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Prevalence of migraine among university students at Parakou, Benin: A cross-sectional study

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ABSTRACT

Objective: To determine the prevalence of migraine and its associated factors in students at the University of Parakou. Methods: It was a cross-sectional study carried out from February 1st to April 30th 2011. It included all students registered during the academic year 2010-2011 and selected by systematic random sampling. Migraine was defined according to IHS 2004 criteria. To assess the link between migraine and body mass index we collected height and weight of each student. Multivariate analysis was used to study the factors associated with migraine, odds-ratio and their confidence interval were estimated. SPSS Soft-ware was used to perform statistical analysis. Results: During the study period 1200, students returned their questionnaires. They were 842 males and 358 females. 171 fulfilled migraine criteria, and the overall prevalence of migraine was 14.2% (CI 95%: 11.6% - 17.4%). The main associated factors were the sex with an OR: 2.3 (CI 95%: 1.6 - 3.2) and family history of headache with an OR: 1.6 (CI 95%: 1.1 - 2.4). Migraine with aura was the frequent form (59.1%) and visual aura the frequent form of aura. No association was found between migraine and body mass index but students with obesity had high risk of migraine with aura OR: 3.8 (CI 95%: 1.5 - 9.7) compared with those with normal weight. The main triggering factors were sleeplessness (90.1%) and mental fatigue (85.4%). Conclusion: The results suggest a high prevalence of migraine among students at Parakou University and no association between obesity and migraine.

KEYWORDS

Migraine; Prevalence; Epidemiology; Students; Obesity

1. INTRODUCTION

Migraine is a common primary headache and has a significant impact on young people. Several data on epidemiology of migraine among young people and students are available in western countries [1-4]. In developing countries especially in Africa few data are available. The prevalence of migraine has been estimated to 19.8% among Nigerian students [5] and 33.8% in Kenya [6]. In Benin its prevalence was 11.3% among students in Cotonou [7]. In this study the associated factors were female sex, single marital status and presence of family history. This study concerned only students registered in the Faculty of Health sciences. No specifically study has been conducted on migraine in the Parakou University in the North of Benin. Other studies conducted in various areas estimate the relationship between body mass index and migraine [8] showed contradictory results [9,10].

Objective

We aimed to assess the prevalence and the clinical features of migraine and the relation between migraine and body mass index among University students in Parakou,

Benin.

2. METHODS

2.1. Study Design

This was a cross-sectional study including the students regularly registered in the Parakou University during the academic year 2010-2011.

2.2. Setting

This study was conducted on students attending all the faculties of Parakou University, located within the third administrative area of Benin. Parakou is the second University in Benin which is located some 420 km north of Cotonou, the economic capital. The city of Parakou has a total population of 150,000 people [11].

During the academic year 2010-2011 there were seven faculties at Parakou University: the Faculty of Médecine, the Faculty of agronomy, the Faculty of Law and political sciences, the Faculty of Economic Sciences, the University Institute of Technology, the School of Epidemiology, the Faculty of Arts and Human Sciences. It was 10,293 students regularly registered during the academic year 2010-2011.

Data were prospectively collected between 1st April and 31 May 2011.

2.3. Participants

2.3.1. Eligibility Criteria

Students regularly registered at Parakou University during the academic year and who were selected after sampling and had given their oral consent to participate.

2.3.2. Methods of Selection of Participants

Students were selected using systematic random sampling proportionally to the number of students in each faculty. The calculated sample size was distributed among the Faculties, proportionally to the number of students registered in each of them, and a numbered list of students was established (**Table 1**).

To select our sample, a sampling interval has been worked out for each Faculty by dividing the number of students registered by the number of students to be selected from it. Then, using the Epitable software, we selected the first student and the following students by applying sampling interval.

2.4. Variables

The main variable (outcome) was the migraine (yes/no).

Exposures variables were:

- socio-demographic information (age, sex, marital status)
- the faculty of the student,
- clinical characteristics (family history of headache, intensity, frequency, age of onset, triggering factors)
- Body mass index: we distinguished 4 groups according to World Health Organization [14]:

- < 18.5 kg/m^2: underweight
- 18.5 to 24.9 Kg/m^2: normal
- 25 to 29.9 kg/m^2: overweight
- 30 kg/m^2 and more: obesity

Table 1. Total size, expected sample, and number of students in the final random sample by attended by faculty in the university, Parakou, Benin, 2011.

	Total size	Sample
Faculty of Médecine	937	446
Faculty of agronomy	444	250
UIT	615	314
School of epidemiology	83	45
High degree school	280	145
Total	2359	1200

UIT: University Institute of Technology.

Diagnostic Criteria

Migraine diagnosis was based on the IHS criteria of 2004 [12]. It listed criteria of migraine with and without aura and was the same as that used in our previous study [7]. This questionnaire was first translated and back translated again in French by Beninese neurologists.

For each student, we collected the data concerning height and weight in the register of local clinic (those data are available for each student since before registration a clinical examination was done systematically and the weight and height were taken according the standard criteria) [13]. Then the body mass index (BMI) was calculated by dividing the weight (kilogram) by the square of the height (meter).

We have done a pilot study to ensure the validity of self-administration. We have compared the results of twenty self-administrated to other twenty face-to-face interviews and showed an excellent validity (sensitivity: 95%, specificity: 95%).

2.5. Study Size

The sample size was computed for an expected prevalence of 11.3% (prevalence of migraine in a previous study among students in Benin) [7] with a precision of 1.8% and a risk of 5% in a two-sided situation. The minimal number of students was 1187.

2.6. Statistical Methods

It was performed by using Epi-Info 6.04C and Statistical

Package for the Social Science (SPSS) version 16 software.

Usual descriptive analysis was used: means and standard deviations, frequencies and confidence intervals (CI). Chi-2 test and independent t-test of Student were used for comparison in bivariate analysis. To estimate the association between migraine and covariates, odds ratios and their CI at 95% were estimated for categories of age, sex, family history of migraine, marital status, and category of BMI.

A logistic regression model by using descending step by step procedure has been established. We included in the initial model all the variables with a p-value less than 0.2 in bivariate.

The level of significance has been fixed to 0.05.

2.7. Ethical Considerations

The study was authorized by the educational authorities and students were informed about the study and had given their oral consent before receiving the questionnaires. Those students younger (<18 years) we requested also their parent's consent.

3. RESULTS

1200 students were self-interviewed and returned questionnaires. They aged from 16 years to 54 years with average age 22.3 years (±4.4 years). They were 842 males (70.2%) and 358 female (29.8%). The BMI ranged from 13.9 to 44.6 kg/m^2 with average of 21.8 kg/m^2 (±3.1). Other characteristics of the sample are summarized in the first column on **Table 2**.

Among the 1200 students 1180 reported at least one headache attack 99.0% (95% CI 98.3 to 99.5) and 44 had chronic daily headache (3.7%).

A total of 171 students fulfilled migraine criteria. The lifetime prevalence of migraine was 14.3% (95% CI 12.3% to 16.4%). Of those 101 met criteria for aura with the frequency of 8.4%.

The prevalence of migraine according to socio-demographic characteristics and BMI are summarized in **Table 2**.

The associated conditions of migraine in multivariate analysis were shown in **Table 3**.

The age of onset of headache ranged from 2 years to 25 years with the mean of 12.4 years (+/−4.6 years), the total average was 12 years. The main characteristics of the migraine are summarized on **Table 4**.

Among the 171 migraine sufferers only 65 (38.0%) had seen a medical doctor for their headache.

4. DISCUSSION

This is the first study on migraine among students in Parakou University applying the IHS diagnostic criteria. It had the same methodological approach as the previous study in Cotonou [7]. We have used a standard questionnaire based on I H S criteria 2004 still used in other epidemiological surveys. The self-administration of questionnaire can introduced biases in responses. Students can overestimate their symptoms and sometimes misunderstand some parts of the questionnaires. However a self-administered questionnaire was used in various studies [7,15-18] and an pilot study showed a good agreement with interviews.

Table 2. Prevalence of migraine by sex, age, marital status, BMI, and family history of headache.

	Sample N (%)	Migraine N (%)	Crude OR (95% CI)	p value
Age (years)				
16 - 19	300 (25.0)	44 (14.7)	1	0.46
20 - 29	817 (68.1)	119 (14.6)	0.99 [0.7 - 1.4]	
30 and more	83 (6.9)	8 (9.6)	0.62[0.3 - 1.4]	
Sex				
Males	842 (70.2)	92 (10.9)	1	0.00001
Females	358 (29.8)	79 (22.1)	2.3 [1.7 - 3.2]	
Marital status				
Single	1126 (93.8)	163 (14.5)	1	0.20
Married/widowed	74 (6.2)	8 (10.8)	0.7 [0.3 - 1.5]	
Family history of headaches				
Unknown	373 (31.1)	44 (11.8)	1.2 [0.7 - 2.0]	
Yes	565 (47.1)	101 (17.9)	2.0 [1.3 - 3.1]	0.003
No	262 (21.8)	26 (9.9)	1	
BMI (kg/m^2)				
<18.5	116 (9.7)	17 (14.7)	1	
18.5 - 24.9	929 (77.4)	126 (13.6)	0.9 [0.5 - 1.6]	0.20
25 - 29.9	130 (10.8)	21 (16.2)	1.1 [0.6 - 2.3]	
30 and more	25 (2.1)	7 (28.0)	2.3 [0.8 - 6.2]	

CI = confidence interval; OR = odds ratio.

Table 3. Factors associated to migraine among students in Parakou in multivariate (after adjusted on the age), Benin, 2011.

	OR (95% CI)	p value
Sex (female/male)	2.3 (1.6 - 3.2)	0.00001
Family history of headache (Yes/No)	1.6 (1.1 - 2.4)	0.014

CI = confidence interval; OR = odds ratio.

Table 4. Main clinical characteristics of migraine in students in Parakou, Benin, 2011.

Characteristics	Number	Percentage
Intensity		
Moderate	66	38.6
Severe	105	61.4
Duration (hours)		
<4	47	27.5
4 - 72	107	62.6
>72	17	9.9
Frequency (per month)		
1 - 4	110	64.3
5 - 9	24	14.0
>10	1	0.6
Unknown	36	21.1
Types of migraine		
– Migraine without aura	70	40.9
– Migraine with aura	101	59.1
Types of aura		
– Visual aura	45	26.3
– Sensitive aura	30	17.5
– Aphasic	29	16.9
– Motor aura	28	16.4
Main triggering factors		
– Sleeplessness	154	90.1
– Mental fatigue	146	85.4
– Anxiety	117	68.4
– Noise	115	67.3
– Physical fatigue	106	62
– Exposure to sun	103	60.2

The prevalence of migraine in this study was 14.3%. In our previous study among students at Cotonou the prevalence of migraine, by using the same methodological approach was 11.3% [7]. We believe that the difference could be explained by the number of faculties and the students' home schools. Indeed in Cotonou the students were all from the Faculty of Health Sciences, while in Parakou they were from different Faculties. However, we did not find any difference in prevalence according to the origin of the students. Ogunyemi [5] in 1984 had found a high prevalence in students of science faculty, while students in health sciences had a lower prevalence of headache. Compared to other studies in Benin we found a higher prevalence. Indeed it has been reported respectively 8.9% and 3.3% among workers in Cotonou [19] and in a rural community in central Benin in Abomey [20]. These differences could be explained by differences in population, educational attainment, healthy worker effect age of subjects included and the triggers for access in different studies. Several studies conducted in the general population have reported prevalence significantly lower than that observed among students of Parakou.

It was higher than the 9.6% reported by Wahab *et al*. among students at Ambrose Alli University in Nigeria [17] and higher than another in the same country which reported 6.4% for 1-year prevalence of migraine [15]. But it was close to another study among university students in Nigeria with 16.7% [5]. Other studies in Africa reported prevalence range from 6.4% to 33.8% among students by using IHS criteria [5-7,17,18]. The difference could be explained by the timeline estimation of prevalence, the cultural reasons, the triggering factors and the study method such as self-administration, face to face interview.

Several studies conducted among the students with fairly similar criteria (IHS 1988 or 2004) have reported figures ranging from 2.1% to over 50% (see **Table 5**).

We think that the variation of prevalence cannot be simply explained by the difference of race. Indeed several studies conducted among students in Africa and other developing countries have reported prevalence significantly higher than those reported in Western countries. We postulate that the low prevalence of migraine among blacks long considered a reality, might be a confounding factor and that the main element that can explain the differences in prevalence was rather the level of education.

Among students (university level) we have not seen significant difference between black and white according to the data from study on this population.

The female predominance was consistently reported by most authors and could be explained by hormonal factors [33]. However in a study conducted in rural community, the main associated factors of migraine were sex and family history of headache. Genetic consideration of transmission of migraine can explain this fact. Indeed several studies suggested and supported this hypothesis [34,35]. Compared with our first study among students in Cotonou, we didn't find marital status as associated despite the same proportion of married students in both samples.

The migraine with aura was the most frequent form of migraine. The same results were reported by Dent *et al*. in a rural community of Tanzania [36]. This can be explained by the misunderstanding of the questionnaire on aura and the self-administered method. Dent *et al*. explained this by the methodology of their survey in which the head of family reported symptoms of other members [36].

No difference was seen between prevalence of migraine according to the body mass index despite the high

Table 5. Prevalence of migraine among students in various setting.

Year	Authors (reference)	Country	Migraine definition	Timeline	Population	Age of interviewees	Prevalence		Overall prevalence
							M	F	
1984	Ogunyemi [5]	Nigeria	AHC	Whole life	Students	All	15.6	19.8	16.7
1994	Kryst et Scherl [3]	USA	IHS	12-months	Students	>20 years	4.5	9.8	8.5
1994	Monteiro *et al*. [4]	Portugal	IHS/AHC	-	Students	-	-	-	6.1/6.9
1996	Amayo *et al*. [6]	Kenya	IHS	-	Students	-	-	-	33.8
1996	Sanvito *et al*. (21)	Brazil	IHS	1-year	Students	17 - 43	28.3	54.4	40.2
1996	Mitsikotas *et al*. [22]	Greece	IHS	6-months	Students	22 - 27	1.6	3.3	2.4
1999	Split et Neuman [2]	Poland	IHS	1-year	Students	15 - 19	10.0	28.4	28.0
2001	Bigal *et al*. [23]	Brazil	IHS	1-year	Students	18 - 31	8.9	78.1	25.0
2001	Deleu *et al*. [24]	Oman	IHS	Lifetime	Students	18 - 26	6.6	15.5	12.2
2002	Dzoljic *et al*. [25]	Yugoslavia	IHS (menstrual)	-	Students (female)	18 - 28	-	12.6	12.6
2004	Zencir *et al*. [26]	Turkey	IHS	-	Students	11 - 18	6.7	11.0	8.8
2006	Demirkirkan *et al*. [27]	Turkey	IHS	-	Students	10 - 34	8.9	14.0	12.4
2006	Karli *et al*. [28]	Turkey	IHS	-	Students	12 - 17	-	-	14.5
2007	Fendrich [1]	Germany	IHS	3-months	Students	12 - 15	1.6	3.5	2.6
2008	Bicakci *et al*. [29]	Turkey	ID Migraine	Lifetime	Students	17 - 31	16.5	27.4	21.9
2008	Kurt *et al*. [30]	Turkey	IHS	Lifetime	Students	17 - 38	12.9	23.5	17.9
2009	Wahab *et al*. [17]	Nigeria	IHS	Lifetime	Students	-	8.9	10.3	9.6
2009	Ojini *et al*. [15]	Nigeria	IHS	1-year	Students	-	3.2	10.9	6.4
2009	Adoukonou *et al*. [7]	Benin	IHS	Lifetime	Students	>16	6.8	18.3	11.3
2010	Ofovwe et ofili [18]	Nigeria	IHS	1-year	Students	11 - 18	9.9	16.9	13.5
2010	Fuh *et al*. [31]	Taiwan	IHS	3-months	Students	13 - 15	-	-	12.2
2010	Falavigni [32]	Brazil	IHS	-	Students	<30 years	-	-	6.9
2011	Current study	Benin	IHS	Lifetime	Students	All	10.9	22.1	14.2

frequency among students with obesity (BMI > 30) and the tendency of high risk. The literature data on this were conflicting [37,38]. The recent study suggested that the association between body mass index and migraine may be J-shaped [39,40]. Other studies had found no association between BMI and migraine [40]. Other finding is the increasing risk among those with underweight despite insignificant association. It is similar to the result of the study of Bigal et al. [37] and confirms that the association of migraine and BMI may be J-shaped. We can explain the no association between migraine and BMI by the high frequency of migraine with aura in our sample compared to other studies on this association. The pathophysiology of the association is still unclear and the preliminary studies suggested the role of serotonin, peptides such as orexin, adiponectin and leptin [41].

In summary, the prevalence of migraine was higher than some others reported in our country and was associated to sex (female) and family history of headache. Our epidemiological survey does not support the link between body mass index and migraine.

CONFLICT OF INTEREST

All authors declare no conflict of interest regarding this article.

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