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The Prevalence of Migraine Headaches in an Anxiety Disorders Clinic Sample

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The association between migraine and psychiatric disorders has been reported in both clinical and epidemiological studies. The prevalence of psychiatric disorders has been found to be increased among individuals with migraine. Studies assessing migraine in psychiatric patients are limited and the majority of these studies have focused solely on examining patients with major depression. In the present study, we examined the prevalence and characteristics of migraine headache in an anxiety disorders clinic sample in order to better understand the relationship between these commonly associated conditions. We evaluated 206 consecutive outpatients to an Anxiety Disorders Clinic for the prevalence of migraine. The presence of migraine was established using International Headache Society Criteria. Subjects completed a modified self-report version of the Headache Diagnostic Questionnaire. In order to assess the relationship between migraine and anxiety disorder symptom severity, subjects completed standardized measures of symptom severity. The prevalence of migraine in our anxiety disorder clinic sample was 67%. Anxiety disorder patients with migraine presented with a significantly greater number of comorbid psychiatric disorders than patients without migraine ($P = 0.012$). The prevalence of migraine was significantly higher in patients with a diagnosis of either panic disorder with agoraphobia ($P = 0.048$) or major depressive disorder/dysthymia ($P = 0.008$) compared to other psychiatric disorders. The severity of anxiety disorder symptoms was significantly higher in patients with migraine compared to patients without migraine. This study suggests that there is an increased prevalence of migraine headaches among anxiety disorder patients as compared to the general population. Migraine comorbidity may have important clinical implications, such that the treatment of one condition could potentially ameliorate the development or progression of the other. Further research is required to better understand the nature and implications of the association between migraine and psychiatric disorders.

Introduction

Migraine headache is a disabling neurological condition that causes significant loss of productivity and decrements in health-related quality of life [1,2]. Epidemiological studies that have utilized International Headache Society (IHS) criteria to diagnose migraine report a prevalence of 11–13% in the North American population [3–5]. Similar migraine prevalence rates ranging from 7 to 12% have also been described for European countries [5,6]. Migraine headaches are more frequently reported in females than in males, with males exhibiting an earlier onset and higher rate of remission than females [3,7]. An association between migraine headaches and psychiatric illness has been reported in both epidemiological and clinic-based studies.

Epidemiologic studies have consistently reported an association between migraine, depression, and anxiety disorders [2,3,7,8–10]. Cross-sectional studies report an increased prevalence of major depression among persons with migraine (21–34%) compared to those without migraine (9–10%) [3,10]. Of the anxiety disorders, panic disorder has the strongest association with migraine [3,7,8,11,12], with an increased prevalence among migraine sufferers (10.9–17%) relative to migraine-free individuals (1.8%) [3,7]. Other anxiety disorders including generalized anxiety disorder (GAD) [13] and social phobia [14] have also exhibited significant associations with migraine. Prospective epidemiologic studies that examined the incidence of psychiatric disorders have revealed that a history of migraine at baseline was associated with a two to four times increased risk of depression and two to three times more likely of developing an anxiety disorder [7,15].

Clinic-based studies that have investigated migraine and psychiatric comorbidity report similar associations. The majority of these studies examined the prevalence of psychiatric disorders in outpatients of headache clinics (rather than in psychiatric populations) and have revealed an increased prevalence of major depression and anxiety associated with all types of headaches including migraine [16–19]. Of the headache clinic outpatients diagnosed with migraine, 20–57% experience depression and 38–50% experience anxiety [17,19].

Studies of psychiatric outpatients have also established an association between migraine, anxiety, and depression [20–23]. Clinical studies report a migraine prevalence of 33–51% among psychiatric outpatients [20,22–23]. The prevalence of migraine in psychiatric populations has not been extensively studied, and of the available studies, many have focused solely on patients with a major depressive disorder [21–24].

Although numerous studies have reported a relationship between migraine and psychiatric symptoms, only a few studies have examined the relationship between migraine and specific psychiatric disorders using structured diagnostic criteria. The objective of this study was to examine the relationship between migraine and anxiety disorders with specifically evaluating the prevalence and the impact of the presence of migraine on the anxiety disorder.

Methods

Subject Selection

Two hundred and six consecutive adult (≥ age 18) outpatient admissions to the Anxiety Disorders Clinic at McMaster University Medical Centre, in Hamilton Canada, were included in the study. The study protocol was approved by the institutional review board. Written informed consent for all subjects was obtained prior to conducting any study-related tasks. All subjects met DSM-IV diagnostic criteria for a primary diagnosis of an anxiety or mood disorder. The sample included 30.1% (N = 62) males and 69.9% (N = 144) females with a mean age of 37.8 ± 12.9 years and a mean number of comorbid psychiatric disorders of 2.1 ± 1.5. All subjects were assessed with the Structured Clinical Interview for the DSM-IV (SCID) [25] by a Research Nurse, and diagnoses were confirmed by a psychiatrist. The primary diagnosis of patients included in the study were: obsessive-compulsive disorder (OCD) 40.3% (N = 83), panic disorder with agoraphobia (PDAG) 24.8% (N = 51), social phobia (SP) 16% (N = 33), and other disorders 18.9% (N = 39) (other disorders include generalized anxiety disorder (GAD), major depressive disorder (MDD), dysthymia (DYS), post-traumatic stress disorder (PTSD), chronic motor tic, impulse control disorder, and trichotillomania). Current pharmacological treatment of patients included antidepressants 4.9% (N = 10), benzodiazepines 1% (N = 2), anticonvulsants 0.5% (N = 1), and analgesics 8.7% (N = 18).

Self-Rated Subject Measures

Subjects completed the following self-rated measures which assessed anxiety and mood symptom severity: Fear Questionnaire [26], Anxiety Sensitivity Index [27], State-Trait Anxiety Inventory [28], Social Adjustment Scale [29], Beck Depression Inventory [30], Maudsley Obsessive-Compulsive Inventory [31], Sheehan Disability Scale [32].

Headache Assessment

Subjects were assessed for the presence of any type of headache as well as migraine headaches. The presence of migraine with and without aura was established using the IHS criteria. Subjects completed a questionnaire that was based on the Headache Diagnostic Questionnaire—a computer-assisted telephone interview (CATI). The questionnaire was modified to a self-administered questionnaire and contained several revisions. First, the questionnaire was shortened to include only the questions required to reliably diagnose migraine according to IHS criteria. Second, the questionnaire examined the impact of migraines only (rather than all headache types) and asked respondents to focus solely on the most severe type of headache experienced. Third, additional questions were included that asked respondents to indicate their perceptions of the impact of migraine on anxiety

symptoms or, conversely, the impact of anxiety symptoms on migraine. Finally, patients were asked to rate the perceived effect of anxiety treatment on migraine symptoms, if applicable. The presence of migraine was confirmed through clinical diagnosis by study psychiatrists.

Migraine Criteria [33]:

Migraine without aura—at least five attacks fulfilling criteria A–C (see below).

Migraine with aura—at least two lifetime attacks fulfilling criteria A–B (see below).

Migraine without aura	Migraine with aura
(A) Headache lasting 4–72 h (that is either untreated or unsuccessfully treated)	(A) Headache with three of more of the following: Reversible aura Gradual onset of aura Aura symptom does not last more than 60 min Headache following aura with a free interval of less than 60 min
(B) Headache has two or more of the following: Unilateral presentation Pulsating quality Pain is moderate to severe in intensity Headache is aggravated by routine physical activity	(B) During the headache at least one or more of the following: Nausea or vomiting Photophobia or phonophobia
(C) During the headache at least one or more of the following: Nausea Photophobia or phonophobia	

Statistical Analysis

Data analysis was performed using SPSS for Windows, version 16 (SPSS Inc., Chicago, IL). *t*-tests and chi-square analyses were used to examine the associations between migraine and associated variables. The odds ratio was determined within the 95% confidence interval for the risk of migraine among patients with an anxiety and mood disorder to patients with an anxiety disorder alone. An odds ratio greater than 1 was considered statistically significant. Logistic regression analysis was used to determine possible predictors of migraine occurrence.

Results

The prevalence of headaches in our anxiety disorders sample (n = 206) is presented in Table 1. The overwhelming majority reported experiencing headaches and approximately 2/3 of the sample met criteria for migraine.

Table 1 Prevalence of headaches in the anxiety disorder clinic sample

Prevalence of headaches	*n* = 206	%
Any type of headache	196	95.1
Migraine	138	67.0
Migraine with aura	73	35.0
Migraine without aura	65	31.6

Table 2 Prevalence of migraine by primary diagnosis

Primary diagnoses	Migraine		
	n	%	*P*
Obsessive compulsive disorder (n = 83)	54	65.1	NS
Panic disorder with agoraphobia (n = 51)	34	66.7	NS
Social phobia (n = 33)	22	66.7	NS

The prevalence of migraine (all subtypes) and migraine with aura among male and female patients was examined. Of the 206 patients, 58.1% (N = 36) males and 70.8% (N = 102) females report migraine. Among those reporting migraines, 27.4% (N = 17) males and 38.9% (N = 56) females report migraine with aura. No significant gender differences were observed for subjects with migraine or migraine with aura.

Table 2 presents rates of migraine for individuals based on primary diagnosis. No significant effects were observed.

Prevalence of migraine by the presence of any current psychiatric disorder is summarized in Table 3, including both primary and comorbid psychiatric disorders.

Table 3 Prevalence of migraine by the current psychiatric disorder (primary or comorbid).

Diagnosis	Prevalence of migraine	*P*
OCD (n = 130)	91	NS
GAD (n = 57)	41	NS
PDAG (n = 99)	73	$P = 0.048$*
SP (n = 107)	72	NS
Phobia (n = 30)	22	NS
MD/DYS (n = 100)	76	$P = 0.008$*
PTSD (n = 1)	1	NS
CMT (n = 18)	13	NS
TTM (n = 3)	1	NS
ICD-NOS (n = 24)	17	NS

Abbreviations: CMT: chronic motor tic, DYS: dysthymia, GAD: generalized anxiety disorder, ICD-NOS: impulse control disorder not otherwise specified, MDD: major depressive disorder, OCD: obsessive compulsive disorder, PDAG: panic disorder with agoraphobia, PTSD: post-traumatic stress disorder, SP: social phobia, TTM: trichotillomania.

*Statistically significant (chi-squared analysis).

Significant effects for the presence of migraine headaches were observed for diagnoses of panic disorder with agoraphobia and major depressive disorder/dysthymia. No significant effects were observed for other psychiatric disorders and the presence of migraine.

The relationship between migraine and the mean number of comorbid anxiety disorders was examined. The mean number of comorbid psychiatric disorders of patients with migraine was significantly higher compared to patients without migraine ($P = 0.012$). Anxiety disorder patients without migraine headaches had a mean 1.7± 1.5 comorbid disorders while patients with migraine headaches had a mean 2.3 ± 1.5 comorbid disorders.

The prevalence of migraine was significantly higher in patients with concurrent anxiety and mood disorders than that in patients with an anxiety disorder alone ($P = 0.008$). Of the patients diagnosed with an anxiety and mood disorder (n = 100), 76% experience migraine headaches, while 58.5% of patients diagnosed with an anxiety disorder (n = 106) experience migraine headaches. Subjects with anxiety and mood disorders were more than two times more likely of presenting with migraine headaches compared to patients with an anxiety disorder alone (OR = 2.25, 95% CI = 1.23–4.09).

Table 4 presents results from the logistic regression analysis which examined possible predictors of migraine headaches. The variables examined include gender, primary diagnoses, comorbid anxiety disorders, and comorbid psychiatric disorders. Of the variables tested, two significant predictors were found: a diagnosis of major depressive disorder/dysthymia ($P = 0.011$) and the number of comorbid anxiety disorders ($P = 0.043$). No significant effects were seen for gender, other psychiatric disorders, and the number of comorbid psychiatric disorders.

Table 4 Logistic regression: predictors of migraine

Variable	B	S.E.	*P*
Gender	0.219	0.351	0.532
OCD	0.297	0.640	0.642
GAD	−0.117	0.718	0.871
PDAG	0.191	0.693	0.783
SP	−0.662	0.705	0.348
Phobia	−0.054	0.737	0.942
MDD/DYS	1.672	0.660	0.011*
Number of comorbid anxiety disorders	1.160	0.572	0.043*
Number of comorbid disorders	−0.724	0.477	0.129

Abbreviations: DYS: dysthymia, GAD: generalized anxiety disorder, MDD: major depressive disorder, OCD: obsessive compulsive disorder, PDAG: panic disorder with agoraphobia, SP: social phobia.
*Statistically significant.

Table 5 Migraine comorbidity and anxiety disorder severity

Measure	Migraine	No migraine	*t*	*df*	*P*
Fear questionnaire: agoraphobia subscale	14.1 ± 9.0 (n = 98)	9.7 ± 10.7 (n = 46)	2.42	142	0.017*
Fear questionnaire: social phobia subscale	19.3 ± 10.1 (n = 98)	13.7 ± 8.2 (n = 46)	3.29	142	0.001*
Fear questionnaire: total score	44.9 ± 23.6 (n = 98)	32.9 ± 20.8 (n = 46)	2.97	142	0.003*
Anxiety sensitivity index	29.1 ± 12.0 (n = 99)	22.5 ± 11.2 (n = 46)	3.14	149	0.002*
Stat-trait anxiety inventory—state scale	60.2 ± 70.2 (n = 104)	49.8 ± 12.3 (n = 47)	1.01	149	0.314
State-trait anxiety inventory—trait scale	56.9 ± 12.8 (n = 104)	53.5 ± 12.1 (n = 47)	1.55	149	0.122
Social adjustment scale—self-report	2.18 ± 0.47 (n = 104)	2.15 ± 0.53 (n = 45)	0.40	147	0.688
Beck depression inventory	19.8 ± 10.6 (n = 103)	18.2 ± 12.6 (n = 47)	0.82	148	0.416
Maudsley obsessive-compulsive inventory	10.7 ± 6.5 (n = 101)	10.3 ± 6.5 (n = 44)	0.38	143	0.706
Sheehan disability scale: work	4.5 ± 3.5 (n = 104)	3.8 ± 3.0 (n = 46)	1.07	148	0.284
Sheehan disability: social	5.5 ± 3.3 (n = 104)	4.5 ± 3.2 (n = 46)	1.84	148	0.067
Sheehan disability: family	3.9 ± 3.0 (n = 104)	3.5 ± 2.9 (n = 46)	0.69	148	0.489

*Statistically significant.

Table 5 lists mean scores for each of the self-report questionnaires for patients with migraine and patients without migraine. A comparison of self-report questionnaire scores between patients with migraine and those without migraine suggests that individuals with migraines have greater symptom severity than those without.

Of the patients reporting migraine/headaches, the onset of anxiety disorders and migraine was determined and compared to examine the potential temporal relationship between the two conditions. Thirty-nine percent (39.3%) of patients reported migraine onset prior to the anxiety disorder; 18.4% of patients reported migraine onset after the anxiety disorder and 42.2% of patients were unable to recall the onset of the two conditions.

The effects of current or past anxiety disorder treatment on headache severity in patients reporting any type of headache including migraine was examined. The majority of the patients, 58.6% reported no change with treatment, while 36.5% reported an improvement and

5% report a worsening of headache symptoms with anxiety disorder treatment.

Subjects were asked whether their anxiety symptoms impact the intensity of headaches. Of the 196 patients experiencing headaches, 38.3% of patients report a worsening, 38.8% report no change, and 23% were unsure as to whether their anxiety symptoms worsen their headaches.

Discussion

In our sample of anxiety disorders patients, we found a high prevalence of both headaches and migraine headaches. The prevalence of migraine headaches among anxiety disorders patients in our sample was 67% which is significantly higher than the 11–13% prevalence of migraine reported in the general population [3–6]. Previous clinical studies in psychiatric populations have also demonstrated an increased prevalence of migraine headaches [20–24]; however, to our knowledge this is the first study to examine the association between migraine and psychiatric illness using an anxiety-disordered population.

There were no significant differences observed in the prevalence of migraine headaches by primary diagnosis. However, the presence of a diagnosis of major depression/dysthymia and panic disorder was significantly associated with the presence of migraine. These findings are consistent with previous clinical studies that have also demonstrated strong associations between migraine, depression, and panic disorder [16–23]. In addition, the presence of major depression/dysthymia and the number of comorbid psychiatric disorders were found to be significant predictors of migraine headaches. Patients who met criteria for comorbid anxiety and mood disorders were at a two times increased risk of migraine compared to patients with an anxiety disorder alone. Similarly Merikangas and colleagues (1990) reported that the co-occurrence of depression and anxiety disorders was associated with an increased risk of migraine as compared to depression or anxiety disorders alone [14].

Our study did not find a clear temporal relationship for the onset of anxiety disorders and migraine headaches. In contrast, previous studies have reported that anxiety disorders preceded the onset of migraine which was followed by the onset of major depression [3,34]. Establishing a temporal relationship between anxiety, migraine, and depression has important clinical implications such that effective treatment of anxiety disorders may prevent the development of both migraine and major depression in patients. Although prospective studies have demonstrated a temporal relationship for the onset of migraine and psychiatric disorders, it remains unclear whether one condition acts as a risk factor for the development of the other condition. The comorbidity of migraine and psychiatric disorders can be interpreted in several ways. It has been hypothesized that psychiatric symptoms may be a causal factor for the development of migraine by worsening somatic symptoms. Alternatively, it has also been argued that migraine may lead to the development of psychiatric symptoms. Bidirectional theories conceptualize the relationship between migraine and psychiatric disorders as reciprocal with each condition increasing the risk of the other. Breslau and colleagues (2001) [11] reported a bidirectional relationship between migraine and panic disorder with the influence being primarily from headaches to panic disorders although a weaker, yet significant influence was observed in the reverse direction. Similarly, a bidirectional relationship between migraine and major depression has also been reported with each condition increasing the risk of the other [11,34]. A bidirectional association between migraine and psychiatric disorders may be accounted for by the presence of a third variable or a predisposition that is involved in the development of both conditions. Migraine and psychiatric disorders may share a common vulnerability, thus suggesting a shared etiological mechanism involving biological or environmental risk factors.

In our sample, 36.5% of patients with migraine report an improvement in their headaches with anxiety treatment. If migraine and anxiety disorders share a common predisposition, such as neurotransmitter abnormalities, it would be expected that pharmacological treatments which regulate neurotransmitter levels would have a positive effect on alleviating both migraine and anxiety symptoms. Pharmacological investigations of several different agents have examined the issue of anxiety disorders and headaches. An open label trial found that duloxetine was effective and well tolerated for the treatment of both comorbid depression and chronic headache [35]. Anticonvulsants have been demonstrated to be effective in migraine prophylaxis [36]. Pregabalin, in particular, has been demonstrated to be effective in the treatment of migraine [37] and is also used to treat specific anxiety disorders [38]. In addition, topiramate has been used for migraine prophylaxis [39] as well as for the treatment of social phobia [40] and obsessive-compulsive disorder [41]. Recent evidence has implicated the serotonin transporter gene, 5HTTLPR polymorphism in both anxiety disorders and migraine [42,43], which may add further support for a common etiological mechanism for both of these conditions.

Limitations of our study should be noted. First, due to our cross-sectional study design, temporal data could be weakened by subject recall bias. This was evident

in our study as a large portion (42.2%) of our subjects could not indicate an accurate sequence for the onset of their conditions. The use of a prospective longitudinal study design would have allowed for a clearer determination of the temporal relationships, and further clarification as to whether the association between psychiatric illness and migraine is unidirectional or bidirectional. Second, we could not eliminate the confounding effects of current pharmacological treatment. Subject interpretations of both anxiety and headache symptoms may have been effected by current psychotropic and analgesic treatments, possibly causing respondents to underrate their symptoms. Finally, we utilized a self-rated headache questionnaire which may be less accurate and more susceptible to variability due to subjective interpretations, although the diagnosis of migraine in this study was confirmed by the psychiatric clinician.

The strong association between migraine and psychiatric comorbidity has been established in the literature and supported by the results of this investigation. Further research to establish causality is warranted to better understand the bidirectional effects of migraine and psychiatric illness. This information may be important for clinicians when considering treatment options for patients presenting with headache and psychiatric symptoms as the presence of one condition may have an effect on the treatment and course of the other. The additive effects of migraine and psychiatric illness can substantially increase disability and loss of productivity than would be expected for either condition alone. Future studies should aim to evaluate possible common etiological factors that could lead to the development of migraine and psychiatric disorders.

Author Contributions

Rhandi Senaratne: Data analysis/interpretation, drafting article, critical revision and approval of article

Michael Van Ameringen: Concept/design, data analysis/interpretation, drafting article, critical revision and approval of article

Catherine Mancini: Study design, critical revision of article and approval of article

Beth Patterson: Study design, data analysis, drafting article, critical revision and approval of article

Mark Bennett: Study design, critical revision of article and approval of article

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Conflict of Interest

The authors declare no conflict of interest.

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