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ORIGINAL ARTICLE

A Case-Control Study to Analyze the Association Between the Frequency of Headaches and Depression or Anxiety in Patients Suffering from Migraine

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ABSTRACT

Objective: The present study aims at investigating the presence of depression or anxiety in patients suffering from migraine.
Study design: A case-control study
Place and Duration: This study was conducted at Neurological Institute, Cleveland Clinic Abu Dhabi, UAE from April 2021 to April 2022
Methodology: A total of 400 participants were included in this study. The stratification of migraine was done based on the frequency of the attacks, the presence or absence of the aura, and some other significant variables. Clinical data, such as sleep characteristics, and demographic data were collected. The multivariable linear regression method was employed for the examination of the frequency of headache attacks and their association with the symptoms of anxiety and depression, as per the indication given by Hospital Anxiety and Depression Subscales (HADS) and Beck's Depression Inventory (BDI).
Results: The score of BDI was highest in the patients with chronic migraine and it was 12.9±7.8. It was 11.8±8.1 in the patients with high-frequency migraine, 10.5±7.5 in the medium frequency, 9.2±7.2 in low frequency, and 6.4±5.5 in the non-migraine participants in the control group. The trend was significant ($p<0.001$). The results were similar for the HADS scores. HADS and BDI scores were related independently to chronic migraine frequency, high-frequency episodic, and poor quality of sleep. A relationship between the frequency of migraine and BDI was found in both aura-absent ($p=0.029$) and the aura-present group ($p=0.001$).
Conclusion: There is a significant association between a higher frequency of headaches and depression/anxiety. This relationship is important in both types of migraine; ie with aura and without aura.
Keywords: depression, anxiety, migraine, headache, frequency

INTRODUCTION

Migraine is a common disorder with serious ramifications on the physical and emotional health of an individual. It disrupts a person's daily life and can cause serious emotional distress. Keeping in view its high prevalence, important socioeconomic and functional implications, and its demographic distributions, migraine has been declared an important public health issue by the World Health Organization [1]. Anxiety and depression are common comorbidities of migraine along with sleep disturbance [2]. There is a vicious cycle between migraine, anxiety, and depression, i.e. migraine is caused by anxiety and depression and vice versa [3].

The quality of health of a person suffering from a headache can be judged and predicted by the frequency of headache attacks [4]. People suffering from migraine are more likely to have anxiety and stress even during the times they are headache free because the fear of getting an attack is always there [5]. It has also been observed in a study that women who have migraine with aura, suffer more anxiety and depression [6]. Furthermore, the risk of anxiety disorders is also associated more with the increase in the frequency of migraine attacks [7].

Anxiety disorders are considered the commonest psychiatric disorders. The correlation between anxiety and migraine is double as compared to depression [8]. It is a general narrative that anxiety and depression have overlapping symptoms, however, the distinct features of both are different on neurobiological grounds [9]. The higher frequency of intense headaches in a patient with chronic migraine is mostly related to anxiety disorder and depression [10]. It is characterized by palpitations, fluctuation in blood pressure, muscular tension [11], restlessness, inflammation, lack of concentration [12], somatic complaints, fatigue, and ruminations [13]. One study also suggests that psychiatric comorbidity, such as depression and anxiety, are more commonly present in transformed migraine compared to episodic migraine [14].

The present study tested the hypothesis of the relationship of depression and anxiety with the frequency of migraine attacks in the patients reporting aura and without aura.

METHODOLOGY

A total of 400 participants that came to the outpatient clinic were included in this study. Overall280 patients included in the study were diagnosed with migraine with aura and without aura. A total of 120 participants did not have migraine and they voluntarily participated in the study. Written informed consent was signed by all the participants. Migraine patients were divided into four categories based on the frequency of headaches experienced by them. A total of patients 44 patients complained of more than 15 headaches days in a month and were categorized as chronic migraineurs. Overall 68 participants had 9-14 headache days in a month and were classified as high-frequency migraineurs. A total of 60 patients who had 5-8 headache days in a month were called medium-frequency migraineurs. The remaining 108 experienced 1-4 headache days in a month and they were low-frequency migraineurs.

The patients were assessed and interviewed with a questionnaire pack including the BDI, HADS, restless legs syndrome (RLS) screening questionnaire, Migraine Disability Assessment questionnaire (MIDAS), and, Pittsburgh Sleep Quality Index (PSQI). The patients who had a ≥18 score of BDI, were considered to have depression. The HADS consists of a 14-item scale in which seven items are related to depression and seven are related to anxiety. All the items further had four points according to the intensity. The maximum subscale score was 21. PSQI was used to assess sleep quality. The final score was 6 and it was considered poor sleep. The cut-off score for RLS was 6 and was considered positive for RLS. The MIDAS was used to evaluate the disability in the last three months. It contained five questions. HADS and BDI were the tools to assess the severity of depression. The data was recorded in analyzed in IBM SPSS version 26.

RESULT

The clinical and demographic data of the control (non-migraine) group and migraine group were gathered and presented in the form of a table. Table 1 shows the demographic and clinical data. Out of 280 participants in the migraine group, 87 (31.07%) participants reported a pre-attack aura. There were no trends seen related to the distribution of auras, age, body mass index (BMI), or gender. Furthermore, a higher frequency of attacks was associated with higher MIDAS, BDI, PSQI, and HADS (p <0.001).

The data derived from multivariable linear regression regarding the effects of migraine on the HADS and BID scores have been summarized in table 2. The trends indicate that the frequency of headaches was significantly associated with the BDI score (p=0.001), HADS score for anxiety (p=0.002), and HADS score for depression (p<0.001). These scores persisted regardless of the presence or absence of the aura.

Table 1: Demographic and clinical characteristics of the participants (n=400)

Characteristics	Control group (Non-migraine)	Migraine Groups (n=280)				P-value
		Low	Medium	High	Chronic	
Number of participants	120	108	60	68	44	-
Aura N (%age)	-	31 (28.7%)	22 (36.67%)	18 (26.47%)	15 (34.09%)	0.665
Age	35.6±10.8	33.8±11.6	34.1±11.1	34.2±10.3	32.1±12.1	0.167
Males	44 (36.67%)	38 (35.19%)	18 (30%)	21 (30.88%)	14 (31.81%)	-
Females	76 (63.33%)	70 (64.81%)	42 (70%)	47 (69.12%)	30 (68.18%)	0.273
BMI	22.8±4.3	22.9±3.4	21.8±2.1	23.1±4.2	22.5±3.8	0.193
HADS anxiety	5.9±3.6	7.6±3.7	8.1±4.2	8.4±4.2	9.1±4.7	<0.001
HADS depression	4.5±2.7	5.4±3.8	5.7±4.4	6.6±4.1	7.2±4.6	<0.001
BDI score	6.8±5.8	9.2±7.2	10.7±8.1	12.2±8.6	13.3±8.6	<0.001
PSQI score	7.4±3.2	8.1±3.6	9.2±3.8	10.0±3.8	9.7±4.3	<0.001
MIDAS	-	22.3±18.1	31.0±21.6	39.8±27.0	67.1±58.1	<0.001

Table 2: Comparison of HADS and BID scores in all the groups

Outcome population	Non-migraine group	Migraine groups				P-value
		Low	Medium	High	Chronic	
BDI total score						
Whole cohort (n=400)	8.5±0.6	10.2±0.8	9.8±0.7	10.2±0.8	11.8±.09	0.001
Migraine with aura and control (n=206)	8.2±0.5	11.3±1.2	9.9±1.3	12.3±1.4	14.6±1.6	0.001
Migraine without aura and controls (n=314)	8.1±0.6	9.4±0.5	7.8±0.8	9.5±0.7	10.5±1.1	0.028
HADS anxiety						
Whole cohort (n=400)	6.4±0.4	7.7±0.2	7.6±0.6	7.6±0.5	8.7±0.6	0.003
Migraine with aura and control (n=206)	6.6±0.3	8.7±0.6	7.7±0.8	8.1±0.8	9.3±0.7	0.012
Migraine without aura and controls (n=314)	6.5±0.4	7.3±0.3	7.3±0.6	7.3±0.03	8.3±0.7	0.011
HADS depression						
Whole cohort (n=400)	4.8±0.4	5.7±0.4	5.4±0.3	6.1±0.5	6.8±0.6	<0.001
Migraine with aura and control (n=206)	4.8±0.4	5.8±0.6	5.6±0.5	6.8±0.8	8.1±0.9	<0.001
Migraine without aura and controls (n=314)	4.9±0.4	5.5±0.4	5.3±0.6	5.8±0.5	6.6±0.5	0.010

DISCUSSION

In the present study, the association of depression and anxiety was observed with the frequency after the adjustment of gender, body mass index, age, PQSI, and MIDAS score. The correlation was found in the subgroups of migraine with and without aura. The scores were higher in the chronic migraine frequency group.

The mean BDI score in the control or non-migraine group in the present study is similar to the results presented in the study of Rhode et al in Germany [15]. According to the study of Lanteri et al, a positive association between the frequency of headaches in migraineurs with depression and anxiety is present [16]. The results of their study are similar to the present study, however, they did not divide the participants into groups according to the number of days and presence or absence of aura as they have been grouped in the present study. The study of Lin et al is suggestive of poor sleep quality associated with a higher frequency of headaches in migraineurs [3]. The present study has also shown similar results. Moreover, the study of Walters et al depicted the quality of sleep as an independent predictor related to emotional distress. Hence, the impacts of poor quality of sleep on the variables related to migraine were not dependent on the affective comorbidities [17].

Emotional distress and headache may affect each other due to their similar pathophysiology. The study of Rainville et al shows that emotional intensity directly affects the severity of pain [18]. The response to emotional distress can potentially alter the perception of pain by affecting the nociceptive signaling in the pain pathway [19]. The periaqueductal gray matter which is responsible to control pain modulation projects the serotonergic neurons present in the medulla and noradrenergic neurons present in the tegmentum and pons [20]. The diminished activity of central serotonin due to successive attacks of migraine leads to recurrent headaches. The low concentration of serotonin also decreases the threshold of pain perception [21].

CONCLUSION

The finding of the present study supports the hypothesis that the frequency of migraine headaches, in the presence or absence of auras, is related to depression and anxiety. PSQI scores also indicate that poor quality of sleep is also a predictor of severe anxiety and depression, hence, it is also associated with migraine headaches.

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Permission: Permission was acquired and received from the ethical committee before the conduct of the study.

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