

Prevalence of headache and associated factors among adolescents: results of a population-based study

Prevalência e fatores associados de cefaleia entre adolescentes: resultados de um estudo de base populacional

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ABSTRACT: *Introduction:* Cephalalgia is one of the most common somatic complaints related to health problems in childhood and adolescence. *Objective:* To measure the cephalalgia prevalence in adolescents from the city of São Paulo, Brazil, and associated factors. *Methods:* This is a cross-sectional population-based study, carried out in 2015, with 539 adolescents of both sexes, aged between 15 and 19 years. The information was collected in a household survey, and the participants were selected from probabilistic sampling. Frequencies, χ^2 test and logistic regression analysis were used in the study, and significance level was 5%. *Results:* the estimated prevalence of cephalalgia was 38.2% (95%CI 33.8 – 42.7), and 7.8% (95%CI 5.6 – 10.7), migraine. The associated factors for cephalalgia were: female sex (OR = 2.2; 95%CI 1.4 – 3.4), Common Mental Disorder (OR = 2.8; 95%CI 1.7 – 4.9), vision impairment (OR = 2.6; 95%CI 1.6 – 4.2), besides back pain (OR = 2.2; 95%CI 1.3 – 3.5), sinusitis (OR = 2.0; 95%CI 1.2 – 3.4) and incomplete elementary education (OR = 3.0; 95%CI 1.6 – 5.6). *Conclusion:* The prevalence of headache among adolescents in the city of São Paulo represented more than 1/3 (one third) of this population. The main associated factors were sex, low schooling and the following comorbidities: common mental disorder and vision impairment.

Keywords: Cephalalgia. Migraine. Adolescents. Epidemiology. Epidemiological surveys. Cross-sectional studies.

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Conflict of interests: nothing to declare – **Financial support:** Secretaria Municipal da Saúde de São Paulo (Process 0.235.936-0, de 2013).

RESUMO: *Introdução:* A cefaleia é uma das queixas somáticas relacionadas a problemas de saúde mais comuns entre crianças e adolescentes. *Objetivo:* Estimar a prevalência de cefaleia em adolescentes da cidade de São Paulo, Brasil, e fatores associados. *Métodos:* Trata-se de estudo transversal de base populacional, realizado em 2015, com 539 adolescentes de ambos os sexos, entre 15 e 19 anos de idade. Coletaram-se as informações por inquérito domiciliar, e selecionaram-se os participantes com base em amostragem probabilística. Utilizaram-se na análise frequências, teste χ^2 e análise de regressão logística. Adotou-se nível de significância de 5%. *Resultados:* A prevalência estimada de cefaleia é de 38,2% (intervalo de confiança — IC95% 33,8 – 42,7), de dor de cabeça simples 32,8% (IC95% 28,8 – 37,2) e de enxaqueca 7,8% (IC95% 5,6 – 10,7). Os fatores associados encontrados com cefaleia foram: ser do sexo feminino (razão de chances/*odds ratio* — OR = 2,2; IC95% 1,4 – 3,4), transtorno mental comum (TMC) (OR = 2,8; IC95% 1,7 – 4,9), problema de visão (OR = 2,6; IC95% 1,6 – 4,2), dor nas costas (OR = 2,2; IC95% 1,3 – 3,5), sinusite (OR = 2,0; IC95% 1,2 – 3,4) e ter escolaridade com ensino fundamental II incompleto (OR = 3,0; IC95% 1,6 – 5,6). *Conclusão:* A prevalência de cefaleia em adolescentes da cidade de São Paulo em 2015 representou mais de 1/3 (um terço) dessa população. Os principais fatores associados foram sexo, baixa escolaridade e as comorbidades TMC e problema de visão.

Palavras-chave: Cefaleia. Transtornos de enxaqueca. Adolescentes. Epidemiologia. Inquéritos epidemiológicos. Estudos transversais.

INTRODUCTION

Cephalalgia is one of the most common complaints among children and adolescents. A systematic review study estimates that the prevalence is 58.4% among people aged less than 20 years¹. In another study, regarding pain among adolescents aged 15 years, about 30% of them reported headache; 30%, back pain; and 20%, stomachache².

In Brazil, a study analyzed the prevalence rates of cephalalgia. Only six studies were found, all involving adults and none in the city of São Paulo; the mean prevalence of cephalalgia was 70.6%, and migraine, 15.8%³.

Studies have shown the association between cephalalgia in adolescents with sex¹, age¹, parental anxiety⁴, mood disorders⁵ and region of household¹.

Since cephalalgia is a subjective phenomenon of pain, it is hard to diagnose and to treat. It is also considered as a major health issue, which can lead to worsened quality of life, reducing the capacity for work, study and leisure⁶. For adolescents, there are variables that make the sickness process more complex, with the addition of hormonal changes related to varied social adaptations and changes in levels of autonomy and responsibility, when adulthood is closer⁷.

The objective of this study was to estimate the prevalence and associated factors to cephalalgia among adolescents in the city of São Paulo.

METHOD

This is a cross-sectional, population-based study, based on data from the Health Survey from the City of São Paulo, 2015 (ISA Capital 2015); data were collected between September

2014 and December 2015, in the population whose household is in the urban area, representing 9,349,890 residents⁸.

This survey is constituted of a sample composed of people aged between 12 years and older. We used the stratified probability sampling, including selection in two stages:

- census sectors;
- households⁸.

The study domains were the regions and the interviewees in the age groups of 12 to 19 years; 20 to 59 years; and 60 years of age or older. For purposes of statistical inference, each individual of the sample was associated with a sampling weight, composed of three components:

- design weight, which considers the sampling fractions of the two stages of selection;
- non-response adjustment;
- post-stratification, which adjusts the distribution of the sample by sex, age group and region of the household, according to the distribution of the population in the city and according to the population estimation⁸.

In this study, 539 (97.3%) of the adolescents aged between 15 and 19 years were selected, with responses about cephalalgia.

The considered dependent variable was cephalalgia, whose measurement was obtained through the answer to the question: “Do you usually have migraine or headache?”. Those who answered “yes” to the question were asked to define if they suffered from migraine and/or headache.

Independent variables were:

- Sociodemographic variables: sex, age, race/ethnicity, and schooling;
- Variables related to health status and life style: self-perceived health⁹, nutritional status¹⁰, smoking, alcohol consumption and use of contraceptives, only for women;
- Variables related to chronic conditions: all self-reported ones were considered and tested;
- Variables related to emotional condition: we selected those who answered “yes” to eight or more questions in the E block of ISA Capital 2015. This block is composed of questions from the Self-Reporting Questionnaire 20 (SRQ-20), instrument containing 20 questions, in which eight affirmative responses selected people with common mental disorders (CMD), revalidated by Gonçalves et al.¹¹.

A descriptive analysis was carried out with proportions, 95% confidence interval (95%CI) and frequencies. The χ^2 test was used to test the difference between proportions. Then, the variables presenting $p < 0.20$ in the bivariate analysis for the multiple logistic regression analysis were selected, with odds ratio (OR) and 95%CI. Of these, the ones in which $p < 0.05$ remained in the model. The adjustment of the logistic regression model was assessed by the Hosmer-Lemeshow test.

In all of the analyses, the sample design effect and the weighting for the analysis of surveys based on complex designs were considered, using the software Stata 14 (StataCorp LP, College Station, United States).

All participants or respective tutors signed the Informed Consent Form, which explained the study objectives and the information that would be requested; the confidentiality of the information was guaranteed. The research protocol was approved by the Ethics Committee from the Epidemiology Department of the School of Public Health, at Universidade de São Paulo — Report n. 1.420.473.

RESULTS

The estimated prevalence rates of adolescents (aged between 15 and 19 years) living in the city of São Paulo were 38.2% (95%CI 33.8 – 42.7) for cephalalgia, 32.8% (95%CI 28.8 – 37.2) for headache and 7.8% (95%CI 5.6 – 10.7) for migraine.

Characteristic of the interviewees: 50.9% were male, and 49.1% were female, therefore, the proportion was similar. Besides, 45% reported having white skin, and 54.1% had completed elementary school (Table 1).

The estimated prevalence of cephalalgia among adolescents, by sex, is: among female participants, 49.8% (95%CI 43.6 – 55) and, among male participants, 26.9% (95%CI 21.7 – 32.9). Regarding schooling, those with incomplete elementary school presented with prevalence of cephalalgia – 52.8% (95%CI 40.8 – 64.4%), that is, more than half of the participants with that schooling status (Table 2).

For nutritional status, the prevalence of cephalalgia among the obese is 53.7% (95%CI 37.8 – 69.0), whereas for those with normal or low weight the prevalence is 34.8% (95%CI 30 – 39.4) (Table 3).

The prevalence rates of cephalalgia with self-reported chronic conditions are, for each disease: sinusitis, 56.1% (95%CI 45.1 – 66.5); rhinitis, 42.4% (95%CI 33.7– 51.6); back pain, 57.8% (95%CI 48.6 – 66.5); vision impairment, 54.7% (95%CI 44.8 – 64.2); and CMD, 68.4% (95%CI 58.7 – 76.8) (Table 3).

Of the univariate analysis, sex and schooling (Table 2), nutritional status, alcohol consumption, health status characterization, sinusitis, back pain, vision impairment and CMD were selected (Table 3).

In the univariate logistic regression, the variables associated with cephalalgia were: being female, having incomplete elementary school, being obese, having CMD, vision impairment, back pain and sinusitis.

In the final model obtained by logistic regression, it was observed that female adolescents have 1.2 more chances of having cephalalgia (OR = 2.2; 95%CI 1.4 – 3.4); 1.8 more chances with CMD (OR = 2.8; 95%CI 1.7 – 4.9); 1.6 more chances when referring vision impairment (OR = 2.6; 95%CI 1.6 – 4.2); 1.2 more chances when reporting back pain (OR = 2.2; 95%CI 1.3 – 3.5); one time higher chances when it comes to sinusitis (OR = 2; 95%CI 1.2 – 3.4), and twice as many chances when schooling status is incomplete elementary school (OR = 3; 95%CI 1.6 – 5.6) (Table 4).

To verify the predictive capacity of the logistic regression model, the Hosmer-Lemeshow test was used and indicated that adolescents present with 99.6% of chances to have cephalgia at the presence of these factors.

DISCUSSION

The estimated prevalence of cephalgia, of 38.2% (95%CI 33.8 – 42.7) in adolescents (aged from 15 to 19 years), in the city of São Paulo, is lower than the global estimation. Abu-Arafeh et al.¹, in a systematic review, presented the prevalence of cephalgia among children and adolescents (aged from 0 to 20 years) as 58.3% (95%CI 58.1 – 58.8). Wöber-Bingöl¹², also in a systematic review from carried out from 1990 to 2013, with four studies in Brazil, estimates the

Table 1. Frequency and proportion of the independent variables of adolescents living in the city of São Paulo, in 2015.

Demographic characterization	% Adolescents (95%CI)	n
Sex		
Male	50.9 (46.8 – 55,0)	271
Female	49.1 (45.0 – 53.2)	268
Age (years)		
15	21.0 (17.9 – 24.4)	115
16	17.1 (13.7 – 21.0)	91
17	21.3 (17.6 – 25.5)	114
18	18.7 (15.3 – 22.6)	104
19	22.0 (18.2 – 26.4)	115
Race/Ethnicity		
White	45.0 (39.9 – 50.3)	231
Black	14.1 (11.0 – 17.8)	77
Brown	36.9 (32.3 – 41.8)	206
Other	4.0 (2.4 – 6.4)	22
Schooling		
Complete High School	33.1 (29.3 – 37.2)	179
Complete Elementary School	54.1 (49.3 – 58.9)	287
Incomplete Elementary School	12.8 (9.8 – 16.5)	73

95%CI: 95% confidence interval.

prevalence of 54.4% (95%CI 43.1 – 65.8). One of the reasons why cephalgia as a bit below expected is that the question in ISA Capital 2015 referred to the usual cephalgia, understood as a frequent symptom. In some studies, however, the question was different, mentioning cephalgia without any further specifications, or not mentioning the exact question¹².

Wöber-Bingöl¹² estimates the prevalence of migraine of 9.1% (95%CI 7.1 – 11.1) among children and adolescents. In this study, we found the estimated prevalence of migraine of 7.8% (95%CI 5.6 – 10.80). The result is similar to the global estimation, which may have occurred because this diagnosis is usually medical.

In the systematic review by Abu-Arafeh¹, women were more prone to having a headache (OR = 1.5, 95%CI 1.4 – 1.6) than men; this increased chance can also be confirmed in other studies, carried out by different researchers, at different age groups¹³⁻¹⁵. In this study, with adolescents from the city of São Paulo, in 2015, the estimated presence of cephalgia

Table 2. Adolescents with cephalgia: demographic characterization of residents in the city of São Paulo, in 2015.

Demographic characterization	% Adolescents with cephalgia (95%CI)	p
Sex		
Male	26.9 (21.7 – 32.9)	< 0.0001*
Female	49.8 (43.0 – 56.7)	
Age (years)		
15	44.0 (34.2 – 54.2)	0.5436
16	31.5 (22.0 – 42.9)	
17	36.5 (27.6 – 46.3)	
18	38.4 (29.6 – 48.1)	
19	39.2 (29.5 – 49.8)	
Race/Ethnicity		
White	39.6 (33.2 – 46.4)	0.3923
Black	43.3 (32.0 – 55.3)	
Brown	35.9 (29.0 – 42.4)	
Other	24.7 (11.4 – 45.6)	
Schooling		
Complete High School	33.5 (26.5 – 41.3)	0.0475*
Complete Elementary School	37.6 (31.3 – 44.4)	
Incomplete Elementary School	52.8 (40.8 – 64.4)	

95%CI: 95% confidence interval; p: Pearson's correlation coefficient; *variables selected for the logistic regression model.

was also higher among women in relation to men (OR = 2.1; 95%CI 1.4 – 3.2). Among the several deductions regarding this association, the literature highlights the report of the relation with female sexual hormones, which seem to be one of the main elements that explain the differences of cephalalgia between genders^{14,15}.

Even though there are several studies approaching cephalalgia among students, we did not identify studies in which schooling is an associated factor. In a study by Barros et al.¹⁶, there was higher prevalence of chronic conditions among those with lower schooling. In this study, the estimated prevalence of cephalalgia among adolescents in the city of São Paulo with incomplete elementary school was 52.8% (95%CI 40.8 – 64.4), which may indicate a relation with the vulnerability and social exclusion factors.

Table 3. Adolescents with cephalalgia: nutritional status, characterization of life habits, health status and health issues of residents in the city of São Paulo, in 2015.

Variables	% Adolescents with cephalalgia (95%CI)	p
Nutritional status		
Normal and low weight	34.8 (30.0 – 39.9)	0.0361*
Overweight	43.0 (33.2 – 53.3)	
Obese	53.7 (37.8 – 69.0)	
Alcohol consumption		
Does not consume alcohol	40.4 (35.0 – 46.1)	0.2144
Consumes alcohol	49.6 (36.3 – 63.0)	
Smoking		
Does not smoke	37.8 (33.2 – 42.6)	0.6147
Smokes	42.6 (26.0 – 61.1)	
Birth control		
No	49.9 (42.9 – 57.0)	0.9063
Yes	48.2 (23.1 – 74.3)	
Characterization of health conditions		
Reported disease: sinusitis	56.1 (45.1 – 66.5)	0.0006*
Reported disease: rhinitis	42.4 (33.7 – 51.6)	0.2551*
Reported symptom: back pain	57.8 (48.6 – 66.5)	< 0.0001*
Vision impairment	54.7 (44.8 – 64.2)	0.0002*
CMD	68.4 (58.7 – 76.8)	< 0.0001*

95%CI: 95% confidence interval; p: Pearson's correlation coefficient; CMD: common mental disorder; *Variables selected for the logistic regression model.

The relation between cephalalgia and back pain was identified in studies by the World Health Organization (WHO), besides others^{6,17,18}. This association is still little understood, being mainly related to stress and musculoskeletal conditions, especially in the cervical region. Ashina et al.¹⁸ indicate that the relation between back pain and cephalalgia was OR = 2.1, which is the same result as the one found in this study.

Jain et al.¹⁹ did not identify an association between refraction correction in the glasses and reduced cephalalgia. Another study showed that the latter is more associated to the use of electronic devices, such as computers and cell phones, than to refraction errors²⁰. In this study, there was an association between vision impairment and cephalalgia, with OR = 2.6 (95%CI 1.5 – 3.9).

The isolated identification of CMD factors, such as depression^{21,22}, insomnia²³ and anxiety²⁴, is common in studies in which they are associated with cephalalgia. In this study, we used the SRQ-20 questionnaire, which qualifies psychic suffering. The association between suspicion of CMD and cephalalgia in our study was significant, with OR = 4.3 (95%CI 2.7 – 7.0).

One of the study limitations was memory bias, because, when questioned, the interviewees may have forgotten to mention an event. There may be potential for verification bias, with the possibility of incorrect classification regarding an individual, a number or an attribute in a different category than the one it should be attributed to. The household selection did not include the population living in census sectors located in the rural area, the homeless population and institutionalized patients. The choice of specific estimations for significant associations in the simple and multiple analyses can show the overestimation in the odds ratio, in comparison to prevalence ratios, but it is known that both measurements of association can be used²⁵.

Table 4. *Odds ratio* — Crude and adjusted OR of cephalalgia in adolescents living in the city of São Paulo, in 2015.

Variables	Crude OR	(95%CI)	p	Adjusted OR	(95%CI)	p
Female gender	2.7	(1.8 – 4.0)	< 0.001	2.2	(1.4 – 3.4)	< 0.001
CMD	4.3	(2.7 – 7.0)	< 0.001	2.8	(1.7 – 4.9)	< 0.001
Vision impairment	2.3	(1.5 – 3.7)	< 0.001	2.6	(1.6 – 4.2)	0.001
Back pain	2.8	(1.8 – 4.5)	< 0.001	2.2	(1.3 – 3.5)	0.003
Sinusitis	2.3	(1.4 – 3.8)	0.001	2.0	(1.2 – 3.4)	0.017
Schooling						
Complete high school	1			1		
Complete elementary school	1.2	(0.8 – 1.9)	0.446	1.4	(0.8 – 2.3)	0.245
Incomplete elementary school	2.2	(1.2 – 4.0)	0.007	3.0	(1.6 – 5.6)	0.001

95%CI: 95% confidence interval; CMD: common mental disorder.

Six factors (being female, having CMD, back pain, vision impairment and sinusitis, and having incomplete elementary school) associated with cephalgia allow to use them as predictors of this condition. The 99.5% chance of an adolescent presenting with cephalgia in the presence of these factors can support clinical decisions and the control of cases, especially in primary care.

It is important to highlight that diagnosed and poorly treated conditions in adolescence have great potential of aggravation in adulthood.

CONCLUSION

The prevalence of cephalgia in adolescents in the city of São Paulo in 2015 was 38.2%, representing more than 1/3 (one third) of this population. The associated factors were being female, having low schooling, having CMD, vision impairment, back pain and sinusitis. Understanding cephalgia as a public health issue makes us think of ways to interpret its origins, associated factors and coping strategies, which may influence new ways to prioritize and organize health care.

ACKNOWLEDGMENTS

We thank the coordinators and interviewers of the study, who made an effort to carry out a qualified analysis; to the interviewees, who were able to collaborate with the study; and to Maria Cecilia Goi Porto Alves, who was responsible for the statistics of the project.

REFERENCES

1. Abu-Arafeh I, Razak S, Sivaraman B, Graham C. Prevalence of headache and migraine in children and adolescents: a systematic review of population-based studies. *Dev Med Child Neurol* 2010; 52(12): 1088-97. <http://doi.org/10.1111/j.1469-8749.2010.03793.x>
2. Gobina I, Villberg J, Villerusa A, Välimaa R, Tynjälä J, Ottova-Jordan V, et al. Self-reported recurrent pain and medicine use behaviours among 15-year olds: Results from the international study. *Eur J Pain* 2015; 19(1): 77-84. <http://doi.org/10.1002/ejp.524>
3. Queiroz LP, Silva Junior AA. The Prevalence and Impact of Headache in Brazil. *Headache J Head Face Pain* 2015; 55(S1): 32-8. <http://doi.org/10.1111/head.12511>
4. Williams R, Leone L, Faedda N, Natalucci G, Bellini B, Salvi E, et al. The role of attachment insecurity in the emergence of anxiety symptoms in children and adolescents with migraine: an empirical study. *J Headache Pain* 2017; 18. <http://doi.org/10.1186/s10194-017-0769-3>
5. Orr SL, Potter BK, Ma J, Colman I. Migraine and Mental Health in a Population-Based Sample of Adolescents. *Can J Neurol Sci* 2017; 44(1): 44-50. <http://doi.org/10.1017/cjn.2016.402>
6. World Health Organization. Atlas of headache disorders and resources in the world 2011. World Health Organization; 2011. 72 p.
7. Brêtas JR da S. Vulnerabilidade e adolescência. *Rev Soc Bras Enferm Ped* 2010; 10(2): 89-96.
8. Alves MCGP, Escuder MML, Goldbaum M, Barros MB de A, Fisberg RM, Cesar CLG. Plano de amostragem em inquéritos de saúde, município de São Paulo, 2015. *Rev Saúde Pública* 2018; 52: 81. <http://doi.org/10.11606/S1518-8787.2018052000471>

9. César CLG, Carandina L, Alves MCGP, Barros MB de A, Goldbaum M. Saúde e condição de vida em São Paulo. São Paulo: FSP/USP; 2005.
10. São Paulo. Secretaria Municipal da Saúde de São Paulo. Estado nutricional da população da cidade de São Paulo [Internet]. São Paulo: Prefeitura de São Paulo; 2018 [Accessed on Nov. 3, 2018]. Available from: http://www.prefeitura.sp.gov.br/cidade/secretarias/upload/saude/arquivos/publicacoes/ISA_2015_EN.pdf
11. Gonçalves DM, Stein AT, Kapczinski F. Avaliação de desempenho do Self-Reporting Questionnaire como instrumento de rastreamento psiquiátrico: um estudo comparativo com o Structured Clinical Interview for DSM-IV-TR. *Cad Saúde Pública* 2008; 24(2): 380-90. <http://doi.org/10.1590/S0102-311X2008000200017>
12. Wöber-Bingöl Ç. Epidemiology of Migraine and Headache in Children and Adolescents. *Curr Pain Headache Rep* 2013; 17. <http://doi.org/10.1007/s11916-013-0341-z>
13. Lu S-R, Fuh J-L, Wang S-J, Juang K-D, Chen S-P, Liao Y-C, et al. Incidence and Risk Factors of Chronic Daily Headache in Young Adolescents: A School Cohort Study. *Pediatrics* 2013; 132(1): e9-e16. <https://doi.org/10.1542/peds.2012-1909>
14. Finocchi C, Strada L. Sex-related differences in migraine. *Neurol Sci* 2014; 35: 207-13. <http://doi.org/10.1007/s10072-014-1772-y>
15. Pavlovic JM, Akcali D, Bolay H, Bernstein C, Maleki N. Sex-related influences in migraine. *J Neurosci Res* 2017; 95(1-2): 587-93. <http://doi.org/10.1002/jnr.23903>
16. Barros MB de A, Francisco PMSB, Zanchetta LM, César CLG. Tendências das desigualdades sociais e demográficas na prevalência de doenças crônicas no Brasil, PNAD: 2003-2008. *Ciêns Saúde Coletiva* 2011; 16(9): 3755-68. <http://doi.org/10.1590/S1413-81232011001000012>
17. Iguti AM, Bastos TF, Barros MB de A. Dor nas costas em população adulta: estudo de base populacional em Campinas, São Paulo. *Cad Saúde Pública* 2015; 31(12): 2546-58. <http://doi.org/10.1590/0102-311X00178114>
18. Ashina S, Lipton RB, Bendtsen L, Hajiyeva N, Buse DC, Lynberg AC, et al. Increased pain sensitivity in migraine and tension-type headache coexistent with low back pain: A cross-sectional population study. *Eur J Pain (United Kingdom)* 2018; 22(5): 904-14. <http://doi.org/10.1002/ejp.1176>
19. Jain SA, Das S, Subashini M, Mahadevan K. Determination of the proportion of refractive errors in patients with primary complaint of headache and the significance of refractive error correction in symptoms relief. *Indian J Clin Exp Ophthalmol* 2018; 4(2): 258-62. <http://doi.org/10.18231/2395-1451.2018.0057>
20. Saueressig IB, Xavier MKA, Oliveira VMA, Pitanguí ACR, Araújo RC de. Primary headaches among adolescents and their association with excessive computer use. *Rev Dor* 2015; 16(4): 244-8. <http://doi.org/10.5935/1806-0013.20150049>
21. Breslau N, Davis GC, Schultz LR, Paterson EL. Migraine and Major Depression: A Longitudinal Study. *Headache* [Internet] 1994 [Accessed on Dec. 10, 2017]; 34: 387-93. Available from: <https://deepblue.lib.umich.edu/bitstream/handle/2027.42/72886/j.1526-4610.1994.hed3407387.x.pdf?sequence=1&isAllowed=y>
22. Zebenholzer K, Lechner A, Broessner G, Lampl C, Luthringhausen G, Wuschitz A, et al. Impact of depression and anxiety on burden and management of episodic and chronic headaches – a cross-sectional multicentre study in eight Austrian headache centres. *J Headache Pain* 2016; 17: 1-10. <http://doi.org/10.1186/s10194-016-0603-3>
23. Lebedeva ER, Kobzeva NR, Gilev DV, Kislyak NV, Olesen J. Psychosocial factors associated with migraine and tension-type headache in medical students. *Cephalgia* 2016; 37(13): 1264-71. <http://doi.org/10.1177/0333102416678389>
24. Baptista T, Uzcátegui E, Arapé Y, Serrano A, Mazzarella X, Quiroz S, et al. Migraine life-time prevalence in mental disorders: concurrent comparisons with first-degree relatives and the general population. *Invest Clin* 2012; 53(1): 38-51. <http://www.ncbi.nlm.nih.gov/pubmed/22524107>
25. Francisco PMSB, Donalísio MR, Barros MB de A, Cesar CLG, Carandina L, Goldbaum M. Medidas de associação em estudo transversal com delineamento complexo: razão de chances e razão de prevalência. *Rev Bras Epidemiol* [Internet] 2008 [Accessed on June 21, 2019]; 11(3): 347-55. Available from: <http://www.scielo.br/pdf/rbepid/v11n3/01.pdf>

Received on: 02/26/2019

Revised on: 04/24/2019

Accepted on: 07/25/2019

Authors' contributions: Mirna Namie Okamura: elaboration of the article, statistical analyses and text revision. Moisés Goldbaum: coordinator and one of the people in charge of the ISA Capital project, from conception to final base, besides orientation and revision of the article. Wilma Madeira: writing and revision of the article. Chester Luiz Galvão Cesar: coordinator and one of the people in charge of ISA Capital, from conception to final base, besides orientation and revision of the article.

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