

HEADACHES IN ADOLESCENTS – FREQUENCY, RISK FACTORS AND OTHER HEALTH COMPLAINTS: A CROSS-SECTIONAL STUDY IN CROATIA

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SUMMARY – Headaches are very common in school population. The aim of this study was to determine epidemiological data on headaches among Croatian schoolchildren and their connection to risk factors and other health complaints. In the study, we used the Croatian database of the international research entitled Health Behavior in School-aged Children for 2013/2014. It is a cross-sectional study conducted every four years in 44 countries among children aged 11-16. The students were interviewed using an anonymous standardized questionnaire. The Croatian sample consisted of 5741 students, of which 2857 (49.8%) girls and 2884 (50.2%) boys. The response rate was 85.9%. Headaches were reported to be often (once a week to daily) by 23.5% of students and were more often in girls and in higher school grades. They were positively linked to cigarette smoking and health complaints such as back pain and stomachache, bad mood, nervousness, irritability, difficulties with sleeping and dizziness. Headaches are associated to many health problems and can cause difficulties in student functioning. This could be a serious problem. This study pointed to connection of headaches with cigarette smoking and importance to underpin the smoking prevention programs.

Key words: *Headache; Child; Risk factors; Health behavior; Cross-sectional studies; Smoking*

Introduction

Somatic pain is very common among adolescents¹. Along with stomachache and back pain, headaches are the most common health issue and the most common type of pain in this age group, with an ever-increasing prevalence¹⁻⁷. They are the most often recurring symptom and are connected to pain in adult age^{1,8,9}. Headaches are a public health problem with an impact on both the individuals and the society¹⁰.

According to studies conducted thus far, the prevalence of headache varies considerably^{3,11,12}, depending on the formulation of questions related to headaches

in questionnaires and on the age of the respondents (in the literature, 4 to 18 years of age), therefore literature data are not easy to compare. Thus, according to one study, 10%-30% of schoolchildren suffer from headaches once a week or once a day and 9%-33% at least once a month (age 7-17 years)⁴. Also, the prevalence of headache episodes from once a month to ever in life was 54.4%-58.4%, weekly 6%-44%, and daily 1%-9% (age 12-18 years)⁷. Other authors state that 33%-40% of schoolchildren suffer from headaches at least once a week (age 12-15 years)⁵. In Croatia, the prevalence of recurrent headaches was 30.1% in the population of high school students in Zagreb (age 16-18 years)¹³ and 54.1% in students from 18 high schools in 10 Croatian cities (age 15-18 years)¹⁴. Headaches occur more often in girls than in boys and become more frequent with age and level of education^{1,5,12,15,16}. Iranian researchers

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found no difference between genders stratified according to age groups¹².

Headaches decrease the quality of life^{3,7,8,11,17}, have negative influence on school success^{3,8} and cause school absenteeism^{12,17}. They are linked to emotional and physical difficulties^{4,5,7,8}. Available research results prove relation with symptoms of depression and anxiety^{4,8,17,18}, musculoskeletal pain^{1,6,8}, obesity^{5,8}, epilepsy and asthma⁸. Headaches represent a multifactorial disorder^{8,16,17}. They are linked to stress, primarily in school (due to tests and questioning), school environment, psychological and physical abuse, peer violence, inadequate spending leisure time and high parental expectations^{1,3,5,6,11}. Authors also state that there is connection with alcohol consumption, cigarette smoking, use of electronic media and physical inactivity^{1,2,5,6,9}.

The aim of this study was to determine epidemiological data on headaches among Croatian schoolchildren and their connection to risk factors and other health complaints.

Subjects and Methods

We used the Croatian database from the Health Behavior of School-aged Children (HBSC) for 2013/2014, a cross-sectional study supported by the World Health Organization. The principal investigator in Croatia is the Croatian Institute of Public Health. Research methodology is described in detail elsewhere¹⁹.

The advantages of this research over other researches in the field is the large multinational sample and use of standardized methods to create the database¹. It is conducted across Europe, North America and Israel every four years and respondents are children aged 11-16. Croatia is one of 44 countries participating in the study. The basic research principle is to monitor, in defined time intervals, the health and behavior among school-aged children and investigate how school, family and other social factors influence the lifestyle and behavior of youth²⁰.

Participants

Our study was conducted in April 2014 among students in our elementary and high schools aged 11, 13 and 15 years. The students were interviewed using an anonymous standardized questionnaire. School and class selection was done by the Croatian Institute of

Public Health using a random sample. Student interviews were conducted anonymously, voluntariness of student participation was secured by providing the student parents/caretakers with the option to decline it without any explanation. The study was approved by the Ministry of Science, Education and Sports and Ethics Committee of the Croatian Institute of Public Health.

The Croatian sample comprised of 5741 students, including 2857 (49.8%) girls and 2884 (50.2%) boys. There were 1792 students aged 11 (mean age, 11.6), 2003 students aged 13 (mean age, 13.6) and 1946 students aged 15 (mean age, 14.6). The response rate was 85.9%.

Variables

The questionnaire consists of 74 questions. One pertains to health complaints whereby the type of investigation is common and represents a reliable measure of psychosomatic difficulties recorded in students²¹.

Health complaints were assessed using a standard list of health complaints by using the following questions: "How often in the past 6 months have you had one of the following: headache, stomachache, back pain, irritability or bad mood, feeling of nervousness, difficulty falling asleep and dizziness"; the multiple choice answers are: 1 = every day, 2 = more than once a week, 3 = every week, 4 = every month, and 5 = rarely or never.

On analysis, the variable of health complaint frequency was dichotomized so that the answers 1, 2 and 3 (often) were compared to answers 4 and 5 (rarely).

Cigarette smoking was assessed by the question: "How often do you smoke cigarettes?" Response options were: 1 = every day, 2 = at least once a week, not every day, 3 = less than once a week, 4 = I don't smoke at all. On analysis, the variable was dichotomized, i.e. answers 1, 2 and 3 *versus* 4.

Drunkenness was assessed by the question: "Have you ever had so much alcohol that you were really drunk?", with possible answers: 1 = no, never, 2 = yes, once, 3 = yes, 2-3 times, 4 = yes, 4-10 times, and 5 = yes, more than 10 times. Answers were dichotomized, i.e. 1 and 2 *versus* 3, 4 and 5.

We also analyzed distribution and association according to gender and age.

The study may have suffered from bias due to subjective assessment of respondents used as a measure for headaches and also due to understanding the term headache in schoolchildren (i.e. does every 11-year-old child know what the word headache means).

Statistical analysis of the questionnaires was conducted using IBM SPSS Statistics 23.0 (Base). We used descriptive statistics to determine the frequency and distribution, and binary logistic regression to analyze the association between headaches and cigarette smoking, drunkenness, other health complaints, gender and age.

Results

Frequent headaches were reported by 431 (15.8%) boys and 862 (66.7%) girls (Table 1).

Frequent headaches were reported by 21.3% of girls aged 11, 36% of girls aged 13 and 42.7% of those aged 15. In boys, the respective figures were 30.9%, 36.9% and 32.3% (Table 2).

Associations between headaches and age, gender, smoking, drunkenness and other health complaints are

Table 1. Headache prevalence according to gender

Headache frequency	Gender		Total, N (%)
	Male, n (%)	Female, n (%)	
Every day	93 (3.4)	234 (8.4)	327 (5.9)
More than once a week	126 (4.6)	283 (10.2)	409 (7.4)
Every week	212 (7.8)	345 (12.4)	557 (10.1)
Often – total	431 (15.8)	862 (31.1)	1293 (23.5)
Every month	514 (18.9)	581 (20.9)	1095 (19.9)
Rarely or never	1776 (65.2)	1333 (48.0)	3109 (56.6)
Rarely – total	2290 (84.2)	1914 (68.9)	4204 (76.5)
Total	2721(49.5)	2776 (50.5)	5497 (100)

Table 2. Headache frequency according to gender and age

Age (yrs)	Headache			
	Often		Rarely	
	Male (%)	Female (%)	Male (%)	Female (%)
11	30.9	21.3	29.8	37.9
13	36.9	36.0	34.1	35.0
15	32.3	42.7	36.1	27.2

Table 3. Multivariate, adjusted binary logistic regression for associations of headache with age, gender, smoking, drunkenness and other health complaints (whole sample)

	OR, 95% CI, p
Age	1.34, 1.23-1.46, p=0.000
Gender	2.45, 2.15-2.8, p=0.000
Smoking	1.94, 1.45-2.59, p=0.000
Drunkenness	1.18, 0.81-1.72, p=0.390
Stomachache	3.31, 2.66-4.13, p=0.000
Back pain	2.08, 1.71-2.54, p=0.000
Bad mood	2.06, 1.68-2.53, p=0.000
Irritability	1.39, 1.14-1.70, p=0.001
Nervousness	1.57, 1.32-1.87, p=0.000
Difficulty falling asleep	1.56, 1.27-1.90, p=0.000
Dizziness	4.82, 3.72-6.24, p=0.000

OR = odds ratio; 95% CI = 95% confidence interval; p = level of significance

shown in Table 3. Frequent headaches were connected with gender (OR 2.45, CI 2.15-2.8) and age (OR 1.34, CI 1.23-1.46). They were also connected with cigarette smoking, i.e. students who were smoking cigarettes had more frequent headaches than those who were not smoking (OR 1.94, CI 1.45-2.59).

Students with other health problems had more frequent headaches, including students with stomachache (OR 3.31, CI 2.66-4.13) and back pain (OR 2.08, OR 1.71-2.54).

Students in bad mood had more frequent headaches than those in good mood (OR 2.06, CI 1.68-2.53). Students with irritability had more frequent headaches than those without it (OR 1.39, CI 1.14-1.70).

There was also positive connection of frequent headaches with nervousness (OR 1.57, CI 1.32-1.87), difficulty falling asleep (OR 1.56, CI 1.27-1.90), and dizziness (OR 4.82, CI 3.72-6.24).

Discussion

According to the results of our study, almost every fourth student (23.5%) had headaches often; headaches were more frequent in girls, and were associated with age. The study pointed to the connection of headaches and cigarette smoking. Headaches were associated with other concurrent somatic complaints (back pain, stomachache and dizziness) and psychological

difficulties (bad mood, nervousness, irritability, sleeping difficulties).

Headaches are a subjective experience for which there is no objective measurement instrument. In this study, the prevalence of headaches in schoolchildren in Croatia could not be determined due to the way the questions related to headaches are formulated. There is no answer that would separate the students who have never had headache. For this reason, we can only speak of a higher or lower frequency, i.e. of often or rarely occurring headaches in schoolchildren. The possibility of bias was reduced in a large multinational, representative sample and application of standardized methods by the HBSC researchers⁶. There is a research claiming that children already after 5 years of age are able to understand and use the scales for assessment of the duration and intensity of physical symptoms²².

Available literature shows great difference in numerical indicators due to a small number of studies conducted, mainly on small samples investigated and measured using various methods within a broad age range. The age of respondents in our study was 11-15 years *versus* 4-17 years in the searched and cited literature, which needs to be taken into account when comparing headache frequency. In our study, every fourth student (23.5%) reported having a headache from every day to every week, which corresponds to literature data (10%-30%). Swedish authors report on 6%-44% of students having a headache once a week *versus* 7.4% of our students². Furthermore, 5.9% of Swedish students reported having headaches daily, yielding a frequency of 1%-9%, as assessed by the authors. Having a headache once a month to ever in life, according to their research, was found in 55.4%-58.4% of students, whereas in our study the percentage of children with the same frequency of headaches was significantly higher (76.5%).

The research conducted thus far shows that headache is more frequent in girls and increases with age^{8,11}. In Croatia, headache is more frequent in girls (about 2.5 times more frequent) with a statistically significant gender difference, and is on increase with age.

Adolescents suffering from headaches are prone to risky behavior such as addictive substance use. In Croatia, headaches are more frequent in students who smoke cigarettes^{2,3}.

Health complaints showed association of headaches with irritability or bad mood, nervousness, diffi-

culty falling asleep and dizziness. The association was highest with dizziness (students with dizziness had headaches 4 times more often). Students suffering from frequent headaches also had stomachache and back pain more often (3 and 2 times, respectively). According to literature data, isolated headaches are an exception rather than a rule and often coexist with other pain⁸.

Pain in childhood is an excellent predictor of suffering pain in adult age. Since there is an association between pain in adult age and adolescence, it is important to know how to act preventively in adolescence⁶. Even though it is not possible to influence some risk factors, many of them are preventable and we can influence the frequency of headaches by changing habits and behaviors.

In conclusion, headaches are common among Croatian students, more common among female students and in older age groups. They are associated with many other health complaints. Their coexistence can cause serious problems in student functioning. Our study also pointed to the association of headaches with cigarette smoking, thus calling for upgrading the smoking prevention programs.

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Sažetak

GLAVOBOLJE KOD ADOLESCENATA – UČESTALOST, RIZIČNI ČIMBENICI I DRUGE ZDRAVSTVENE POTEŠKOĆE: HRVATSKO PRESJEČNO ISTRAŽIVANJE

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Glavobolje su vrlo česte kod školske djece. Cilj ovoga rada bio je utvrditi epidemiološke karakteristike glavobolja kod školske djece i njihovu povezanost s rizičnim čimbenicima i drugim zdravstvenim tegobama. Koristili smo hrvatsku bazu podataka međunarodnog istraživanja *Health Behavior in School-aged Children* za 2013./2014. godinu. To je presječno istraživanje koje se provodi svake četiri godine u 44 zemlje, a uključuje školsku djecu u dobi od 11 do 16 godina. Učenici se ispituju standardiziranim, anonimnim upitnikom. Uzorkom je u Hrvatskoj obuhvaćeno 5741 učenika, od kojih je bilo 49,8% učenica (n=2857) i 50,2% učenika (n=2884), uz odziv od 85,9%. Glavobolje je imalo često (od jednom tjedno do svakodnevno) 23,5% učenika i to češće kod učenika u višim razredima. Utvrđena je pozitivna povezanost s pušenjem cigareta i drugim zdravstvenim tegobama poput bolova u leđima i trbuhu te lošim raspoloženjem, nervozom, iritabilnosti, poteškoćama spavanja i vrtoglavicama. Glavobolje su povezane s mnogim zdravstvenim tegobama i mogu utjecati na funkcioniranje učenika, što može biti ozbiljan problem. Ovaj rad je ukazao na povezanost glavobolja i pušenja cigareta te na važnost jačanja preventivnih programa u tu svrhu.

Ključne riječi: *Glavobolja; Dijete; Rizični čimbenici; Zdravstveno ponašanje; Presječno istraživanje; Pušenje*