Original Articles

Migraine, Personality, and Psychiatric Comorbidity

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The purpose of this report is to examine the association between migraine and personality, taking into account history of co-occurring psychiatric disorders. Data came from an epidemiologic study of young adults in the Detroit, Michigan metropolitan area. Migraine, defined according to 1988 IHS criteria, and major depression and anxiety disorders were ascertained by a structured diagnostic interview. Migraine was associated with neuroticism, but not with extraversion or psychoticism, measured by the Eysenck's Personality Questionnaire. The association remained significant, when sex and history of major depression and anxiety disorders were controlled. An excess of 25% of persons with migraine alone, uncomplicated by psychiatric comorbidity, scored in the highest quartile of neuroticism. The results suggest that migraine sufferers might be more vulnerable to psychopathology and poor adjustment to their medical condition.

Key words: migraine, personality, neuroticism, psychiatric comorbidity

Abbreviations: EPQ-R Eysenck Personality Questionnaire - Revised

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Clinical descriptions of migraine patients as anxious, depressed, and hypochondriacal, or as hostile, resentful, and rigid[1-3] have been widely accepted, despite the potential for bias in observations based on clinical samples.[4] Community-based epidemiologic studies have generally supported an association between migraine and neuroticism.[5-7] Brandt et al reported that persons with migraine scored significantly higher on the Eysenck neuroticism scale, compared with matched controls.[5] Rasmussen reported no difference between persons with pure migraine and controls on the Eysenck neuroticism scale, although when all migraineurs were considered together-including the vast majority who suffered also from tension-type headache-a tendency to score higher on neuroticism was observed.[6] Employing a different personality instrument, Merikangas et al found that persons with migraine with aura scored higher than no headache controls and those with other types of headache on various indicators of neuroticism.[7] The two community-based studies that examined also personality traits other than neuroticism reported no significant association between migraine and extraversion.[5,7] One of these studies[5] reported that females with migraine, but not males, scored significantly higher on psychoticism.

The interpretation of the link between migraine and neuroticism observed in community studies has been complicated by recent evidence of increased rates of psychiatric disorders, especially major depression and anxiety disorders, in persons with migraine.[8-11] An association between migraine and neuroticism might reflect the psychiatric comorbidity associated with migraine, as a connection between neuroticism and major depression or anxiety disorders has been demonstrated both cross-sectionally and prospectively.[12-14] Previous epidemiologic studies have not considered the role of psychiatric comorbidity in the migraine-neuroticism association.

The purpose of this report is to extend previous epidemiologic research that suggested an association between migraine and neuroticism and examine that relationship, controlling for history of psychiatric comorbidity. Using data from an epidemiologic study of young adults in the Detroit, Michigan area, we address the following question: Is the association between migraine and neuroticism accounted for by the high rates of co-occurring major depression and anxiety disorders? Or, conversely, is migraine, uncomplicated by psychiatric comorbidity, associated with higher neuroticism? Although previous research has supported an association between migraine and neuroticism, we examine associations with a wider range of personality traits to ascertain whether migraine is associated specifically with neuroticism.

METHODS

A random sample of 1200 was drawn from all 21- to 30-year-old members of a large health maintenance organization (HMO) in Southeast Michigan. A total of 1007 respondents, 84% of the sample, were interviewed at their homes from March through October 1989. Median age was 26 years, 61.7% were female, 80.7% were white, and 45% were married. A small minority, 3.7%, had less than high school education, 21% completed high school, 46% had some college, and 29.3% were college graduates. Drawn from a list of members of an HMO- as direct subscribers or dependents-the sample represents the population of Detroit and its surrounding suburbs, excluding the extremes of the socioeconomic range.

Information was gathered face-to-face using a structured interview, conducted in respondents' homes. The interview included a sequence of questions that elicit information on criterial features of migraine, adapted from the diagnostic criteria published by the Headache Classification Committee of the International Headache Society.[15] Because no information was gathered on other headache types, migraine cases include those with pure migraine as well as migraine plus other headache types, primarily tension headache.

Migraine Without Aura.-Common migraine-was defined by the following criteria: (A) at least five attacks; (B) headache attacks lasting more than 4 hours; (C) at least two of the following features: (1) unilateral location, (2) pulsating, (3) inhibits or prohibits daily activities, (4) aggravation by routine physical activities; (D) at least one of the following: (1) nausea *or* vomiting, (2) photophobia and phonophobia.

Migraine With Aura-Classic migraine-was defined as the presence of visual or sensory disturbances preceding one or more headache attacks that fulfilled the above migraine criteria.

The National Institute of Mental Health (NIMH) Diagnostic Interview Schedule (DIS), revised to cover DSM-III R disorders,[16-17] was used to gather information on history of common psychiatric disorders. Information gathered by the DIS and the sequence of questions on migraine was used to generate lifetime diagnoses, defined as having ever experienced the disorder up to the time of the interview.

Personality traits were measured by the Eysenck Personality Questionnaire - Revised (EPQ-R).[18] The EPQ-R is a self-administered instrument with 48 dichotomous items that constitute four scales: neuroticism, extraversion, psychoticism, and lie. Extensive theoretical background and experimental validation have been published on the extraversion and neuroticism scales.[19,20] The concept of neuroticism, measured by the neuroticism scale, refers to a general emotional over-responsiveness and liability to develop neurotic disorders under stress. The concept of extraversion measured by the extraversion scale, refers to outgoing, sociable, uninhibited, impulsive inclinations. The lie scale is a methodologic instrument that may be used to detect attempts to falsify responses or a "desirability response set." The validity of the psychoticism scale is far less established than that of neuroticism and extraversion, and considerable criticisms of the scale have been published.[21] The underlying characteristics that the psychoticism scale is designed to capture include, insensitivity, hostility, aggression, solitary, uncaring.[18]

Statistical Analysis.-For the purpose of this analysis, migraine and the psychiatric diagnoses of interest were defined as *lifetime* disorders. The associations between migraine and the four scales of the EPQ-R were tested in a series of multiple regression analyses, in which sex, history of major depression, and history of any anxiety disorder were included as covariates. In additional models, we tested the interactions between migraine and psychiatric disorders with respect to their association with personality traits. Interactions between migraine and sex and 3-way interactions were tested as well. No significant interactions were detected ($P > .20$).

RESULTS

Personality Traits and History of Migraine.- Table 1 presents comparisons of unadjusted scores on Eysenck's personality traits in persons with a lifetime history of migraine with and without aura and persons with no history of migraine. Means and standard deviations and results from a series of ANOVAs appear in the table. Persons with history of migraine of either subtype scored markedly higher on neuroticism than persons with no history of migraine. Differences across the three groups on other personality scales were relatively small. Using alpha corrected for multiple (four) comparisons (P=.012), differences across groups were statistically significant only on neuroticism. Scheffe' comparisons revealed significant differences on neuroticism between each migraine subtype and no migraine, but not between migraine with aura and migraine without aura.

Controlling for Psychiatric Comorbidity.-The association between migraine subtypes and personality traits, independent of psychiatric comorbidity, was estimated using multiple regres-

Table 1.-Comparison of Personality Scores in Persons With History of Migraine With Aura, Migraine Without Aura, and No Migraine

	Migraine With Aura (n=59)	Migraine Without Aura (n=69)	No Migraine (n=879)	F (*df*=2, 1004)	*P*
Neuroticism (mean ± SD)	7.07 ± 3.35	6.26 ± 3.10	3.96 ± 3.12	41.56	.001
Psychoticism (mean ± SD)	1.83 ± 1.59	1.59 ± 1.19	2.05 ± 1.48	3.58	.028
Extraversion (mean ± SD)	8.39 ± 3.24	8.20 ± 3.33	8.75 ± 3.14	1.25	.286
Lie (mean ± SD)	4.20 ± 2.72	4.35 ± 2.31	4.84 ± 2.66	2.48	.084

sion analysis, in which major depression, any anxiety, and sex were included as covariates. Table 2 presents the results. Migraine with aura and migraine without aura had significant associations with neuroticism, controlling for sex, history of major depression, and history of any anxiety disorder. In contrast, migraine was unrelated to any of the other personality scales. The increment in the neuroticism score associated with migraine of either subtype was approximately the same as the increment associated with history of major depression or history of any anxiety disorder. No significant interactions between migraine and psychiatric disorders were detected.

To display more clearly the effect of psychiatric comorbidity on the migraine-personality association, we compared the EPQ-R personality scores across four groups classified as: (1) migraine alone, (2) major depression/any anxiety disorder alone, (3) migraine plus major depression/any anxiety disorder, and (4) none. For this analysis, migraine with aura and migraine without aura were combined, as no differences in personality scores between the two subtypes were detected. Table 3 presents mean scores on the Eysenck's personality scales across the four groups and results from ANOVAs. Using alpha corrected for multiple (four) comparisons (*P*=.012), significant differences across groups were observed on the neuroticism and lie scales. On neuroticism, Scheffe' tests revealed significant differences between the reference group of persons with none of the disorders and each of the disorder groups, including migraine alone. In addition, persons with migraine plus major depression/any anxiety scored significantly higher than either those with migraine alone or those with major depression/any anxiety alone. The difference in neuroticism between persons with migraine alone and persons with major depression/any anxiety alone was not significant.

Table 2.-Migraine and Personality, Controlling for Sex and Psychiatric Comorbidity (Results From Four Multiple Regression Analyses)

	Neuroticism ß(SE)	Psychoticism ß(SE)	Extraversion ß(SE)	Lie ß(SE)
Migraine with aura	1.79(.40)*	-.14(.20)	-.25(.44)	-.29(.36)
Migraine without aura	1.43(.37)*	-.34(.18)	.52(.40)	-.33(.33)
Sex, female	.95(.19)*	-.65(.10)*	.68(.21)**	.54(.17)**
Major depression	1.96(.29)*	.13(.14)	-.11(.32)	-.72(.26)**
Any anxiety	1.54(.22)*	.00(.11)	-.66(.23)**	-.65(.19)**

Unadjusted partial regression coefficients shown.
*P<.0001.
**P<.004.

Table 3.-Comparison of Personality Scores by History of Migraine and Major Depression/Any Anxiety

	Migraine Alone (n=52)	Major Depression/ Anxiety Alone (n=268)	Migraine and Major Depression/ Anxiety (n=76)	None (n=611)	F (*df*=3, 1003)	*P*
Neuroticism (mean ± SD)	5.33 ± 3.11	5.60 ± 3.07	7.53 ± 3.01	3.24 ± 2.87	76.36	.0001
Psychoticism (mean ± SD)	1.64±1.25	1.96±1.46	1.75±1.48	2.10±1.49	2.73	.0427
Extraversion (mean ± SD)	8.71 ± 3.14	8.39 ± 3.51	8.00 ± 3.35	8.91 ± 2.96	3.04	.0281
Lie (mean ± SD)	4.77 ± 2..68	4.27 ± 2..48	3.95 ± 2.33	5.08 ± 2.70	8.59	.0001

Although the results of the ANOVA of the lie scale showed significant differences across the four groups, persons with migraine alone were not significantly different from the reference group of persons with none of the disorders, according to Scheffe' tests. Furthermore, those with migraine plus major depression/any anxiety were indistinguishable from those with major depression/any anxiety alone (Table 3). Put in other words, migraine did not contribute any significant increment to the lie score.

What does the higher average neuroticism score in persons with migraine mean? To address this question, we compared the distributions of scores across the four groups, classified according to history of migraine and major depression/any anxiety disorder. The results, displayed in Table 4, show an excess of nearly 24% of persons with

Table 4.-Distribution of Neuroticism Scores by History of Migraine and Major Depression/Any Anxiety

	None (n=611)	Migraine Only (n=52)	Major Depression/ Any Anxiety (n=28)	Both (n=76)
0-1 (1st Quartile)	35.2	15.4	10.1	5.3
2-4 (2nd Quartile)	33.9	25.0	27.6	10.5
5-6 (3rd Quartile)	16.4	21.2	25.0	21.0
[3]) 7 (4th Quartile)	14.7	38.5	37.3	63.2

Kolmogorov-Smirnov two-sample tests show significant differences between migraine only and none (P = .0008), migraine only and both (P = .046), and major depression/any anxiety and both (P = .0007).

migraine only scoring in the highest quartile, compared to persons with none of the disorders, 38.5% vs 14.7%, respectively. The results also show an excess of more than 25% of persons with migraine plus psychiatric disorders (comorbid migraine) scoring in the highest quartile, compared with persons with history of major depression/any anxiety disorder but not migraine. Kolmogorov-Smirnov pairwise tests revealed significant differences between the distribution of migraine only and the reference group of persons with none of the disorders and between the comorbid migraine group and major depression/any anxiety alone (Table 4). The sex-adjusted odds ratio for high neuroticism score in persons with migraine alone, compared with persons with none of the disorders, was 3.5 (95% confidence interval 1.9 to 6.4).

COMMENTS

The analysis yielded the following answers: (1) migraine, with aura or without aura, was associated specifically with neuroticism. Persons with either migraine subtype scored significantly higher on neuroticism than persons with no migraine, and the difference between subtypes was not significant. (2) The association between migraine and neuroticism remained statistically significant when sex, history of major depression, and history of any anxiety disorder were controlled. (3) Migraine and major depression/any anxiety disorder, each independent of the other, were associated with a similar size increment in the neuroticism score. An excess of 25% of persons with migraine scored in the highest quartile of neuroticism. (4) There was no evidence of an association with any of the other personality dimensions measured by the EPQ-R.

The generalizability of the findings are limited in several respects. Most important, the age range of the sample was between 21 and 30 years and estimates of the associations of migraine with personality cannot be extrapolated to younger or older populations. Apart from the age limitation, the sample is restricted geographically and socioeconomically. It represents the population of a large metropolitan area in the USA, excluding the extremes of the socioeconomic range, especially the uninsured.

Within these limitations, the study provides the first body of epidemiologic evidence on the association between migraine and key personality traits, uncontaminated by psychiatric comorbidity. Persons with migraine, uncomplicated by psychiatric disorders, scored higher on neuroticisms than persons with a history of neither migraine nor major depression or any anxiety disorder. Furthermore, persons with migraine *and* psychiatric comorbidity scored higher on neuroticism than persons with major depression/any anxiety alone. While not all persons with migraine alone ("uncomplicated" migraine) had high neuroticism scores-40.4% scored at or below the median of the distribution, 38.5% scored in the highest quartile; an excess of 24% over the corresponding proportion of persons with no disorder.

The observed association between neuroticism and migraine has important clinical implications. First, it suggests that an increased proportion of migraine sufferers might be at risk for future onset of psychiatric disorders, specifically major depression and anxiety disorders. This possibility is particularly relevant to young adults, who have not

yet passed the age of onset of major depression and some of the anxiety disorders. Second, migraine, like other disorders with recurrent or chronic symptoms, represents a life stressor that might challenge coping abilities. Clearly, those with a tendency to emotional overreactivity, as measured by high neuroticism scores, can be expected to have greater difficulties.

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