Neck pain and factors associated in University Students: a cross sectional study

Dor cervical e fatores associados em estudantes universitários: um estudo transversal

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ABSTRACT

INTRODUCTION: Neck pain is a musculoskeletal condition with high prevalence that may affect the physical, social and psychological aspects of the individual, contributing to the increase in costs in society and business. **OBJECTIVES:** To determine the prevalence of neck pain and to analyze the association with the individual, sociodemographic variables and electronic devices. **METHODS:** A cross-sectional observational study was carried out with a sample of 1143 university students, who answered the questionnaire on sociodemographic aspects, use of electronic devices and the Nordic questionnaire. Descriptive, bivariate and Poisson regression analyzes were performed. **RESULTS:** The prevalence of neck pain was 66.7% (CI 63.8 to 69.3), and 57.6% (CI 52.9 to 62.1) were men and 72.3% (CI 68.8 to 79.4) women. In the adjusted analysis, female (PR = 1.92, 1.49-2.47), time of use of TV above 3 hours per day (PR= 1.35; 1.05 - 1.79), time of use of computer above 3 hours per day (PR= 1.41; 1.08 - 1.85), time of use of game above 3 hours per day (PR= 1.42; 1.02 - 1.97), using the tablet at a distance from the eye on the screen above 20 cm (PR = 1.08, 1.01 - 1.17), posture lying down in the use of the cell phone (PR = 1.67, 1.04 - 1.72), posture semi-lying down in the use of the cell phone (PR= 1.28, 1.02 - 1.65), sitting posture in the use of the tablet (PR = 1.54, 1.03 - 2.38), lying down posture in the use of the tablet (PR = 1.83; , 05 - 3,18) and to use the tablet during two or more hours a day (PR = 2.28, 1.15 - 4.49) remained associated with neck pain. **CONCLUSION:** There is a high prevalence of neck pain in university students and striking association with the female sex and with the use of electronic devices.

KEYWORDS

Neck pain; Electronic devices; University students; Prevalence.

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RESUMO

INTRODUÇÃO: A dor cervical é uma condição musculoesquelética com alta prevalência que pode afetar os aspectos físicos, sociais e psicológicos dos indivíduos, contribuindo para o aumento de custos na sociedade e nos negócios. **OBJETIVOS:** Determinar a prevalência de dor cervical e analisar a associação com variáveis sociodemográficas e dispositivos eletrônicos. **MÉTODOS:** Foi realizado um estudo observacional transversal com uma amostra de 1143 universitários, que responderam ao questionário sobre aspectos sociodemográficos, uso de dispositivos eletrônicos e o questionário nórdico. Foram realizadas análises descritivas, bivariadas e de regressão de Poisson. **RESULTADOS:** A prevalência de dor cervical foi de 66,7% (IC 63,8 a 69,3), sendo que, 57,6% (IC 52,9 a 62,1) em homens e 72,3% (IC 68,8 a 79,4) em mulheres. Na análise ajustada, o sexo feminino (RP = 1,92; 1,49-2,47), tempo de uso da TV acima de 3 horas por dia (RP = 1,35; 1,05 - 1,79), tempo de uso do computador acima de 3 horas por dia (RP = 1,41; 1,08 - 1,85), tempo de uso de videogame acima de 3 horas por dia (RP = 1,42; 1,02 - 1,97), uso do tablet à distância do olho na tela acima de 20 cm (RP = 1,08; 1,01 - 1,17), postura deitada no uso do celular (RP = 1,67; 1,04 - 1,72), postura semi-deitada no uso do celular (RP = 1,28; 1,02 - 1,65), postura sentada no uso do tablet (RP = 1,54; 1,03 - 2,38), postura deitada no uso do tablet (RP = 1,83; 0,5 - 3,18) e usar o tablet por duas ou mais horas por dia (RP = 2,28; 1,15 - 4,49) permaneceu associado à dor cervical. **CONCLUSÃO:** Existe alta prevalência de dor cervical em estudantes universitários e associação marcante com o sexo feminino e com o uso de dispositivos eletrônicos.

PALAVRAS-CHAVE

Dor cervical; Dispositivos eletrônicos; Estudantes universitários; Prevalência.

INTRODUCTION

Neck musculoskeletal symptoms are common health complaints. A epidemiologic study demonstrated that the annual incidence rate of neck pain is 10.4-21.3% with a higher rate for office and computer workers (HOY et al., 2010). In the college student population, one-year prospective cohort study demonstrated a high incidence rate at 46% and of whom 33% reported persistent neck pain. Such high prevalence of neck and shoulder symptoms, especially among the younger populations, presents a substantial burden to the society (HOY et al., 2010; KANCHANOMANI et al., 2011).

In developed and developing countries, the most common of neck pain has been reported in university students. In Finland the prevalence of cervical pain was 29% (OKSANEN et al., 2014), 34.6% in Australia (SMITH AND LEGGAT, 2004), 54% in the USA (JENKINS et al., 2004), 49.7% in Brazil (MATTOS et al., 2009), 46% in Thailand (KANCHANOMAI et al., 2011), Saudi Arabia (GHARIB AND HAMID, 2013) of 54%, in Korea (KIM AND KIM, 2013) of 55.8%, and in China (WOO et al., 2016) of 49.9%.

This condition has a complex etiology, including a number of factors: ergonomic (strenuous physical activity, use of force and vibration, inappropriate posture, repetitive movement), individual (age, sex, body mass index, genome, musculoskeletal pain history) psychosocial (job satisfaction, stress level, anxiety and depression) and the use of electronic devices - TV, computer, tablet, games and cell phones (KANCHANOMAI et al., 2011; RAZVI et al., 2018; KALIRATHINAM et al., 2017; LEE et al., 2018).

International literature has shown that in Malaysian (RAZVI et al., 2018), Indian (KALIRATHINAM et al., 2017), Canadian (BEROLO et al., 2011) and Iranian (BAYATIANI et al., 2016) university students neck pain was related to the duration and frequency of cell phone uses, but with the Koreans there was no association. Regarding tablet use, it was observed an association between Canadian (BEROLO et al., 2011) students and American (LEE et al., 2018; BLAIR et al., 2015), whereas, with Chinese (CHIANG AND LIU, 2016) university students this fact didn't process. In Brazil, there are few epidemiological studies on neck pain in university students.

This study will contribute as a reference for other epidemiological investigations and may contribute to the knowledge of the national estimate of prevalence and its risk factors for systematic reviews and meta-analysis, since the availability of data sources from Brazilian surveys related to the outcome are scarce. There is also a lack of studies on the association of cervical pain with the use of electronic devices (tablet and cell phone) in Brazilian university students.

Studies on the prevalence and risk factors of neck pain in the population are important because they generate social and economic consequences, both for the State and individuals. The economic burden due to neck disorders is high and includes treatment costs, lack of work and disability payments. There is also inability related to neck pain and related recurrences which can significantly affect workforce productivity and the economics of families and communities. The economic burden of neck pain loses only to low back pain in workers' compensation claims in the United States and Sweden, and cervical and shoulder problems account for 18% of all disability payments (CHILDS et al., 2018).

Considering these points, the objective of this study was to determine the prevalence of neck pain and to analyze the association with the individual, sociodemographic variables and use of electronic devices.

MATERIALS AND METHODS

Study cross-sectional design, approved by the Ethics in Research Committee of Universidade Sagrado Coração, Bauru-SP (number 1.972.579), with 1143 university students.

For the calculation of sample size, the following parameters were used: the population equal to 5,941 students, including the bachelor's and teaching degree, the prevalence of the outcome unknown (50%), sampling error equal to 4 percentage points and a confidence interval of 95% (95% CI). The sample size obtained was multiplied by 2 due to the effect of the study delineation (*deff*), added of 20% of expected losses and 15% for association studies, totaling 1,143 students.

In the selection process, the proportion of students distributed according to courses and classes was considered. Thus, the sample selection was done by

conglomerate in two stages, with all the raffles performed at random. At first, the sampling unit was the course, being all students are eligible to participate in the study, considering the density of students per course. In the second, all classes (smaller sample unit) of the courses were considered eligible for the study. A simple random sampling was used, and as a criterion of stratification, the density of classes per period of each course was considered.

The exclusion criteria were: (a) foreign students in institutional exchanges, (b) in gestation period, and (c) with physical limitations (such as morbid obesity, amputation of a limb, spinal cord trauma).

Data collection procedures

The University was requested a letter of authorization for the accomplishment of the research in the university. The procedures adopted for data collection included: (a) prior contact with professors of each course via e-mail or telephone contact, with the sending of the terms of consent and schedule for subsequent application of the questionnaire to the class and (b) training of procedures among the evaluators.

The data collection occurred during the months of March and April of 2016, being performed by the researcher and two more students of the undergraduate course in physiotherapy, trained based on the protocol of standardization of data collection procedures (theoretical and practical), previously established in order to minimize possible intra and inter-raters errors.

For the data collection the following procedure was performed: first the researcher explained the research objectives, and students were informed about the voluntary nature of participation, the possibility of abandoning the research at any time and the right to confidentiality of individual data. In the sequence, they were requested to sign the Informed Consent Form (ICF) and the questionnaires were distributed with receiving instructions and recommendations for filling, not being established time limit for the same. During the process, the eventual doubts were promptly answered by the interviewer that accompanied the data collection. During the filling out of the questionnaire, the students did not communicate among themselves, in order to minimize possible undesirable interference in their answers.

The coding was performed by the interviewers themselves soon after the interviews and reviewed by supervisors of field work. The supervisors also

performed the quality control that consisted of the application of questionnaires with reduced number of questions to 10% of the respondents.

Instruments

Neck pain, reported in the 12 months prior to the interview, represented the variable response of interest in this study. It was observed using the Nordic questionnaire, validated and adapted to Brazilian culture (BARROS AND ALEXANDRE, 2003). Neck pain was defined as pain, suffering or discomfort in the area between the occipital bone and the third thoracic vertebra, and between the medial border of the scapula (FEJER AND HARTVIGSEN, 2008). In the interview, individuals were asked the following question: "Did you have any pain or discomfort in the neck in the past year?" In addition to the verbal questionnaire, an image of the spinal regions in different colors was also presented, so the interviewees could better specify the neck region where the pain was (BARROS AND ALEXANDRE, 2003).

The form for the characterization of the subjects was made up of items related to the socio-demographic aspects: sex (women or men), age, marital status (married or consensual, single, divorced and widowed), skin color (white, black, brown, asiatic and indigenous) and the income was determined in minimum wages (MW) - low: up to 3 times the MW; middle: from 4 to 9 MW; and high: 10 or more MW- (PALMA et al., 2014).

In relation to electronic devices (use of TV, computer, tablet or mobile phone) the following questions were asked: "In a normal week class do you watch TV?" (yes/no); "How many times a week do you watch TV?" (once or twice, three or four times, five times, more than five times); "How many hours a day do you watch TV?" (less than one hour, two hours, three hours, four hours, five hours, more than five hours a day); "Do you use your computer?" (yes/no); "What type of computer do you use?" (Desktop/Laptop); "What is the height of your PC screen?" (eyes above the midpoint of the screen, eyes approximately in the middle point of the screen, eyes below the mid-point of the screen); "How many times a week do you use computer?" (once or twice, three or four times, five times, more than five times); "How many hours a day do you use computer?" (less than one hour, two hours, three hours, four hours, five hours, more than five hours a day); What is the eye-to-screen distance while using your computer? (<20 cm, 20 cm to 25 cm,

25 cm to 30 cm and > 30 cm); "Do you use your cell phone?" (yes/no); "What posture do you use the mobile phone?" (Standing, sitting, lying or semi-lying); "Average daily time using cell phone?" (< 1h, 2h and 3h, 3h and 4h and 4h); "What is the eye-to-screen distance during the use of the cell phone?" (<10 cm, 10 cm to 15 cm, 15 cm to 20 cm and > 20 cm); "Do You Use tablet?" (yes/no); "What posture do you use the tablet?" (Standing, sitting, lying or semi-lying); "Average daily time using tablet?" (< 1h, 2h to 3h, 3h to 4h and > 4h); "What is the eye-to-screen distance while using the tablet? (<10 cm, 10 cm to 15 cm, 15 cm to 20 cm and > 20 cm).

Data analysis

Data analysis was performed in the program *Statistical Package for the Social Sciences (IBM SPSS Statistics 18.0 - SPSS, Inc., Chicago, Illinois 60606, USA)*. In the descriptive analysis, the prevalence of all the variables included in the study was calculated, with the respective confidence intervals. The demographic, socioeconomic and electronic devices were considered independent variables. Independent variables with a significance level of $p < 0.20$ in bivariate analysis were

included in a Poisson regression model with robust variance, and the assumptions required for Poisson regression to yield a valid result were respected. The effect measure is presented as prevalence ratio (PR) with 95% confidence interval (CI). The threshold $\alpha = 0.05$ was used to indicate statistical significance.

RESULTS

1,143 students were studied, already deducted from the final percentage of 2.05% of refusals. Of this total, 66.7% (CI 63.8 to 69.3) reported neck pain for at least some time in the 12 months preceding the interview, 57.6% (CI 52.9 to 62.1) for men and 72.3% (CI 68.8 to 79.4) for women, with a statistically significant difference.

Regarding the sociodemographic characteristics of the sample, 82.9% of the men and 90.0% of the women are in the age group of 18 to 25 years, 77.2% of the men and 83.3% of the women are of the white race white, 92.0% of males and 91.8% of females are single, and 78.1% of males and 79.6% of females are middle income.

The variables related to the use of electronic devices in high school adolescents are presented in Table 1.

Table 1. Distribution of absolute and relative frequencies regarding the use of electronic devices in university students.

Factors	Sex	
	Male (n = 439)	Female (n = 704)
Watch TV		
No	92 (21.0%)	92 (13.1%)
Yes	347 (79.0%)	612 (86.9%)
How many times TV/week		
Up to 2 times	156 (35.5%)	239 (33.9%)
3 times or more	191 (43.3%)	373 (53.0%)
How many hours TV/day		
Up to 2h	253 (35.5%)	429 (34.0%)
Above 3h	94 (10.7%)	183 (14.7%)
Use the computer		
No	2 (0.5%)	5 (0.7%)
Yes	437 (99.5%)	699 (99.3%)
Type of computer		
Desktop	176 (40.1%)	160 (22.7%)
Laptop	247 (56.3%)	513 (72.9%)
Desktop and Laptop	14 (3.2%)	26 (3.7%)
Height of the computer screen		
Above the midpoint	133 (30.3%)	184 (26.1%)
Above the midpoint	229 (52.2%)	373 (53.0%)
Above the midpoint	75 (17.1%)	142 (20.2%)
Distance from the eye to the computer screen		

Less than 30 cm	191 (43.5%)	445 (63.2%)
30 cm or more	246 (56.0%)	254 (36.1%)
How many times computer/week		
Up to 2 times	24 (5.5%)	61 (8.7%)
3 times or more	413 (94.1%)	638 (90.6%)
How many hours computer/day		
Up to 2h	110 (25.1%)	212 (30.1%)
Above 3h	327 (74.5%)	487 (69.2%)
Use videogame		
No	280 (63.8%)	617 (87.6%)
Yes	159 (36.2%)	87 (12.4%)
How many times videogame/week		
Up to 2 times	107 (24.4%)	74 (10.5%)
3 times or more	52 (11.8%)	13 (1.8%)
How many hours videogame/day		
Up to 2h	118 (26.9%)	70 (9.9%)
Above 3h	41 (9.3%)	17 (2.4%)
Use cell phone		
No	8 (1.8%)	3 (0.4%)
Yes	431 (98.2%)	701 (99.6%)
What posture use the cell phone		
Standing	261 (59.5%)	434 (61.6%)
Sitting	335 (76.3%)	579 (82.2%)
Lying down	226 (51.5%)	470 (66.8%)
Semi-lying	166 (37.8%)	377 (53.6%)
Daily use time		
Up to 2h	166 (23.6%)	166 (37.8%)
3h or more	265 (60.4%)	535 (76.0%)
Distance from the eye to the cell phone		
Less than 20 cm	261 (59.5%)	584 (83.0%)
20 cm or more	170 (38.7%)	117 (16.6%)
Use tablet		
No	385 (87.7%)	598 (84.9%)
Yes	54 (12.3%)	106 (15.1%)
What posture use the tablet		
Standing	20 (4.6%)	14 (2.0%)
Sitting	41 (9.3%)	78 (11.1%)
Lying down	24 (5.5%)	53 (7.5%)
Semi-lying	19 (4.3%)	42 (6.0%)
Daily use time		
Up to 2h	43 (5.9%)	90 (7.7%)
3h or more	11 (2.5%)	16 (2.3%)
Distance from the eye to the tablet		
Less than 20 cm	22 (5.0%)	96 (13.6%)
20 cm or more	32 (7.3%)	10 (1.4%)

In table 2 there is a statistically significant association between neck pain with the female.

Table 2. Prevalence of neck pain by sociodemographic characteristics.

Factors	Total	Neck pain		
		Prevalence		
		N	%	RP (IC 95%)
Sex				
Men	439	253	57,6	1,00
women	704	509	72,3	1,25 (1,14 – 1,38)
Age group				
18to 20	501	348	69,5	1,00
21 to 25	497	320	64,4	0,93 (0,85 – 1,01)
26 to 30	85	59	69,4	1,00 (0,86 – 1,16)
31 or more	60	35	58,3	0,84 (0,67 – 1,05)
Race				
White	925	630	68,1	1,00
Parda/mulatto	150	90	60,0	0,88 (0,77 – 1,01)
Indigenous	6	4	66,7	0,98 (0,55 – 1,73)
Black	36	22	61,1	0,90 (0,69 – 1,17)
Asiatic	26	16	61,5	0,90 (0,66 – 1,23)
Marital Status				
Marriage	82	58	70,7	1,00
Single	1050	698	66,5	0,94 (0,81 – 1,09)
Divorced/widower	11	6	60,0	0,85 (0,50 – 1,43)
Income				
Upper	83	58	69,9	1,00
Middle	151	113	74,8	1,07 (0,90 – 1,27)
Low	909	591	65,4	0,94 (0,80 – 1,09)

In table 3 there was an association with the time of use of TV above 3 hours per day, time of use of game above 3 hours per day, use of the cell in the lying postures, , use of the cell in the semi-lying down posture, use of the tablet, use of the tablet above 2 hours per day.

Table 3. Prevalence of neck pain by electronic devices.

Factors	Total	Neckpain		
		Prevalence		
		N	%	RP (IC 95%)
Watch TV				
No	184	122	66,3	1,00
Yes	959	640	66,7	1,01 (0,9 – 1,13)
How many times TV/week				
Upto 2 times	325	203	78,2	1,00
3 times or more	634	437	50,8	1,54 (1,39 – 1,71)
How many hours TV/day				
Upto 2h	395	245	62,0	1,00
Above 3h	564	395	70,0	0,89 (0,81 – 0,97)
Use thecomputer				
No	7	3	42,9	1,00
Yes	1136	759	66,8	1,55 (0,66 – 3,64)
Typeofcomputer				
Desktop	760	515	67,8	1,00

Laptop	336	214	63,7	0,94 (0,86 – 1,03)
Desktop and Laptop	40	30	75,0	1,11 (0,92 – 1,33)
Height of the computer screen				
Abovethemidpoint	602	395	65,6	1,00
Abovethemidpoint	317	218	68,8	1,05 (0,95 – 1,15)
Abovethemidpoint	217	146	67,3	1,03 (0,92 – 1,14)
Distance from the eye to the computer screen				
Lessthan 30 cm	636	439	69,0	1,00
30 cm or more	500	320	64,0	0,93 (0,85 – 1,01)
How many times computer/week				
Upto 2 times	85	54	63,5	1,00
3 times or more	1051	705	67,1	1,06 (0,89 – 1,25)
How many hours computer/day				
Upto 2h	322	197	61,2	1,00
Above 3h	814	562	69,0	1,13 (1,02 – 1,25)
Use videogame				
No	897	612	68,2	1,00
Yes	246	150	61,0	0,89 (0,80 – 1,00)
How many times videogame/week				
Upto 2 times	181	109	60,2	1,00
3 times or more	65	41	63,1	1,05 (0,84 – 1,31)
How many hours videogame/day				
Upto 2h	188	111	59,0	1,00
Above 3h	58	39	67,2	1,14 (0,92 – 1,41)
Use of the cell phone				
No	11	5	45,5	1,00
Yes	1132	757	66,9	1,47 (0,77 – 2,81)
What posture use the cell phone				
Standing	695	466	67,1	1,01 (0,93 – 1,10)
Sitting	914	615	67,3	1,05 (0,94 – 1,17)
Lyingdown	696	482	69,3	1,11 (1,01 – 1,21)
Semi-lyingdown	543	378	69,6	1,09 (1,01 – 1,18)
Daily use time				
Upto 2h	332	222	66,9	1,00
3h or more	800	535	66,9	1,00 (0,91 – 1,09)
Distance from the eye to the cell phone				
Lessthan 20 cm	845	571	67,6	1,00
20 cm or more	287	186	64,8	0,96 (0,87 – 1,06)
Use ofthe Tablet				
No	983	641	65,2	1,00
Yes	160	121	75,6	1,16 (1,05– 1,28)
What posture use the cell phone				
Standing	34	22	64,7	0,97 (0,75 – 1,25)
Sitting	119	89	74,8	1,14 (1,02 – 1,27)
Lyingdown	77	60	77,9	1,18 (1,04– 1,34)
Semi-lyingdown	61	45	73,8	1,11 (0,95 – 1,30)
Daily use time				
Upto 2h	133	97	72,9	1,00
3h or more	27	24	88,9	1,22 (1,03– 1,44)
Distance from the eye to the cell phone				
Lessthan 20 cm	118	93	78,8	1,00
20 cm or more	42	28	66,7	0,85 (0,67– 1,07)

In Poisson regression the associations with neck pain remained for the female (PR = 1.92, 1.49-2.47), time of use of TV above 3 hours per day (PR= 1.35; 1.05 – 1.79), time of use of computer above 3 hours per day (PR= 1.41; 1.08 – 1.85), time of use of game above 3 hours per day (PR= 1.42; 1.02 – 1.97), using the tablet at a distance from the eye on the screen above 20 cm (PR = 1.08, 1.01 - 1.17), posture lying down in the use of the cell phone (PR = 1.67, 1.04 - 1.72), Posture semi-lying down in the use of the cell phone (PR= 1.28, 1.02 - 1.65), sitting posture in the use of the tablet (PR = 1.54, 1.03 - 2.38), lying down posture in the use of the tablet (PR = 1.83; , 05 - 3,18) and to use the tablet during two or more hours a day (PR = 2.28, 1.15 - 4.49), remained associated with neck pain (Table 5).

Table 5. Poisson Regression analysis, final model, for associations of variables studied with neck pain.

Neck pain		p value	Adjusted PR*/95%CI*
Factors			
Sex	Men	-	1.00
	Female	0,0001	1.92 (1,49 – 2.47)
How many hours TV/day	Upto 2h		1.00
	Above 3h		1.35 (1.05 – 1.79)
How many hours computer/day	Upto 2h		1.00
	Above 3h		1,41 (1,08 – 1,85)
How many hours videogame/day	Upto 2h		1.00
	Above 3h		1,42 (1,02 – 1,97)
Distance from the eye to screen of tablet	to 20 cm	-	1,00
	20 cm or more	0,01	1,08 (1,01 – 1,17)
Posture lying down in the use of the cell phone	No	-	1,00
	Yes	0,0001	1,67 (1,04 – 1,72)
Posture semi-lying down in the use of the cell phone	No	-	1,00
	Yes	0,04	1,28 (1,02 – 1,65)
Sitting posture in the use of the tablet	No	-	1,00
	Yes	0,04	1,54 (1,03–2,38)
Posture lying down in the use of tablet	No	-	1,00
	Yes	0, 03	1,83 (1,05 – 3,18)
How many hours tablet/day	Upto 2h	-	1,00
	Above 3h	0,01	2,28 (1,15 – 4,49)

DISCUSSION

In the present study, the prevalence of neck pain was 66.7% higher than in 29.0% in Finland (OKSANEN et al., 2014), 52.8% in Australia (SMITH AND LEGGAT, 2004), 33.0% in Thailand (KANCHANOMAI ET AL., 2011), in Brazil (MATOS et al., 2009), 54.0% in Saudi Arabia (GHARIB AND HAMID, 2013), 55.8% in Korea (WOO et al., 2016) and 28.0% in Ghana (ABLEDU AND OFFEL, 2015), similar to what was reported in studies from Jordan (ALMHDAMI et al., 2017), in Australia (SMITH et al., 2006) and in Italy (LORUSSO et al., 2009).

The women were 1.92 more likely to present cervical pain. In Thailand (KANCHANOMAI ET AL., 2011) it was 1,43, in Finland (OKSANEN et al., 2014), it was 2,30, in Australia (SMITH et al., 2006) it was 3,40 and in China (WOO et al., 2016) it was 1,61. Differences between men and women can be explained by some assumptions. The first is related to physical strength, which is lower in women than in men, making their energy expenditure greater when exposed to the demand for similar work, increasing the risk of musculoskeletal overload. The second refers to psychosocial factors, in which women report their complaints more frequently than men. Women have a more social and educational permission profile to talk about their symptoms and a more developed observation capacity (LEE et al., 2018; SILVA et al., 2016; YAO et al., 2012).

Using the devices electronics (TV, computer, game and tablet) for three hours or more were associated with neck pain similar to studies (DOCKRELL et al., 2015; HAYES et al., 2009; RAKHADANI et al., 2017; KIM et al., 2015), whereas in other investigations there were no associations (KANCHANOMAI et al., 2011; OBEMBE et al., 2013; CHIANG AND LIU, 2016).

This association may be due to prolonged sitting time, usually using incorrect postures, inadequate furniture, and poorly organized. Under these conditions, sitting posture generates various changes in musculoskeletal structures, increasing approximately 35% internal pressure in the intervertebral disc nucleus, stretching all structures (ligaments, small joints and nerves) of the spine, reducing return circulation. lower limbs and promotes the development of inflammatory processes in musculoskeletal structures with associated painful symptoms (XIE et al., 2017).

Another point, currently, is the portability of tablets and cell phones provides continuous use in multiple workstations and non-traditional postures (eg on the couch or when using public transport) and associated with their design that do not allow the wrist and fingers to rest on the surface of the inadequate postures of the cervical spine, shoulders and increased muscular activity of the shoulder girdle (SHIN AND ZHU, 2011; KIM et al., 2014). As a result of this, it has been reported that users may present in cervical spine pain, headaches, fatigue, dizziness and tension (SHARAN et al., 2014).

Using the tablet at a distance from the eye on the screen above 20 cm and postures lying down, semi-lying and sitting were associated with neck pain, corroborating the study in the United States (LEE et al., 2018), whereas in another investigation this fact did not occur (WOO et al., 2016).

The combination of these postures and the distance of the equipment to the eyes causes the individuals to have an anterior head posture (FHP) that promotes an increase in flexion of the lower cervical vertebrae and upper thoracic regions, enlargement of the superior cervical vertebrae and extension of the occiput in C1. FHP is considered to coexist with hyperextension of the high cervical spine, flattening of the lower cervical spine, rounding of the upper back, and elevation and protraction of the shoulders. All these changes cause a constant isometric muscle contraction to support the head, a stretching of the supahyoid muscles, narrowing of the intervertebral foramina in lordotic areas of the cervical region, and abnormal compression in the posterior zygapophysial joints and posterior portions of the intervertebral discs, resulting in cranial pain facial pain, headache, neck pain and shoulder pain, along with decreased cervical range of motion, muscle stiffness and sensitivity and degenerative changes (RAZVI et al., 2018; LEE et al., 2018; DOUGLAS AND GALLANGER, 2017).

This study had a number of methodological limitations: first, some confounding factors such as the types of tablets used, previous injuries and exposure to other technologies were not controllable. Second, no data were collected on how the outcome affected and / or limited their usual activities or caused changes in their daily routine and related to psychosocial factors. Third, the data were based on self-reported a response,

which increases the risk of recall bias. Finally, our sample was limited to the students of a university in Bauru and, therefore, caution should be exercised when generalizing the results of this study to other populations. The strength of this study is the consistency of the results with the literature, in the use of validated questionnaires for the outcome studied and the number of individuals interviewed.

Neck pain is a common condition that causes substantial disability. Considering that data available from national endpoint surveys are scarce in Brazil, this study will serve as a reference for other epidemiological investigations and will contribute to the national assessment of risk prevalence factors, systematic reviews and meta-analyses. Further studies should be

performed on the predictors and clinical outcome of cervical pain in different settings.

CONCLUSION

Finally, it was concluded that pain in the neck had a high prevalence and a strong association with female, time of use of TV above 3 hours per day, time of use of computer above 3 hours per day, time of use of game above 3 hours per day, using the tablet at a distance from the eye on the screen above 20 cm, posture lying down in the use of the cell phone, posture semi-lying down in the use of the cell phone, sitting posture in the use of the tablet, lying down posture in the use of the tablet and to use the tablet during two or more hours a day.

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