2 times per week and 2 hours per day	76 (6.4%)	11 (4.1%)	
	More than 3 times per week and 3 hours per day	464 (38.9%)	110 (40.7%)	

Tabela 4. Resultado da análise multivariada de regressão logística, Modelo Final para associações independentes com a dor lombar. (Ourinhos, 2009).

Factor	*p* value	Adjusted OR / CI 95%
Age range		
10 a 11 years old		1.00
12 a 14years old	0.04	1.13 (1.05 – 1.25)
Gender		
Masculine	0.004	1.00
Feminine		1.49 (1.13 – 1.93)
Number of times per week and hours per day watching TV		
Less than 2 times per week and 2 hours per day		1.00
Up to 2 times per week and 2 hours per day	0.20	1.31 (0.86 – 1.96)
More than 3 times per week and 3 hours per day	0.03	1.53 (1.04 – 2.27)

DISCUSSION

The results of this study show that the prevalence of low back pain (18.5%) is, in general, similar to that reported in the literature, which vary between 13% and 34.5%, according to studies. In the city of Pelotas (RS, Brazil)[3] it was 13.7%; in São Paulo (SP, Brazil), 19.5%;[2] in southern Brazil, 31.6%;[7] 28.4% in tunisians[8] and 28.9% in japoneses.[9] These variations may be related to the definition of pain in the lumbar regions, the differences between populations, to time of exposure and psychological factors.

Regarding gender, it was noticed that women were 14% more likely to have back pain than men. In Sao Paulo[2] girls were about twice as likely to have back pain as boys, in southern Brazil the risk was 12% higher in girls, and in a private school in the city of Porto Alegre (Brazil) girls had about 10% higher risk for developing low back pain as compared to boys. The differences between genders can be explained through some assumptions. The first is related to physical strength, which is lower in women than in men, making women's energy expenditure greater when exposed to similar labor demand, increasing the risk of musculoskeletal overload. Another difference is of psychosocial nature, because it is believed that women complain more often than men, that is, according to this line of thought, the contrasts resulting from differences in the predisposition of men and women when reporting this information. Maybe women have more social 'permission' to talk about their symptoms and feelings, or have a more developed powers of observation, both events due to social and educational factors.[1,2]

Schoolchildren aged 12-14 years had higher risk than 10-11 year old to develop back pain (OR = 1.13; range 1.05-1.25). According to a review conducted by Spanish authors the rates increase with the age of subjects[1]. In the Southern region of Brazil prevalence ratios ranged from 1.16 to 1.42, being quite high in the range 15-17 years old.[3] In the city of Santa Maria (RS, Brazil) older schoolchildren were 13% more likely to have low back pain in comparison to younger students.[10] Among Japanese the prevalence of low back pain was 15.8% higher among high school students compared to elementary schoolchildren.[9] Result from chi-square test showed in Tunisian students a significant association between age and low back pain in Tunisian[11] ($p < 0.000$) and Iranian students[12] ($p < 00001$). This association can possibly be due to enhanced growth in adolescents and consequent decreased flexibility, especially of the quadriceps and hamstring muscles, causing functional failure of the lumbar muscles and, consequently, pain.[13]

In the present study, the students who watched TV more than three times a week and up to 3 hours a day have 15% more chances of reporting low back pain. In Chinese schoolchildren[14] the risk of pain for those who remained in front of the TV/computer for more than two hours per day was 1.87 times higher than for those who did not; for Americans the risk was 1.89 times higher;[15] for Brazilians[16] and Iranian it was 1.22 times

higher.[17] (p=0.002). Other studies have found no association between these variables.[17,18] The difference in results may be due to low back pain settings, in addition to self-assessment on equipment usage time may be inaccurate.[3]

This association may be motivated by long time in the seated position and/or incorrect postures, inadequate and poorly organized furniture and/or inactivity. The sitting posture generates various changes in musculoskeletal structures of the various body segments, and it increases by approximately 35% the internal pressure in the nucleus of the intervertebral disc, stretches all structures (ligaments, nerves and small joints) of the spine, reduces circulation return in the lower limbs and promotes the development of an inflammatory processes in the osteomuscular structures with associated pain symptonms.[3]

The sample size, randomized choosing of schoolchildren participants, using validated questionnaires for the Brazilian population and data from adolescents with the same level are the main strengths of this study. However, the cross-sectional design and the fact that the measurements were based on self- report and collected in a short period of time are the main limitations. Due to confidentiality, data on symptoms, sports practices, frequency and hours on TV/computer answered by schoolchildren were not researched with family members. In some cases, the difficulty of adolescents to remember about the presence or absence of symptoms may have occurred.

CONCLUSION

The results showed that there is a predominance of the manifestation of the symptoms reported in the lumbar spine of female schoolchildren aged 12-14 years and in those who watched TV more than three times a week and up to three hours a day. A significant contribution is that data of this kind, and others derived from it, can improve the understanding of the relationships between the variables and provide useful elements for the implementation of measures aimed at the maintenance, improvement and promotion of physical and psychological well-being of schoolchildren.

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