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Original Article

Social anxiety score is high in adolescents with chronic migraine

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Abstract ***Background***: Social anxiety disorder, also known as social phobia, is a marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others. It usually begins in mid-adolescence and has a chronic course and interferes in academic, social, family and personal functioning. Recent studies have shown that social anxiety disorder is more prevalent in adults with migraine. Little evidence on this subject is available for the adolescent population.

Methods: This study was performed between August 2009 and August 2010; all patients were recruited in schools, pediatric or neuropediatric facilities, and were submitted to a detailed headache questionnaire, which consisted of demographic and clinical data. To evaluate social anxiety, the Social Phobia Inventory was used.

Results: A total of 151 subjects were evaluated: 50 had chronic migraine, 50 had episodic migraine and 51 were control subjects. In the chronic migraine group, the mean score in the Social Phobia Inventory was 18.5 ± 12.4, which was significantly higher than in the episodic migraine group (12.1 ± 8.1) and in the control group (13.8 ± 10.8; $F^{2131} = 4.8$, $P = 0.010$). The mean score, however, was not significantly different between the control and episodic migraine groups.

Conclusions: Chronic migraine is strongly associated with high social anxiety score, regardless of demographic data and pain intensity. The total burden of migraine may be increased with social anxiety disorder comorbidity.

Key words adolescent, anxiety, headache, migraine disorders, phobic disorders.

Migraine is the most common neurological complaint in adolescents,[1] leading to high levels of school absence[2] and being associated with several comorbid conditions, such as sleep disorder, anxiety and depression.[3]

Adolescents with migraine, specifically chronic migraine (CM), are as acutely disabled as adults with CM and require treatment paradigms designed specifically for them.[4] A recent systematic review showed that there is inconclusive evidence that children and adolescents with migraine have more signs of anxiety and depression, and there is limited evidence, in a clinical setting, that they are more frequently diagnosed with dysthymia or depression compared with healthy children.[5]

Social anxiety disorder (SAD), also known as social phobia, is a marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others.[6]

The symptoms of SAD are somewhat different in children and adults, in that the early onset of SAD typically means that children with the disorder fail to achieve at their predicted level, whereas adults and adolescents show declines from previously achieved levels of functioning. Adults and adolescents with SAD, as well as many children with the disorder, have sufficient insight to recognize that their fears are excessive or unwarranted. This factor often adds to their distress and feelings of inferiority.[7]

Epidemiological studies showed SAD is one of the three most common mental disorders and the most common anxiety disorder in adolescence, while data in clinical settings indicate that it is also the anxiety disorder most commonly diagnosed in this developmental stage.[7]

Social anxiety disorder usually begins in mid-adolescence, the mean age of onset being 10–16 years, it has a chronic course and interferes in academic, social, family and personal functioning.[8] Youth with social anxiety in general have poor social networks, underachieve at school, are less likely to complete school, have poorer adjustment outcomes, and fail to meet social expectations for full adult status, as well as being at a high risk for developing major depression due to social isolation. In addition, SAD precedes onset of internalizing and externalizing disorders, including substance abuse and tends to follow a chronic course.[9]

Recent studies have shown that SAD is more prevalent in adults with migraine. Jette *et al*. showed that the adjusted odds ratio (OR) was 2.3 (95% confidence interval [CI]: 1.9–2.9) for

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SAD in migraine patients compared with normal subjects.[10] It seems to be even more frequent in CM patients, as showed by Corchs *et al*., who found a frequency of 26.8%.[11] To our knowledge, however, there have been no studies dealing with this subject specifically in the adolescent population, and which compare CM and episodic migraine (EM) patients.

Methods

The study was performed between August 2009 and August 2010; all patients were recruited from pediatric or neuropediatric facilities, whereas all controls, from schools. We enrolled patients with migraine and control subjects of both sexes, aged 10–20 years, whose parents were able to understand the consent form and explanations given by the research team and agreed to participate in the study. The local ethics committee approved the study. Control subjects did not suffer from migraine or any other primary headache syndrome and were selected from among adolescents with the same sociodemographic background as the experimental subjects. The exclusion criteria were: chronic disease; secondary headache; continuous usage of any kind of medication; drug addiction; or abusive alcohol use.

Migraine was defined according to the International Classification of Headache Disorders diagnostic criteria, second edition (ICHD-2),[12] and CM was defined according to 2006 appendix criteria.[13] All patients were submitted to a detailed headache questionnaire that was divided into sections about demographic data (probing age, gender, ethnic background, and educational level for both the patient and their parents) and clinical data (age of headache onset, duration, frequency, pain intensity, and the presence of aura). They were also asked to fulfill a headache diary during a 2 month period.

To evaluate social anxiety scores, all the subjects were asked to fill out the Social Phobia Inventory (SPIN), a brief 17-item measure of generalized social anxiety that assesses a range of avoidance behaviors, physical symptoms and social fears.[14] The SPIN has been demonstrated to have solid psychometric properties. It is capable of distinguishing between subjects with and without SAD, and of measuring treatment response. Items assessing fear, avoidance, and physiological distress make up the three subscales (fear, avoidance, and physiological subscales).[14] Due to its brevity and simple design, the SPIN appears suitable for use both in epidemiological research and as a clinical screening instrument, also being a reliable self-report instrument among adolescents. Furthermore, the scale has been adopted for use in adolescent samples and in different languages; results from various studies in adolescents also showed high sensitivity (68–81%) and high specificity (81–85%), with different cut-off scores from 21 to 24.[15]

Data analysis

The chi-squared test (without Yates correction) was used for categorical data comparisons. The means between the two patient groups were compared using the independent Student's *t*-test; one-way analysis of variance (ANOVA) was used when there were three samples. When the ANOVA showed significant differences, Bonferroni's multiple comparisons test was used to verify the significance of the results.

Multiple logistic regression analysis was performed to verify the relationship between social anxiety (as the independent variable) and migraine (as the dependent variable). The dependent variables were analyzed in pairs (control group [CG] × EM, CG × CM and EM × CM). The results are given as OR. Mean ± SD are reported unless stated otherwise. $P < 0.05$ was considered to indicate statistical significance; all tests were two-tailed, and 95%CI were calculated for the difference between means and OR. All statistical analysis was performed using SPSS 11.5.1 for Windows (SPSS, Chicago, IL, USA).

Results

A total of 187 subjects were referred to the study. From this total, 36 subjects were excluded: eight refused to take part in the study, six did not give reliable history information and 22 met at least one exclusion criterion. The remaining 151 subjects were included in the analysis. Among them, 50 had EM, 50 had CM and 51 were enrolled as the CG.

There were no significant differences between the three groups regarding age ($F^{2148} = 1.3$, $P = 0.275$). The proportion of women was higher in the CM group (CG, 59%; EM, 60% vs CM, 84%; $\chi^{22} = 9.24$; $P = 0.010$). There was no difference in the distribution of race between the three groups (CG: 69% white, 18% black vs EM: 58% white, 22% black vs CM: 74% white, 12% black; $\chi^{24} = 3.25$; $P = 0.518$).

Clinical characteristics of migraine

The age of headache onset for EM patients was 8.6 ± 2.9 years, and attack duration had a median of 4.5 h. For the CM group, age of onset was 7.8 ± 2.3 years with a median duration of 6.0 h. There were no significant differences regarding age of onset ($t^{98} = -1.5$; 95%CI: –0.23 to 1.87; $P = 0.125$) or the duration of headache episodes (EM, 8.3 ± 9.2 h vs CM, 9.0 ± 7.1 h; $t^{98} = -0.4$; 95%CI: –3.94 to 2.62; $P = 0.689$). The mean score of pain intensity in CM patients was significantly higher than the scores in the EM group (7.3 ± 1.4 vs 6.1 ± 1.9; $t^{98} = 3.5$; 95%CI: 0.52–1.88; $P = 0.001$).

SPIN questionnaire

In the CM group, the mean SPIN score was 18.5 ± 12.4, which was significantly higher than in the EM group (12.1 ± 8.1) and in the CG (13.8 ± 10.8; $F^{2131} = 4.8$; $P = 0.010$). The mean score, however, was not significantly different between the CG and the EM group.

Multiple logistic regression analysis was performed to verify if the relationship between SAD (as a dependent variable) and type of migraine (as an independent variable) were independent of age, sex, race and pain intensity (Table 1).

Chronic migraine was strongly positively associated with SPIN score independently of age, sex, race and pain intensity.

Discussion

Given that the medical comorbidities associated with migraine could influence its outcome through several factors, including

Table 1 Relationship between social phobia and type of migraine (multiple linear regression analysis)

	β	SE	*t*	95%CI (β)	*P*
Constant	−11.89	8.20	–	–	–
CM	6.34	2.33	2.72	1.70 to 10.97	0.008*
Sex	0.56	2.50	0.22	−4.41 to 5.53	0.823
Age	0.68	0.40	1.70	−0.11 to 1.48	0.092
White	2.56	2.85	0.90	−3.09 to 8.21	0.371
Black	6.47	3.55	1.82	−0.58 to 13.51	0.071
Pain intensity	0.80	0.62	1.29	−0.43 to 2.03	0.201

CI, confidence interval; CM, chronic migraine.

quality of life, functioning, and psychological wellbeing, it is crucial to assess the prevalence and impact of these conditions on migraine. Although the association between psychiatric disorders and migraine may or may not be a causal one, a greater understanding of these specific relations may contribute to our understanding of the underlying etiologies of both conditions, extend our comprehension of the development of psychopathology, and function as a tool for improving nosology.

The main finding of this study was that CM is strongly associated with SAD, regardless of demographic data and pain intensity. Previous reports have shown that SAD had a twofold higher prevalence among adult migraine sufferers, with a rate of 8–10%.[10] Indeed, patients in this subgroup may have a different profile in terms of the clinical course of the disorder and treatment response. Migraine patients may have more phobia symptoms as a consequence of debilitating attacks, causing avoidance, fear, and leading to the social phobia scenario. In contrast, the phobic behavior, avoidance, may be one of the mechanisms triggering migraine attacks, and possibly related to migraine chronification.[11]

Cephalalgiaphobia was recently described in migraine patients, particularly CM with excessive acute medication intake, again, avoidance playing a role in migraine.[16] School phobia is considered a kind of SAD according to the DSM-IV. Fujita *et al*. found that chronic daily headache (CDH) with school phobia was more intractable than CDH without school phobia because of comorbid psychiatric disorders.[17] Children with CDH and school phobia had problems in school and/or the family.

The phobic response may increase the noradrenergic output, leading to more somatic symptoms, including migraine headaches.[18] A serotoninergic neurotransmission dysregulation may be involved in these patients, and because this is a common mechanism for both disorders, the use of serotonin agents may be useful in the migraine–SAD association. Melatonin levels were found to be decreased in migraine comorbid with psychiatric disorders including anxiety;[19] this may be another putative mechanism in the pathophysiology of this association.

The main finding of the present study was that CM is strongly associated with SAD in the adolescent population, regardless of demographic data and pain intensity. The total burden of migraine may be increased with SAD comorbidity. Diagnosis and treatment of anxiety disorders in adolescent migraine patients is key for a better prognosis.

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