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Neck/shoulders pain and its relation to the use of tv/computer/videogame and physical activity in school students from Bauru[1]

Dor na região cervical/ombros e sua relação com a utilização de tv/computador/videogame e atividade física em escolares bauruenses

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Abstract

Objective: The objective was to determine the prevalence of musculoskeletal pain in the neck/shoulders of school children and its relationship with the level of physical activity and sedentary activities (time spent on TV and computer and/or video game). **Materials and methods**: We conducted a cross-sectional study with a sample of 524 5th to 8th grade students (278 boys and 246 girls), enrolled in all five urban elementary schools in the municipality of Bauru (SP), aged between 10 and 14 years old. Sociodemographic data, sedentary activities – time spent on TV and computer and/or videogame - and level of physical activity - was collected through a Physical Activity Questionnaire for Children (PAQ-C). **Results**: The results showed that the prevalence of localized pain in the neck/shoulders was of 30.1% for boys and girls. It was also found that

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there is a predominance of onset of pain reported in neck/shoulders in boys related to the frequency and amount of hours a day watching TV and hours on the computer, whereas in girls the association was with frequency and amount of hours they watch TV daily. **Conclusions**: It can be concluded that the pain in the neck/shoulders are common in children and that understanding the relationship between variables enables valuable elements of measures aimed at maintaining, improving and promoting the welfare of students.

Keywords: Neck pain. Shoulder pain. Computer/Television. Physical activity. Students.

Resumo

Objetivo: *O objetivo foi verificar a prevalência de dor musculoesquelética na região cervical/ombros em escolares e sua relação com o nível de atividade física e atividades sedentárias (tempo na TV e computador e/ou videogame).* ***Materiais e métodos****: Realizou-se um estudo transversal com uma amostra de 524 escolares (278 meninos e 246 meninas) matriculados nas 5ª a 8ª séries de todas as cinco escolas municipais de ensino fundamental urbanas do município de Bauru (SP), na faixa etária entre 10 e 14 anos, de quem foram coletados dados sociodemograficos, atividades sedentárias – tempo na TV e computador e/ou videogame – e nível de atividade física, por meio do questionário de atividade física para crianças (PAQ-C).* ***Resultados****: Os resultados mostraram que as prevalências de dor localizada na região cervical/ombros foi de 30,1% para meninos e meninas. Verificou-se também que há predomínio da manifestação dos sintomas referido na cervical/ombros, nos meninos, em relação à frequência e quantidade de horas que assistem TV ao dia e horas no computador; enquanto que nas meninas a associação foi com a frequência e quantidade de horas que assistem TV ao dia.* ***Conclusões****: Pode-se concluir que a dor cervical/ombros é comum em escolares e que a compreensão das relações entre as variáveis possibilita elementos valiosos de medidas visando à manutenção, melhora e promoção do bem-estar dos estudantes.*

Palavras-chave*: Dor cervical. Dor no ombro. Computador/Televisão. Atividade física. Estudantes.*

Introduction

The neck/shoulders pains are common among school students, with a yearly prevalence varying from 7% to 58% (1, 2).These symptoms have increased in recent decades and the knowledge on its causes is little. Some authors suggest that the main risk factors are biological, mechanical and cognitive, highlighting: sex, obesity, a decrease on the flexibility and mobility of muscles, hypermobility, depression, school level, competition sports, type and way of carrying and transporting weight, posture habits, domestic and occupational ergonomic factors, sedentary activities (time spent on TV and computer/videogame), physical activity level and smoking (3, 4).

Cross-sectional investigations have pointed that the time spent watching television and using the videogame is positively related to musculoskeletal pain (4, 5, 6).

Data on the association between the level of physical activity and musculoskeletal pain is contradictory. Some studies show a relation between a low level of physical activity and neck/shoulders pain (7, 8, 9), while others (10, 11, 12, 13, 14, 15, 16) do not report an association between physical activity and neck/shoulders pain among school students.

The relevance of studies on the prevalence of musculoskeletal symptoms in the spine among school students lies in the fact that these pathologies generate economical and social consequences to both the State and the individuals. To the individual, it means a loss in quality of life and to the State, costs with treatment and rehabilitation (17).

Thus, taking into account 5th to 8th grade elementary school students from Bauru, this study aimed at verifying the prevalence of neck/shoulders musculoskeletal pain among school students and its relation to the level of physical activities and sedentary activities (time spent on TV and computer and/or videogame).

Materials and methods

This cross-sectional study was carried out in 2009 with a population of 5th to 8th grade school students

enrolled in all five municipal urban elementary schools of Bauru (SP), aged between 10 and 14 years old.

The sampling process was carried out through a multi-stage technique (18): first, a stratified sample proportional to the number of students of each school was performed, followed by a random sample inside each school. This sampling process allowed that each school student had an equal probability of being randomly chosen.

The sample size to evaluate the prevalence of neck/shoulders musculoskeletal symptoms was calculated from a population of 1505 students enrolled in the five elementary schools. This analysis adopted a prevalence of 50% (unknown prevalence), an acceptable error of four percentage points, a confidence level of 95% and a design effect of 1.5. A total of 524 students was estimated considering these points.

The criteria adopted in order to exclude some school student who was randomly chosen to take part in the study were: younger than 10 years old and older than 14 years old; failure to hand in the Informed Consent Form (ICF) signed by the parents/responsible ones; and refusal to take part.

Procedures

The city Education Department (Secretaria de Educação) issued a letter of authorization. The students' parents were informed on the ethical aspects and signed the informed consent form. The Project was approved by the Research Ethics Committee at Universidade Sagrado Coração (proc. 10/07).

The data collection was carried out from February to May in 2009, with the collaboration of each class professor, who sent one student a time to answer the questionnaire. The study objectives were explained to each student, then, the researcher carried out the structured interview, question by question. Each individual approach lasted about thirty minutes.

The team in charge of data collection consisted of two researchers trained based on a standardized data collection protocol (theoretical and practical), which had been previously established to minimize possible errors intra- and inter- evaluators. The technical error of measurement was not determined by the collection team, but the sample of school students was measured in duplicate to control the quality of the questionnaires.

The variables (age, sex, school grade and sedentary activities – time spent on TV and computer and/or videogame) were collected through the questionnaire (18, 19), which consisted of the following questions: age (10, 11, 12, 13 and 14 years old); sex; "In a normal school week, do you watch TV?" (yes/no); "In a normal school week, how many times do you watch TV?" (once, twice, three times, four times, five times or more a week); "In a normal school day, how many hours do you watch TV for?" (less than an hour, two hours, three hours, four hours, five hours or more a day); "In a normal school week, how many times do you use the computer or the videogame at home ?" (once, twice, three times, four times, five times or more a week); "In a normal school day, how many hours do you use the videogame at home for?" (less than an hour, two hours, three hours, four hours, five hours or more a day).

The level of regular physical activity was evaluated by the Physical Activity Questionnaire for Children (PAQ-C), which was translated and adapted only in order to exclude the sports and physical activities not practiced in Brazil (20, 21). Such instrument consists of nine questions on the practice of sports and games, physical activities at school and on leisure time, including the weekend. Each questionnaire item is scored on a 5-point scale and the final score is obtained by the mean of the questions, representing the interval from very sedentary (1) to very active (5). The scores 2, 3 and 4 indicate the categories sedentary, moderately active and active, respectively. So, it´s possible to classify the subjects as active or sedentary based on this score. The active are the ones with a score ≥ 3 while the sedentary are the ones with a score < 3.

The score mentioned above had to be changed for question 1, which is composed of a list of activities, by the division of the total score obtained in the question by the number of activities in the list, including also the activities that had been added in the section "others".

The same kind of procedure was necessary for question 13, which indicates the level of physical activity in each weekday. This question total score was divided by 7. The final score is obtained by the mean of the questions 1 to 7, 9 and 13.

The variables (sedentary activities – time spent on TV and computer and/or videogame and level of physical activity) were considered as independents.

The dependent variable – neck/shoulders pain – was observed through the Nordic Questionnaire, which was adapted to the Brazilian culture by Barros (22). The pain was defined as pain or discomfort

in the last twelve months, not related to trauma or menstrual pain.

The following question was asked to the school students in the moment of the interview: "Have you had neck/shoulders pain in the last year?". For a greater specificity on the pain location, besides the verbal questioning, an image of the neck/shoulders area in different colors was presented so that they could identify the areas. This kind of tool is valid and reliable to measure pain among school students, as it enables the students to be very specific about the pain location.

Analysis of results

Data was inserted in a database and the analysis was carried out stratified by sex using the statistical software SPPP, version 10.0 (SPSS Inc., Chicago, United States). The analysis was carried out following a descriptive approach and another analytical one.

In the descriptive approach, the distribution of absolute and relative frequencies was made for the categorical variables. In the analytical approach, a bivariate analysis was carried out through the Pearson test and, then, a multivariate binary logistic regression was carried out following a hierarchical model. The method adopted for introducing the variables in the models was the backward stepwise. A significance level of 5% and a confidence interval (CI) of 95% were considered with the calculation of adjusted odds ratios (18).

Results

From the 536 students evaluated, 12 (2.3%) were excluded as they didn´t have the appropriate age for the studied grades. So, the sample consisted of 524 students distributed in 278 boys (53.1%) and 246 (46.9%) girls.

It is possible to observe in Table 1 that, in both sexes, there was a greater prevalence of sedentary school students who watch TV and use the computer for more than three hours a day, with a frequency over three times a week for both.

The prevalence of pain located in the neck/shoulders was of 31.1% of the total of school students verified; the prevalence was of 30.2% in boys and 32.1% in girls.

Table 2 shows that the factors associated with the symptoms reported in the neck/shoulders, in boys, were the frequency and amount of hours a day watching TV and hours on the computer.

Regarding the girls, Table 3 shows that there was an association between the pains located in the neck/shoulders and the frequency and amount of hours a day watching TV.

Table 1 - Distribution of absolute and relative frequencies of sedentary activities and level of physical activity according to sex, Bauru - 2009

Variables	Answer	Sex		Total n = 524
		M (n = 278)	F (n = 246)	
Level of physical activity	Sedentary	154 (55.4%)	200 (81.3%)	35 (67.5%)
	Active	124 (44.6%)	46 (18.7%)	170 (23.5%)
Frequency of TV	Less than twice	48 (17.9%)	38 (15.8%)	85 (16.7%)
	Three times or more	219 (82.1%)	202 (84.2%)	421 (83.3%)
Hours a day spent on TV	Below two hours	78 (29.2%)	71 (29.5%)	148 (29.2%)
	Three hours or more	189 (70.8%)	169 (70.5%)	358 (70.8%)
Frequency of computer use	Less than twice	102 (45.5%)	81 (40.0%)	183 (42.9%)
	Three times or more	122 (54.5%)	121 (60.0%)	243 (57.1%)
Hours a day spent on the computer	Below two hours	94 (41.9%)	90 (44.5%)	184 (43.1%)
	Three hours or more	130 (58.1%)	112 (55.5%)	242 (56.9%)

Source: Research data.

Table 2 - Result of the multivariate binary logistic regression, final model for independent associations with pain in the neck/shoulders among male school students, Bauru - 2009

Variables		N	% DCO	OR (95% IC)
Level of physical activity				
	Active	170	15.1%	NS
	Sedentary	354	15.1%	
Frequency of TV				
	Less than twice	86	5.4%	1
	Three times or more	421	24.1%	1.90 (1.19 – 2.51)
Hours spent on TV				
	Below 2 hours	149	9.7%	1.03 (1.00 – 2.04)
	Over 2 hours	358	12.6%	
Frequency of computer use				
	Less than twice	183	7.9%	NS
	Three times or more	243	21.6%	
Hours spent on the computer				
	Below 2 hours	184	6.1%	1
	Over 2 hours	242	17.6%	1.06 (1.00 – 2.01)

Source: Research data.

Table 3 - Result of the logistic regression multivariate analysis, final model for independent associations with pain in the neck/shoulders among female school students, Bauru - 2009

Variables		N	% DCO	OR (95% CI)
Level of physical activity				
	Active	170	6.1%	NS
	Sedentary	354	26.0%	
Frequency of TV				
	Less than twice	86	6.1%	1.99 (1.09 – 2.24)
	Three times or more	421	25.6%	
Hours spent on TV				
	Below 2 hours	149	8.5%	1.83 (1.66 – 2.04)
	Over 2 hours	358	17.1%	
Frequency of computer use				
	Less thanx twice	183	11.0%	NS
	Three times or more	243	20.7%	
Hours on the computer				
	Below 2 hours	184	93.7%	NS
	Above 2 hours	242	17.9%	

Source: Research data.

Discussion

The results of this study show that the prevalence of pain in the neck/shoulders (31.1%) is, in general, similar to the rates recorded in the literature, which vary from 13% to 34.5%, as it can be demonstrated in the percentages found in some studies on neck/shoulders pain: 11.5% of the Dutch students reported such pain (2), 21% of the Finnish (4) and 28.5% of the Western Australia residents (23).

These variations in the symptoms reports may be related to the definition of cervical/neck pain, the differences between populations, the exposure time factor and psychological factors (19).

In this study, the multivariate analysis showed that there was an association between the use of computer and television and the neck/shoulders pain in both sexes. In a study with Finnish adolescents (9), the risk of pain was of 1.30 among the school students who stay in front of TV and computer for over two hours, while among the Spanish (24) and the Nigerian (25) students, the risk was of 1.5 and 2.0, respectively, for the ones who used the computer for more than two hours. Another study did not find any association between these variables (2).

This association can be motivated due to the extended time sitting and/or to an incorrect posture, inappropriate and poorly organized furniture. The sitting posture generates many alterations in the musculoskeletal structures of several body segments: it increases by 35 %, approximately, the internal pressure in the nucleus of the intervertebral disc, it stretches all the spine structures (ligaments, nerves and small joints), it decreases the return circulation of inferior limbs and causes the development of inflammatory processes in the osteomuscular structures with associated painful symptoms (26).

No association between the level of physical activity and pain was found in this study, confirming the results of other investigations (27, 28). Other researches also didn´t find any association between the neck / shoulders pain and physical activity (10, 11, 12, 13).

The limitations must also be considered. The measurements were based on self reports and collected in a short period of time. Due to confidentiality, data relating to symptoms, practice of sports, frequency and hours spent on TV/computer which were answered by the students was not researched with the family members. In some cases, it might have happened, mainly regarding the symptoms, a difficulty for the teenagers to remember the presence or absence of the same after twelve months. However, the Nordic Musculoskeletical Questionnaire agrees with a clinic evaluation (27) and the self-reported data on physical activity are similar to this variable objective measures (29).

Taking into account its cross-sectional design, it is not possible to infer any causality in this study, only an association. Consequently, this study does not allow us to judge if any characteristic of an activity is mediated by a neck/shoulders pain experience. It is possible that adolescents who have pain avoid activities that can propagate it, which eliminates any association in a cross-sectional analysis. Therefore, a prospective study will be important to investigate the association between pains and physical activity and use of TV/computer and take into account other factors that mediate such associations in order to determine with certainty such risks regarding the pains. Prospective data suggests that the natural course of the neck/shoulders pain varies throughout life, but the same kept on for a small subgroup of adolescents. A detailed exam in this subgroup or in another one without any particular comorbidities may contribute to elucidating the association between the pains and the studied variables (30).

Conclusion

The results showed that there is a predominance in the manifestation of symptoms reported in the neck/shoulders, in boys, regarding the frequency and amount of hours a day watching TV and amount of hours on the computer while, among the girls, the association was with the frequency and amount of hours a day watching TV. A highly favorable point of this study was the use of validated questionnaires for the Brazilian population (Nordic Questionnaire and PAQ-C), as well as the data having been collected from adolescents with the same socioeconomic level and the analysis having been carried out stratified by sex. A significant contribution is that this kind of data, and others resulting from it, may improve the understanding of the relations between the variables and offer useful elements to the implementation of measures aiming at the maintenance, improvement and promotion of the students' psychological and physical well-being (19).

References

1. Harreby M, Nygaad B, Jenssen T, Larsen E, Storr--Paulsen A, Lindahl A, et al. Risk factors for low back pain in a cohort of 1389 Danish school children: an epidemiologic study. Eur Spine J. 1999;8(6):444-50.

2. Diepenmaat MF, Wal HCW, Hirasing R. A neck/shoulder, low back, and arm pain in relation to computer use, physical activity, stress, and depression among Dutch adolescents. Pediatrics. 2006;117(2):412-6.

3. El-Metwally A, Salminen JJ, Auvinen A, Macfarlane G, Mikkelsson M. Risk factors for development of non-specific musculoskeletal pain in preteens and early adolescents: a prospective 1-year follow-up study. BMC Musculoskelet Disord. 2007;8:46.

4. Hakala PT, Rimpela AH, Saarni LA, Salminen JJ. Frequent Computer – related activities increase the risk of neck-shoulder and low back pain in adolescents. Eur J Public Health. 2006;16(5):536-41.

5. Alexander LM, Currie C. Young people's computer use: implications for health education. Health Educ. 2004;4:254-61.

6. Smith L, Louw Q, Crous L, Grimmer-Somers K. Prevalence of neck pain and headaches: impact of computer use and other associative factors. Cephalalgia. 2008,29(2):250-7.

7. Green BN. A literature review of neck pain associated with computer use: public health implications. J Can Chiropr Assoc. 2008;52(3):161-7.

8. Hakala PT, Saarni LA, Punamäki RL, Wallenius MA, Nygård CH, Rimpelä AH. Musculoskeletal symptoms and computer use among Finnish adolescents – pain intensity and inconvenience to everyday life: a cross-sectional study. BMC Musculoskelet Disord. 2012;13:41.

9. Hakala P, Rimpela A, Salminen JJ, Virtanen SM, Rimpela M. Back, neck and shoulder pain in Finnish adolescents: national cross sectional surveys. BMJ. 2002,325(7367):743.

10. Bostrom M, Dellve L, Thomee S, Hagberg M. Risk factors for generally reduced productivity – a prospective cohort study of young adults with neck or upper-extremity musculoskeletal symptoms. Scand J Work Environ Health. 2008;34(2):120-32.

11. Sitthipornvorakul E, Janwantanakul P, Purepong N, Pensri P, van der Beek AJ. The association between physical activity and neck and low back pain: a systematic review. Eur Spine J. 2011;20(5):677-89.

12. Kujala UM, Taimela S, Viljanen T. Leisure physical activity and various pain symptoms among adolescents. Brit J Sports Med. 1999;33(5):325-8.

13. Cardon G, De Bourdeaudhuij I, De Clercq D, Philippaerts R, Verstraete S, Geldhof E. Physical fitness, physical activity, and selfreported back and neck pain in elementary schoolchildren. Ped Exercise Sci. 2004;16(2):147-57.

14. Ehrmann Feldman D, Shrier I, Rossignol M, Abenhaim L. Risk factors for the development of neck and upper limb pain in adolescents. Spine. 2002;27(5):523-8.

15. Mikkelsson LO, Nupponen H, Kaprio J, Kautiainen H, Mikkelsson M, Kujala UM. Adolescent flexibility, endurance strength, and physical activity as predictors of adult tension neck, low back pain, and knee injury: a 25 year follow up study. Br J Sports Med. 2006;40(2):107-13.

16. Mogensen AM, Gausel AM, Wedderkopp N, Kjaer P, Leboeuf-Yde C. Is active participation in specific sport activities linked with back pain? Scand J Med Sci Sports. 2007, 17(6):680-6.

17. De Vitta A, Zapater AR, Campos RS, Padovani CR. Desconfortos musculoesqueléticos percebidos em trabalhadores de diferentes faixas etárias, gêneros e ocupações. Fisioter Mov. 2007;20(1):29-35.

18. Zar JH. Biostatistical Analysis. 5th ed. New Jersey: Prentice-Hall; 2010.

19. De Vitta A, Martinez MG, Piza NT, Simeão SFAP, Ferreira NP. Prevalência e fatores associados à dor lombar em escolares. Cad Saúde Pública. 2011;27(8):1520-8.

20. Crocker PR, Bailey DA, Faulkner RA, Kowalski KC, McGrath R. Measuring general levels of physical activity: preliminary evidence for the Physical Activity Questionnaire for Older Children. Med Sci Sports Exerc. 1997;29(10):1344-9.

21. Silva RC, Malina RM. Nível de atividade física em adolescentes do município de Niterói, Rio de Janeiro, Brasil. Cad Saúde Publica. 2000;16(4):1091-7.

22. Barros ENC, Alexandre NMC. Cross-cultural adaptation of the Nordic musculoskeletal questionnaire. Int Nurs Rev. 2003;50(2):101-8.

23. Briggs AM, Straker LM, Bear NL, Smith AJ. Neck/shoulder pain in adolescents is not related to the level or nature of self-reported physical activity or type of sedentary activity in an Australian pregnancy cohort. BMC Musculoskelet Disord. 2009;10:87.

24. Camargo D, Orozco LC, Herrera E. Dolor de cuello/hombros y espalda en adolescentes. Prevalencia y factores asociados. Rev. Univ Ind Santander Salud. 2008;40(2):71-82.

25. Ayanniyi O, Ukpai BO, Adeniyi AF. Differences in prevalence of self-reported musculoskeletal symptoms among computer and non-computer users in a Nigerian population: a cross-sectional study. BMC Musculoskelet Disord. 2010;11:177.

26. Zapater AR, Silveira DM, De Vitta A, Padovani CR, Silva JPC. Postura Sentada: a eficácia de um programa de educação para escolares. Ciênc saúde coletiva. 2004;9(1):191-9.

27. Auvinen J, Tammelin T, Taimela S, Zitting P, Karppinen J. Neck and shoulder pains in relation to physical activity and sedentary activities in adolescence. Spine. 2007;32(9):1038-44.

28. Ebbehoj NE, Hansen FR, Harreby MS, Iassen CF. Low back pain in children and adolescents. Prevalence, risk factors and prevention. Ugeskr Laeger. 2002; 164(6):755-8.

29. Troussier B, Davoine B, Gaudemaris R, Foconni J, Phelip X. Back pain in school children. A study among 1178 pupils. Scand J Rehabil Med. 1994;26(3):143-6.

30. Stahl M, Kautiainen H, El-Metwally A, Hakkinen A, Ylinen J, Salminen JJ, et al. Non-specific neck pain in schoolchildren: prognosis and risk factors for occurrence and persistence. A 4-year follow-up study. Pain. 2008;137(2):316-22.

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