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Lifestyle, quality of life, nutritional status and headache in school-aged children

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Abstract

Background: **Headache has been described as a factor with significant negative impact on the quality of life of school-aged children with a high risk of developing in chronic and persistent form in adulthood. Among other headache associated triggers or aggravating factors, lifestyle and obesity has been investigated, but results are still conflicting.**

Objective: **To evaluate the prevalence of headache in school-aged children and its relationship to anthropometric characteristics, lifestyle, and quality of life.**

Methods: **A cross-sectional study was conducted in six schools located in two cities in southern Brazil, involving 750 students aged 7 to 14 years. Information was collected on sociodemographic characteristics, clinical variables (presence of headache and menarche), anthropometric data, lifestyle, and quality of life.**

Results: **A total of 185 (24.7%) students reported having headache crises in the last 3 months. Among students aged 10 to 14 years, presence of headache was associated with female sex, affecting 32.2% of girls *vs.* 23.3% of boys (p = 0.042, chi-square test). Anthropometric parameters (data on overweight/obesity) were consistent with national prevalence rates, and there was no association between Body Mass Index (BMI) and headache. Regarding lifestyle, 2.0% of students reported smoking and 1.6% consuming alcohol occasionally, and neither was associated with headache. Quality of life, especially aspects of social life, appeared to be affected by the presence of headache.**

Conclusion: **This study found a high prevalence of headache in school-aged children, which was associated with female students aged 10–14 years and quality of life.**

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ESTILO DEVIDA, CALIDAD DE VIDA, ESTADO NUTRICIONAL Y DOLOR DE CABEZA EN EDAD ESCOLAR

Resumen

Introducción: **Dolor de cabeza se ha descrito como un factor con impacto negativo significativo en la calidad de vida de los niños en edad escolar, con alto riesgo de desarrollar la forma crónica y persistente en la edad adulta. Entre otros factores desencadenantes o agravantes asociados, se ha investigado el estilo de vida y la obesidad, pero los resultados siguen siendo contradictorios.**

Objetivo: **Evaluar la prevalencia de dolor de cabeza en niños en edad escolar y su relación con las características antropométricas, estilo de vida y calidad de vida.**

Métodos: **Un estudio transversal se llevó a cabo en seis escuelas ubicadas en dos ciudades del sur de Brasil, con la participación de 750 estudiantes de 7 a 14 años. Se obtuvo información sobre características sociodemográficas, variables clínicas (presencia de dolor de cabeza y la menarquia), datos antropométricos, estilo de vida y calidad de vida.**

Resultados: **Un total de 185 (24,7%) estudiantes reportaron tener crisis de dolor de cabeza en los últimos 3 meses. Entre los estudiantes de 10 a 14 años, presencia de dolor de cabeza se asoció con el sexo femenino, que afecta a un 32,2% de niñas frente a un 23,3% de los varones (p = 0,042, chi-cuadrado). Parámetros antropométricos (datos de sobrepeso/obesidad) fueron consistentes con las tasas nacionales de prevalencia, y no hubo asociación entre el Índice de Masa Corporal (IMC) y dolor de cabeza. En cuanto a estilo de vida, 2,0% de los estudiantes reportaron fumar y un 1,6% el consumo de alcohol de vez en cuando, y no se asoció con dolor de cabeza. La calidad de vida, especialmente los aspectos de la vida social, parece estar afectada por la presencia de dolor de cabeza.**

Conclusión: **Este estudio encontró una alta prevalencia de dolor de cabeza en niños en edad escolar, que se asoció con estudiantes de 10-14 años y la calidad de vida.**

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Palabras clave: *Niño. Adolescente. Dolor de cabeza. Antropometría. Calidad de vida. Estilo de vida.*

Abbreviations

BMI: Body Mass Index.
CCEB: Economic Classification Criterion-Brazil.
PedsQL™: Pediatric Quality of Life Inventory.
WHO: World Health Organization.
HCPA: Hospital de Clínicas de Porto Alegre.
MIDAS: Migraine Disability Assessment Test.

Introduction

Estimates of the prevalence of headache in children and adolescents vary widely depending on the methods and diagnostic criteria applied. Self-reported headache frequency ranges from 6.5 to 30% for children and adolescents.[1] Among primary headaches, migraine is considered one of the most prevalent in young children, while the frequency of tension type headache increases in the later years of childhood.[2]

Headache has a significant negative impact on children and their families, who often seek more to healthcare services than children without headache.[1,2] In this age group, a stable functional status is crucial, so that children can develop their essential skills to perform their basic learning activities.

Furthermore, the prevalence of overweight has increased among children and adolescents. In Brazil, among children aged 5 to 9 years, 36.5% are overweight and 16.7% are obese, and among adolescents aged 10 to 19 years, 27.2% are overweight and 7.7% are obese.[3] The impact of obesity and weight change on the characteristics of headache may have important implications for possible clinical interventions.[4] Studies have suggested a possible relationship between obesity and headache. Hershey et al. investigated the effect of weight loss on the characteristics of headache in 913 children, with 71% classified as having migraine, and found that, in overweight children, weight loss contributed to reduce headache crises over time.[4] However, studies associating the effects of obesity and the prevalence of headache are controversial in adults[5,6] and scarce in school-aged children.

Among lifestyle factors potentially associated with headache, the association between stress and headache crises has been described both in children and adolescents.[7,8] According to Gherpelli (2002),[9] on the pharmacological prophylaxis of migraine, a placebo effect of up to 50% is to be expected, which underscores the importance of assessing the actual need for medication. In addition, further information involving the non-pharmacological aspects of headache and its management may contribute to establishing additional therapeutic measures. This study aimed to evaluate the prevalence of headache in school-aged children from two cities in southern Brazil and its possible relationship to anthropometric characteristics, lifestyle, and quality of life.

Methods

This was a cross-sectional study of students aged 7 to 14 years, of both sexes, attending three public and three private schools in 2012. The schools were located in two different cities in southern Brazil (Porto Alegre, in the state of Rio Grande do Sul; Chapecó, in the state of Santa Catarina) and were selected by convenience sampling. The study was approved by the Research Ethics Committee of Universidade Federal do Rio Grande do Sul (protocol no. 20425) and of Universidade Comunitária da Região de Chapecó (protocol no. 085/11). The study was conducted in accordance with the provisions of the Declaration of Helsinki and all experiments described herein comply with the current laws of Brazil. The parents/guardian of all participants provided written informed consent prior to their inclusion in the study.

Information was collected through interviews on sociodemographic characteristics (age, sex, socioeconomic status, educational system, and class schedule), clinical variables (presence of headache and menarche), anthropometric data, and lifestyle variables (alcohol consumption, smoking, and extracurricular activities – activities such as sports, dancing classes, language classes, or private lessons).

The socioeconomic status of the participants was defined based on their responses to a questionnaire designed and validated by the Brazilian Association of Market Research Agencies, namely Economic Classification Criterion-Brazil (*Critério de Classificação Econômica Brasil*, CCEB).[10] This questionnaire is used to estimate the purchasing power of individuals and families and categorizes the Brazilian population into five socioeconomic levels: A to E – with A being the highest and E the lowest level.

Children who reported having headaches completed answered a questionnaire on the characteristics of headache. The responses were then evaluated by a neurologist according to the diagnostic criteria defined by the International Headache Society.[11] Quality of life was assessed using the Pediatric Quality of Life Inventory (PedsQL™) version 4.0 (in Brazilian language). It consists of 23 questions that result in scores in four domains related to pediatric health (Physical, Emotional, Social, and School Functioning).[12,13]

Anthropometric variables included weight (kg), height (cm), and Body Mass Index (BMI). The nutritional status was classified according to z-score reference ranges (BMI-for-age),[14] which were calculated using the World Health Organization (WHO) Anthro Plus v. 1.0.4 software.[15] The participants were weighed according to the WHO guidelines[14] using a portable electronic digital scale (UM-080;Tanita®; Tanita Corp., Tokyo, Japan) with a maximum capacity of 150 kg and accurate to 50 g. Height was measured using a vertical stadiometer (ES-2060; Sanny®; American Medical do Brasil, São Paulo, SP, Brazil) with a length of 2.10 m to the nearest 0.1 cm.

Table I
Sociodemographic characteristics of school-aged children and association with headache

Variable	*Presence of headache*		*Total*	*p**
	Yes n (%)	*No* n (%)	*n (% of total sample)*	
Total sample	185 (24.7)	565 (75.3)	750 (100)	
School system				
Public	76 (19.6)	**312 (80.4)**	388 (51.7)	0.001
Private	109 (30.1)	253 (69.9)	362 (48.3)	
Sex				
Male	73 (22.2)	256 (77.8)	329 (43.9)	0.173
Female	112 (26.6)	309 (73.4)	421 (56.1)	
Age (years)				
7 to 9	63 (20.0)	**252 (80.0)**	315 (42.0)	0.013
10 to 14	122 (28.0)	313 (72.0)	435 (58.0)	
Socioeconomic status†				
A	42 (17.8)	**194 (82.2)**	236 (31.5)	0.007
B	112 (26.9)	305 (73.1)	417 (55.6)	
C	31 (32.0)	66 (68.0)	97 (12.9)	
Class schedule				
Morning	114 (32.5)	237 (67.5)	351 (46.8)	0.000
Afternoon	71 (17.8)	**328 (82.2)**	399 (53.2)	

*Chi-square test.
†According to the Economic Classification Criterion-Brazil (CCEB)[13].
Values in bold are significant by residue analysis.

The questionnaires and anthropometric measurements were performed during physical education classes in a specific room for such and conducted by trained researchers.

Categorical variables were expressed as absolute frequencies and percentages, and continuous variables as mean ± standard deviation (SD). The chi-square test was used to test for associations. Comparisons between means were performed using Student's *t* test. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 18.0. A p-value < 0.05 was considered to be statistically significant.

Results

Of 839 children and adolescents asked to participate in the study, 89 refused to participate. Therefore, the sample consisted of 750 children and adolescents (62% of the potential sample), for the prevalence data and 746 for anthropometric data, since 4 participants don't agree with measures. Mean age was 10.4 ± 1.7 years, and 56.1% were female. Most students (55.6%) belonged to B socioeconomic level (table I).

A total of 185 (24.7%) students reported having headache crises in the last 3 months (table I). Migraine was the most prevalent type of headache (17.3%) (table II). There was an association between belonging to A socioeconomic level (p = 0.007), going to the public school (p = 0.001), age 7-9 years (p = 0.013) and attending the afternoon shift (p < 0.001) with absence of headache (chi-square test) (table I). Presence of headache was associated with female students aged 10 to 14 years, affecting 32.2% of girls *vs.* 23.3% of boys (p = 0.042). This association was not found in the

Table II
Prevalence of headache in school-aged children (n = 750)

Classification of headache	*Frequency* n (%)
Migraine	133 (17.7)
Episodic migraine with aura	98 (13.1)
Episodic migraine without aura	31 (4.1)
Chronic daily migraine	4 (0.5)
Headache	52 (6.9)
Chronic tension-type headache	15 (2.0)
Episodic tension-type headache	37 (4.9)

Table III
Anthropometric data in school-aged children and association with headache

Variable (z-score)	*Presence of headache*		*Total*	*p**
	Yes n (%)	*No* n (%)	*n (% of total sample)*	
BMI-for-age	183	563		
Underweight	0 (0)	6 (1.0)	6 (0.8%)	
Normal weight	130 (71.0)	431 (76.5)	561 (75.2%)	
Overweight	34 (18.5)	90 (15.9)	124 (16.6%)	0.169
Obesity	18 (9.8)	33 (5.8)	51 (6.8%)	
Severe obesity	1 (0.5)	3 (0.5)	4 (0.5%)	

BMI: Body Mass Index.
*Chi-square test.

group aged 7 to 9 years. There was no significant association between menarche and presence of headache in girls.

Considering the anthropometric parameters, most students were within the normal weight range (table III). However, overweight and obesity were observed in a higher percentage of cases in the group of students reporting headache (28.8% *vs.* 22.2% in those without headache), although without statistically significant differences. While there was no association between the classifications derived from anthropometric parameters and presence/absence of headache, mean BMI was significantly higher in students with headache (19.7 ± 3.9 kg/m^2) than in those without headache (18.6 ± 3.3 kg/m^2) ($p < 0.001$).

Regarding lifestyle, students who reported having headache spent more hours on extracurricular activities (4.2 ± 3.2 h) than those without headache (4.0 ± 2.6 h) ($p < 0.001$).

Of the total sample, 2.0% reported smoking and 1.6% consuming alcohol occasionally, and neither was associated with headache.

Regarding measurement of quality of life, patients without headache had higher total PedsQL™ mean scores (73.9 ± 10.8) when compared to the group with headache (69.9 ± 11.8) ($p = 0.017$). When analyzing quality of life scores per domain (Physical, Emotional, Social, and School Functioning), the group without headache had higher scores in the Social domain (88.9 ± 14.3 *vs.* 85.2 ± 16.4, $p = 0.001$).

Discussion

In this study, the frequency of students who reported having headache in the last 3 months was 24.7%. The prevalence of headache reported in the literature ranges from 6.5 to 30%, [16] ranges from 6.5 to 30%, showing that the results obtained are closer to the upper limit, which may have a significant impact on a variety of aspects of these school communities. According to Ozge et al. (2012),[17] migraine is the most common type of headache, leading to decreased quality of life in children and adolescents. In the present study, most students with headache reported having migraine, which is consistent with data from the literature.[4] Nevertheless, migraine with aura was the most prevalent type, in disagreement with the data reported by Kinik et al. (2010).[18]

Studies have shown an association between socioeconomic status and headache, indicating that subjects at lower socioeconomic levels are twice as likely to have headache.[6] The fact that most students were members of the upper socioeconomic classes may have minimized possible triggering factors in this research. Paradoxically, attending public schools, which is sometimes an indicator of lower socioeconomic status, was associated with absence of headache. As for lifestyle, time spent on extracurricular activities, such as physical activities, language classes, and private lessons, also indicated a greater workload in the group with headache, which could be associated with stress-related aspects. A recent study reported that, in children and adolescents, stress and lack of sleep were the most common triggers of migraine crises.[8] However, the small difference founded in the present article, though statistically significant, was unlikely to be of clinical importance.

Although headaches are common in children, they become more prevalent during adolescence,[19] which was also observed in the present study. Moreover, the association found between lower prevalence of headache and studying in the afternoon is possibly due to the fact that, in general, younger children study in the afternoon shift. Children today are unlikely to have regular sleep and waking schedules.[20] Thus, lack of sleep may also be an important triggering factor,[8] and children who study in the afternoon are believed to sleep longer hours than those studying in the morning.

Furthermore, it is known that, during puberty, there is an increased prevalence of migraine in girls compared to boys, suggesting a role of female sex hormones in the expression of headache.[21] The association between presence of headache and female students

aged 10-14 years found no support, while expected, in the well-known relationship to puberty when menarche was analyzed, since, of 75 girls with headache, only 23 had had their first menstruation.

Obesity and headache are common disorders among adults and children, and studies suggest a relationship between these two conditions, especially in adults. This relationship has been explained, at least in part, by the overlap of inflammatory mediators.[22] These associations have been more commonly found with respect to the pattern of crises in subjects with headache, especially migraine,[4] rather than with respect to the prevalence of headache in the population.[23] However, several studies in adults have failed to demonstrate this relationship.[24] In a large population-based study involving children and adolescents, overweight was more frequently observed in those who had headache.[2] In a study involving 273 children and adolescents from a pediatric clinic,[25] the participant girls with headache had higher BMI scores than those without headache. Pediatric patients with headache have also shown increased incidence of overweight compared to the general population.[26]

In the present study, among the anthropometric parameters investigated, though most of them were in accordance with the reference values,[14] data on overweight and obesity were similar to the national figures of the Brazilian Family Budget Survey.[3] In a study of children and adolescents with migraine, 33.7% were classified as overweight and obesity, quite over the data found in the present study, in which 28.8% of students with headache were also in overweight and obesity.[18] Although this is an expressive percentage, it is similar to the percentage of overweight students in the group without headache. A recent large study involving 5,847 students found a higher prevalence of overweight in adolescents with headache than in those without headache.[27] In this investigation, there was no association between groups with and without headache and anthropometric classifications; however, when mean BMI values were analyzed per group, they were higher in the group with headache. It is noteworthy that the means found for both groups remained within the normal range.[28] In childhood, Hershey et al.[4] found the BMI of children with headache to be positively associated with the frequency of crises; conversely, decreased BMI was associated with a reduction in the frequency of crises, at 3 and 6 months, for overweight children, but not for those with normal weight. This finding underscores the importance of continued surveillance of the nutritional status of children and adolescents in order to maintain good nutritional status, because, in addition to issues involving prevention of chronic diseases, weight reduction appears to contribute to a lower prevalence of headache, as well as to a lower frequency and severity of crises in children who report having this problem.[4]

The data are some conflicting regarding to whether there is an association between headache and smoking. Whereas during adolescence, smoking was associated with recurrent headache, smoking did not increase the risk of developing headaches in adulthood.[27,29] The present article showed no relationship between these two variables.

Headache is often responsible for reduced quality of life among adolescents,[7] which was also confirmed in this study. Aspects of social life, in particular, appeared to be affected by the presence of headache. Any strategy or action that can be taken to minimize the crises may improve the health of children and adolescents considerably. Despite the difficulty in assessing quality of life in this population,[30] there are reports of its impact on functional abilities at home and in the school, based on generic quality of life scores.[16] The authors also address the fact that the interplay between headache and quality of life is likely to be bidirectional and sit within a biopsychosocial framework, i.e., increased frequency of headache may have an impact on lower quality of life or headache may be the result of psychosocial factors.[16]

This study has some limitations. This is a cross-sectional study, which reduces the ability of the participants to answer questions about habits. Also, notwithstanding the population was significant, it is limited to the reality of two cities in southern Brazil, which were chosen by convenience sampling. In conclusion, as observed in other studies, a high prevalence of headache was found among school-aged children and adolescents in this study, with no association between anthropometric parameters and headache. Due to the impact of headache on the quality of life of children and adolescents, further studies should be conducted to search for prophylactic and therapeutic measures that can complement pharmacological prophylaxis and help counteract the problem in this population.

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