

Primary headaches among adolescents and their association with excessive computer use

Cefaleias primárias em adolescentes e sua associação com o uso excessivo de computador

Ingrid Becker Saueressig¹, Michelle Katherine Andrade Xavier^{1,2}, Valéria Mayaly Alves Oliveira^{1,2}, Ana Carolina Rodarti Pitangui^{1,2}, Rodrigo Cappato de Araújo^{1,2}

DOI 10.5935/1806-0013.20150049

ABSTRACT

BACKGROUND AND OBJECTIVES: The use of electronic devices as entertainment and recreation means has directly affected adolescents' lives; however their excessive use may bring consequences. This study aimed at observing the prevalence of primary headaches and their possible association with excessive use of computers among adolescents.

METHODS: Participated in the study 262 teenagers aged between 14 and 19 years, students of a public school, who have answered a questionnaire to evaluate socio-demographic variables, data on computer use, presence of headache symptoms and level of physical activity. Multiple models of binary and multinomial logistic regression were used to evaluate the association among variables. Significance level was 5%.

RESULTS: Prevalence of headache was 87.8%. There has been no significant difference in the prevalence of headache between genders, but among classification types, tension headache was more prevalent among females (35.4%). Females aged between 12 and 15 years and excessive computer use had higher chances of reporting headache. Females have 15.61 times more chance of reporting tension headache. Adolescents reporting excessive computer use had 2.54 times more chance of reporting migraine.

CONCLUSION: Results have shown high prevalence of primary headache among adolescents, being migraine the most prevalent type. Abusive computer use were considered risk factors for the development of headache.

Keywords: Adolescent, Computer, Headache, Information technology.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A inclusão de dispositivos eletrônicos como meios de entretenimento e recreação trouxe repercussão direta na vida dos adolescentes, todavia o uso excessivo pode gerar consequências. Objetivou-se verificar a prevalência de cefaleias primárias e sua possível associação com o uso excessivo de computador em adolescentes.

MÉTODOS: Participaram do estudo 262 adolescentes com idade entre 14 e 19 anos, estudantes de uma escola pública, que responderam um questionário que visou avaliar variáveis sócio-demográficas, dados sobre uso de computador, presença de sintomas de cefaleia e nível de atividade física. Foram utilizados modelos múltiplos de regressão logística binária e multinomial para avaliar a associação entre as variáveis. O nível de significância adotado foi de 5%.

RESULTADOS: A prevalência de cefaleia foi de 87,8%. Não houve diferença significativa quanto à presença de cefaleia entre gêneros, mas dentre os tipos de classificação, a tensional apresentou maior frequência entre o gênero feminino (35,4%). Indivíduos do gênero feminino, faixa etária entre 12 e 15 anos e uso excessivo de computador apresentaram maiores chances de relatar cefaleia. O gênero feminino apresenta 15,61 vezes mais chances de relatar cefaleia do tipo tensional. Adolescentes que referiram uso excessivo do computador apresentaram 2,54 vezes mais chances de relatar migrânea.

CONCLUSÃO: Os resultados mostram alta prevalência de cefaleia primária entre os adolescentes, sendo a migrânea a mais prevalente. O uso abusivo do computador foi considerado fatores de risco para o desenvolvimento de cefaleia.

Descritores: Adolescente, Cefaleia, Computador, Tecnologia da informação.

INTRODUCTION

The inclusion of electronic devices as leisure and recreation means is considerably increasing with technological advances and such insertion is directly affecting daily life of adolescents, occupying major space in their lives¹. Devices such as cell phones, computers, electronic games, tablets and TV have been used both for school purposes and leisure^{2,3}.

Due to easy access to electronic devices more time is spent with them and, as a consequence, negative impact on adolescents' health have been reported in the literature, such as sleep changes, tiredness, anxiety, depression, overweight, de-

1. Universidade de Pernambuco, Departamento de Fisioterapia, Petrolina, PE, Brasil.

2. Universidade de Pernambuco, Programa de Mestrado em Hebiatria, Camaragibe, Petrolina, PE, Brasil.

Submitted in July 17, 2015.

Accepted for publication in October 01, 2015.

Conflict of interests: none – Sponsoring sources: none.

Correspondence to:

Rodrigo Cappato de Araújo
BR 203, km 02 s/n - Cidade Universitária
56328-903 Petrolina, PE, Brasil.
E-mail: rodrigo.cappato@upe.br

creased levels of physical activities, decreased concentration, musculoskeletal pain, stress and headache³⁻⁷.

Headache, pointed as an increasing problem among children and adolescents and which is possibly related to changes in lifestyle and stress-related factors⁸, has been highlighted by some studies as a major complaint among adolescents due to the excessive use of electronic devices^{6,9}. Recently, Brindova et al.¹ have observed that adolescents referring watching TV for more than three hours per day have higher chances of reporting physical and psychological complaints, including headache. Similarly, those using computers for work or leisure for more than three hours have 70% more chances of presenting headache.

This reality is not different in Brazil where current studies show high prevalence of headache among adolescents, with decreased quality of life^{10,11}, negative impact on daily activities¹² as well as on academic performance¹¹. Brazilian technological development, both in job market and social communications, requires the mastering of electronic devices, regardless of socio-economic conditions. In the attempt to keep pace with this scenario and still aiming at social inclusion and amplification of access to information by students, the State Department of Education of Pernambuco has distributed laptops to high school students of state schools in 2012.

However, the question is whether such attitude could imply more time spent with those devices and even cooperate with the appearance of mentioned complaints, including headache. In this context, in light of the increasing number of adolescents referring headache, added to the scarcity of national studies on the relationship between the use of electronic devices and this complaint, this study aimed at observing the prevalence of headache and its possible association with the use of computers and electronic games among adolescents of a state school of the city of Petrolina/PE.

METHODS

Target population of this study was made up of students enrolled in the 8th grade of basic school and in the first three years of high school of Colégio de Aplicação Professora Vande de Souza Ferreira, school of the state public network of the city of Petrolina-PE. Sample was calculated by the WinPepi program and total population of students of the Escola de Aplicação Professora Vande de Souza Ferreira (n=600), bilateral statistics with $\alpha=0.05$, power of 80%, estimated proportion of 50% absolute precision around the estimate of 5% and loss of approximately 10% were taken into consideration, reaching a minimum number of 261 individuals.

The study has included students duly enrolled in the mentioned school, aged between 14 and 19 years and who have signed, dated and delivered the Free and Informed Consent Term (FICT). Exclusion criteria were adolescents with filling mistakes or incomplete filling of the questionnaire.

Data were collected in the school, from October 2013 to

March 2014 using a developed and adapted questionnaire, aiming at evaluating socio-demographic variables (age, gender, grade, presence of paid activity, and family income in minimum wages), data about computer use, presence of headache symptoms and physical activity level.

Some questions were based on the self-applicable questionnaire: *Musculoskeletal syndromes and injuries in children and adolescents and their relationship with computers and video-games*¹³. Aiming at assuring further understanding and coverage of the study, some questions were adapted, such as the use of the words Notebook and Tablet instead of Laptop. To identify whether the individual had headache, criteria was headache complaint at least once in the last year, and to classify the type of headache questions based on the international classification of headache disorders were used¹⁴. Physical activity level was evaluated by means of the International Physical Activity Questionnaire (IPAQ) – Short Version¹⁵.

To calculate body mass index (BMI) body mass and height were measured using a portable electronic scale with 150kg capacity (brand Camry) and a portable stadiometer (brand Welmy), respectively. Nutritional status of adolescents was classified according to criteria suggested by Cole et al.¹⁶.

Statistical analysis

Nine independent variables (gender, age, socio-economic level, professional activity, physical activity level, nutritional status and time using computers) and one dependent variable (presence of headache) were considered. To classify the type of headache, tension headache, migraine and other types of headache were taken into consideration. Data were entered in an electronic Microsoft Excel spreadsheet, using the double-entry process. Data were analyzed by the program SPSS (version 20). Descriptive analysis has included relative and absolute frequency of categorical variables and confidence interval (CI 95%) for proportions. Mean and standard deviation were calculated for numerical variables.

Pearson Chi-square or Fisher Exact tests were used to analyze differences between female and male variables. Bivariate logistic regression models were built to check the isolated association between the dependent variable and each independent variable. These analyses have allowed the analysis of variables which would be part of a multiple regression model, as well as the identification of potential confusion factors and identification of the need to adjust the analysis. Binary logistic regression was used to express the level of association between independent and dependent variables, through odds ratio calculation (OR) and confidence interval of 95%. In the multiple final model, variables with significance $p<0.20$ were selected.

Finally, to observe the association between independent variables and different types of headache, multinomial regression model was used. Statistical significance was considered when $p<0.05$ in all tests.

This study was approved by the Ethics and Research Committee, Universidade de Pernambuco (CAAE: 13598313.5.0000.5207).

RESULTS

Information of 265 adolescents was collected. However, three volunteers were lost due to poor questionnaire filling, thus totaling a final sample of 262 adolescents (101 males and 161 females). Sample mean age was 15.36 ± 1.56 years; body mass was 56.61 ± 11.21 kg and height was 165.45 ± 8.41 cm. Most respondents were physically active (160 subjects – 61.1%) and were overweighted or obese (192 subjects – 73.3%). With regard to time spent with computers, adolescents had usage mean of 228.75 minutes per week, or 3.83 hours per day.

Table 1 shows the analysis of the frequency of headache and its possible classification between genders. There has been no

statistically significant difference in the presence of headache, but among classification types, tension headache was more frequent among females ($p=0.001$).

Multiple regression analysis has shown that variables gender, age, and computer use were maintained in the final model. Females aged between 12 and 15 years and using computers for more than three hours per day had higher chances of reporting headache (Table 2).

Multinomial regression analysis has shown, for different types of headache, that females have 15.61 times more chances of having tension headache and 72% less chances of classifying headache as “other types”. Adolescents referring computer use for more than three hours per day had 2.54 more chances of reporting migraine, as shown in table 3.

Table 1. Description, in absolute frequencies, of the presence of headache and its classification in adolescents of both genders

Variables	Total	Male	Female	p value
Headache	230	89 (88.1%)	141	0,98
Yes	(87.8%)	12 (11.9%)	(87.6%)	
No	32 (12.2%)		20 (12.4%)	
Classification of headache				0,001*
Tension	59 (22.5%)	2 (2.0%)	57 (35.4%)	
Migraine	79 (30.2%)	21 (20.8%)	58 (36.0%)	
Other types	92 (35.1%)	66 (65.3%)	26 (16.1%)	
No headache	32 (12.2%)	12 (11.9%)	20 (12.4%)	

* $p < 0.05$.

Table 3. Factors associated to the presence of different types of headache in adolescents of a public school of Petrolina, PE. 2013-2014

Variables	OR	CI [95%]	p value
Tension headache			
Gender (Female)	15.61	[3.01-80.93]	0.001
Migraine			
Computer use	2.54	[1.02-6.33]	0.045
Other types			
Gender (Male)	0.28	[0.11-0.72]	0.008

Reference variable for multinomial model: no headache complaint; Significant association $p < 0.05$.

Table 2. Association of independent variables and presence and absence of headache among adolescents

Independent variables	Headache	No headache	OR [CI 95%]	Adjusted OR [CI 95%]
Gender	141	20	0.95 [0.44 – 2.04]	3. 71 [1. 20 – 11.46]
Female	89	12	1	
Male				
Age (years)	123	12	1.92 [0.89 – 4.10]	8. 58 [1.86 – 39.47]
12 to 15	107	20	1	
16 to 19				
Education level	114	12	0.42 [0.16 – 1.19]	
8 th Grade	22	2	1	
1 st Year	62	9	1.16 [0.24 – 5.54]	
2 nd Year	32	8	0.72 [0.29 – 1.82]	
3 rd Year				
Socio-economic level	106	14	1.04 [0.48 – 2.22]	
Up to 2 MW	117	16	1	
Above 2 MW				
Professional activity	78	12	0.86 [0.40 – 1.85]	
Works	151	20	1	
Does not work				
Nutritional status	167	25	0.74 [0.31 – 1.80]	
Overweight/obesity	63	7	1	
Eutrophic				
Physical activity level	91	11	1.25 [0.58 – 2.72]	
Inactive	139	21	1	
Active				
Computer use	135	15	1.61 [0.77 – 3.38]	3.44 [1.11 – 10.67]
Long time (>3h/day)	95	17	1	
Short time (<3h/day)				

MW = minimum wage.

DISCUSSION

There are still few Brazilian studies evaluating the association of the use of electronic devices and headache, which has justified the objective of this study. After observing the high prevalence of headache among 262 evaluated adolescents, it was clear the importance of this study about factors which could be associated to this complaint.

The prevalence of headache in the studied population was 87.8%. Prevalence as high as this has been also reported by other authors^{17,18}, however it is still possible to find lower figures (35.1%)¹⁹, and such differences may be explained by different methodological designs and by the ways to evaluate headache, since some studies classify as has having headache people presenting at least one headache episode in the last three months and other studies consider one episode in the last year.

Recently, Albers et al.¹⁹ have proposed a systematic review on the prevalence of headache among children and adolescents and have concluded that its increase is proportional to age; however this finding is different from our study which has observed higher chance of reporting headache in the age group from 12 to 15 years of age as compared to adolescents from 16 to 19 years of age. There are different headache triggering factors in different age groups, which may explain different results, and in this context Juang et al.²⁰ and Tietjen et al.²¹ have observed that factors linked to family structure, such as stress and/or divorce, may be associated to headache in younger adolescents. Such associations were not observed in our study, which was limited to evaluating possible association with computer use, what has restricted the identification of other possible associations.

As to frequency distribution of different types of primary headache, there has been a prevalence of 30.2% for migraine and 22.5% for tension headache. In a study by Xavier et al.¹⁸ with Brazilian adolescents and similar methodology, migraine was also the most common type of headache (19.3%), followed by tension headache (17.9%). Notwithstanding the similarity of methodological designs, discrepancies among prevalence rates were found, possibly because the recruited sample could be exposed to different primary headache triggering factors.

In our study, females had higher prevalence of tension headache as compared to males. Another relevant finding was that girls had 271% more complaints and were 15.61 times more prone to reporting tension headache. Shantakumari et al.²² have also observed that females had 78% more chance of developing headache. Albers et al.¹⁹ have reported that from 22 studies on prevalence of primary headache between genders, 15 have reported higher values for females. This association between headache and female gender is already well documented in the literature^{19,23,24} and a possible reason might be hormonal issues present during this phase²⁵. Such data emphasize the importance of considering headache as a symptom associated to gender.

About electronic devices use, it was observed a total usage time of 228.75 minutes per week, or 3.83 hours per day. These figures show abusive use of such devices by adolescents and

call the attention as possible risk factor for the development of headache. In addition, adolescents using computers for more than three hours per day have 3.44 times more chance of referring headache. Specifically, the use of computers subjects individuals to increased migraine complaints in 154%. Confirming such findings, a study carried out with 8042 adolescents with mean age of 13.13 years in Finland, has shown that spending more than three hours per day watching TV increases the chances of having headache¹.

Xavier et al.¹⁸ state that adolescents abusively using electronic devices have higher chances (OR=1.52) of having headache. The literature also states that overload of visual system and maintenance of inadequate postures for long periods are reflected in headache reports by adolescents^{2,9}.

Notwithstanding our results being in agreement with most current literature and presenting statistical and social relevance, the study was limited by the fact of generalizing results for students of a public school and extending them to private school students. In addition, the use of self-applicable questionnaires could lead both to over and underestimation of values due to memory bias of evaluated subjects. However, results have their importance justified as risk indicators for headache associated to time of computer use, gender and age. So, it is clear the need for following up adolescents abusively using such devices, aiming at restricting, as much as possible, negative influences of such use in the daily life of adolescents.

CONCLUSION

Our results show a high prevalence of primary headache among evaluated adolescents, being migraine the most prevalent type, followed by tension headache. Excessive computer use was considered risk factor for the development of headache, especially among females.

REFERENCES

1. Brindova D, Veselska ZD, Klein D, Hamrik Z, Sigmundova D, van Dijk JP, et al. Is the association between screen-based behaviour and health complaints among adolescents moderated by physical activity? *Int J Public Health*. 2015;60(2):139-45.
2. 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.
3. Milde-Busch A, von Kries R, Thomas S, Heinrich S, Straube A, Radon K. The association between use of electronic media and prevalence of headache in adolescents: results from a population-based cross-sectional study. *BMC Neurol*. 2010;10:12.
4. Punamäki RL, Wallenius M, Nygård CH, Saarni L, Rimpelä A. Use of information and communication technology (ICT) and perceived health in adolescence: the role of sleeping habits and waking-time tiredness. *J Adolesc*. 2007;30(4):569-85.
5. Anderson CA, Bushman BJ. Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, psychological arousal, and prosocial behavior: a meta-analytic review of the scientific literature. *Psychol Sci*. 2001;12(5):353-9.
6. Alexander LM, Currie C. Young people's computer use: implications for health education. *Health Educ*. 2004;104(4):254-61.
7. Blaauw BA, Dyb G, Hagen K, Holmen TL, Linde M, Wentzel-Larsen T, et al. The relationship of anxiety, depression and behavioral problems with recurrent headache in late adolescence – a Young-HUNT follow-up study. *J Headache Pain*. 2015;16:10.
8. Ozge A, Termine C, Antonaci F, Natriashvili S, Guidetti V, Wöber-Bingöl C. Overview of diagnosis and management of paediatric headache. Part I: diagnosis. *J Headache Pain*. 2011;12(1):13-23.
9. Oksanen A, Metsähonkala L, Anttila P, Aromaa M, Jäppilä E, Viander S, et al. Leisure activities in adolescents with headache. *Acta Paediatr*. 2005;98(1):609-15.
10. Castro K, Rockett FC, Billo M, Oliveira GT, Klein LS, Parizotti CS, et al. Lifestyle,

- quality of life, nutritional status and headache in school-age children. *Nutr Hosp.* 2013;28(5):1546-51.
11. Rocha-Filho PA, Santos PV. Headaches, quality of life, and academic performance in schoolchildren and adolescents. *Headache.* 2014;54(7):1194-202.
 12. Lima AS, de Araújo RC, Gomes MR, de Almeida LR, de Souza GF, Cunha SB, et al. [Prevalence of headache and its interference in the activities of daily living in female adolescent students]. *Rev Paul Pediatr.* 2014;32(2):256-61. English, Portuguese.
 13. Jannini SN, Dória-Filho U, Damiani D, Silva CA. [Musculoskeletal pain in obese adolescents]. *J Pediatr.* 2011;87(4):329-35. English, Portuguese.
 14. The International Classification of Headache Disorders: 2nd ed. *Cephalalgia.* 2004;24(Suppl 1):9-160.
 15. Matsudo S, Araujo T, Matsudo V, Andrade D, Andrade E, Oliveira LC, et al. Questionário internacional de atividade física (IPAQ): estudo de validade e reprodutibilidade no Brasil. *Atividade Física & Saúde.* 2001;6(2):5-18.
 16. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ.* 2000;320(7244):1240-3.
 17. Blaschek A, Milde-Busch A, Straube A, Schankin C, Langhagen T, Jahn K, et al. Self-reported muscle pain in adolescents with migraine and tension-type headache. *Cephalalgia.* 2012;32(3):241-9.
 18. Xavier MK, Pitangui AC, Silva GR, Oliveira VM, Beltrão NB, de Araújo RC. Prevalência de cefaleia em adolescentes e sua associação com uso de computador e jogos eletrônicos. *Ciêñ Saúde Colet.* 2015 [In Press]. <http://www.sbp.com.br/trabalhos-de-congressos-da-sbp/13-congresso-brasileiro-de-adolescncia/0092-prevalencia-de-cefaleia-em-adolescentes-e-sua-associacao.pdf>.
 19. Albers L, von Kries R, Heinen F, Straube A. Headache in school children: is the prevalence increasing? *Curr Pain Headache Rep.* 2015;19(3):4.
 20. Juang KD, Wang SJ, Fuh JL, Lu SR, Chen YS. Association between adolescent chronic daily headache and childhood adversity: a community-based study. *Cephalalgia.* 2004;24(1):54-9.
 21. Tietjen GE, Brandes JL, Peterlin BL, Eloff A, Dafer RM, Stein MR, et al. Childhood maltreatment and migraine (part I). Prevalence and adult revictimization: a multi-center headache clinic survey. *Headache.* 2010;50(1):20-31.
 22. Shantakumari N, Eldeeb R, Sreedharan J, Gopal K. Computer use and vision-related problems among university students in ajman, United arab emirate. *Ann Med Health Sci Res.* 2014;4(2):258-63.
 23. Bahrami P, Zebardast H, Zibaei M, Mohammadzadeh M, Zabandan N. Prevalence and characteristics of headache in Khoramabad, Iran. *Pain Physician.* 2012;15(4):327-32.
 24. Fendrich K, Vennemann M, Pfaffenrath V, Evers S, May A, Berger K, et al. Headache prevalence among adolescents—the German DMKG headache study. *Cephalalgia.* 2007;27(4):347-54.
 25. Monteith TS, Sprenger T. Tension type headache in adolescence and childhood: where are we now? *Curr Pain Headache Rep.* 2010;14(6):424-30.