Original Article
DOI: https://doi.org/10.70749/ijbr.v3i5.1498

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://induspublishers.com/IJBR
ISSN: 2960-2793/ 2960-2807

Migraine, Mental Health, and Marginalization: A Study of Psychiatric Comorbidities in a Multiethnic Cohort from Quetta, Pakistan

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ARTICLE INFO

Keywords: Migraine, Psychiatric Comorbidities, Depression, Anxiety, Sociodemographic Variables, Quetta.

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Declaration
Authors' Contribution
All authors equally contributed to the study and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 22-02-2025 Revised: 03-05-2025
Accepted: 15-05-2025 Published: 30-05-2025

ABSTRACT

Background: Migraine is the most common cause of disability in the world, and it often happens along with psychiatric disorders. This study aimed to examine the correlation between migraine and psychiatric comorbidities in Balochistan. **Methods:** A cross-sectional study involving 349 migraine patients (70.8% female; mean age 38.2 ± 12.5 years) was undertaken from January 2023 to December 2024. Validated instruments (PHQ-9, GAD-7, MIDAS, SF-36) and structured interviews evaluated psychiatric comorbidities, migraine features, disability, and quality of life. Descriptive statistics, bivariate analysis, and logistic regression models determined the predictors of depression and anxiety. **Results:** Psychiatric comorbidities were frequent, with 44.7% (n = 156) screening positive for depression (PHQ-9 ≥10) and 38.1% (n = 133) for anxiety (GAD-7 ≥10). Patients with chronic migraines demonstrated elevated rates of depression (67.8% vs. 40.0%) and anxiety (61.0% vs. 33.4%) in comparison to those with episodic migraines. Sociodemographic factors, such as illiteracy (51.9%). Logistic model indicated chronic migraine (aOR = 2.8, 95% CI: 1.9–4.0), female gender (aOR = 2.1, 95% CI: 1.4–3.2), illiteracy (aOR = 1.7, 95% CI: 1.1–2.6), and elevated stress (aOR = 3.5, 95% CI: 2.3–5.4) as independent predictors of depression. Patients with comorbidities had 50% reduced SF-36 scores and twice the number of disability days (MIDAS: 12.0 vs. 6.0 days/month). **Conclusion:** Migraine and psychiatric comorbidities are significantly interconnected, especially among chronic migraine sufferers and socioculturally disadvantaged populations. Research supports the implementation of integrated neurology-psychiatry care models, regular mental health assessments, and culturally customized therapies.

INTRODUCTION

Migraine is a common neurological condition marked by recurrent bouts of moderate to severe headache, frequently accompanied by symptoms like nausea, vomiting, and hypersensitivity to light and sound[1-3]. It imposes a significant burden on people, impacting their everyday activities, quality of life, and economic output[4-6]. In addition to physical symptoms, migraines often co-occur with various psychological problems, such as depression, anxiety, post-traumatic stress disorder (PTSD), bipolar disorder, and obsessive-compulsive disorder (OCD)[7-9]. The existence of these comorbidities can considerably complicate the clinical management of migraines, resulting in suboptimal treatment outcomes and heightened impairment[8, 10].

The association between migraine and psychiatric problems is intricate and multifarious. Numerous potential causes have been suggested, encompassing shared underlying pathophysiology, genetic susceptibility, and the influence of chronic pain and disability on mental health[11-13]. Studies have consistently shown a greater prevalence of psychological disorders in patients with migraines compared to the general population[14-16]. Depression and anxiety are two to three times more prevalent among those with migraines, and chronic migraine, defined by headaches occurring on 15 or more days per month, exhibits a stronger correlation with psychiatric comorbidity[17-19]. The relationship between migraine and mental health issues has been extensively studied in developed nations, but data from low- and middle-income countries (LMICs), like Pakistan, are very scarce. The prevalence and effect of migraine and its comorbidities may be impacted by several socio-cultural, economic, and environmental factors that are specific to different environments, making this a considerable gap. In Pakistan, poor access to healthcare, socioeconomic problems, and cultural stigma regarding mental health may lead to the underdiagnosis and undertreatment of both migraines and psychiatric illnesses, thereby intensifying their related burden[20-22]. This study seeks to examine the frequency of psychiatric comorbidities among a sample of migraine patients in Quetta, Pakistan. This study aims to ascertain the prevalence of depression, anxiety, PTSD, bipolar disorder, and OCD among adult migraine patients. This study will enhance the understanding of the intricate relationship between

mental comorbidities and migraine patients in Quetta, Pakistan, by presenting relevant data on their burden. The results could significantly enhance the identification and treatment of migraines and related psychiatric conditions in similarly resource-limited environments, thereby improving patient outcomes and decreasing disability.

METHODOLOGY

This cross-sectional study was performed in the Neurology Department of Bolan Medical Complex (BMC) Hospital in Quetta, Pakistan, from January 2023 to December 2024. Ethical approval was secured from the Institutional Review Board (IRB) of Bolan University of Medical and Health Sciences, Quetta (Ref: BUMHS-IRB-2023-589). The study followed the principles of the Declaration of Helsinki.

Participants

A consecutive cohort of 349 adult patients, with no age restrictions, diagnosed with migraine by a board-certified neurologist, was enlisted for this study. Consecutive sampling was employed to reduce selection bias and guarantee the inclusion of all eligible patients within the designated time window. Power calculations established the sample size of 349 to identify significant correlations among migraine characteristics, psychiatric comorbidities, and quality of life, considering the incidence of these diseases in analogous populations.

Inclusion Criteria

- Diagnosis of migraine (with or without aura, or chronic migraine) according to the International Classification of Headache Disorders, 3rd edition (ICHD-3)[23]. The ICHD-3 criteria were used to ensure diagnostic accuracy and consistency in defining migraine subtypes, which is crucial for valid comparisons.
- Willingness to provide informed consent, indicating their voluntary participation in the research.

Exclusion Criteria

- Secondary headaches (due to trauma, tumors, or infections). This exclusion criterion was important to isolate migraine as the primary headache disorder and to avoid confounding the results with other headache etiologies.
- Severe cognitive impairment or inability to complete interviews. This exclusion ensured the reliability of data collection, as patients needed to be able to understand the questionnaires and provide accurate responses.

Data Collection

Trained research assistants conducted in-person interviews and distributed structured questionnaires to collect data. Research assistants participated in a training program to standardize questionnaire delivery and interview approaches, thereby reducing inter-interviewer variability. The interviews were held in a discreet environment within the neurology OPD to guarantee patient privacy and comfort.

Statistical Analysis

Statistical analyses were performed utilizing SPSS version 28. Demographic and clinical data were reported using descriptive statistics, where continuous variables were shown as means ± SD or medians (IQR), as appropriate, and categorical variables as frequencies and percentages. Bivariate analyses utilized Chi-square or Fisher's exact tests for categorical data. Binary logistic regression determined predictors of mental comorbidities, with findings shown as adjusted odds ratios (aOR) and 95% confidence intervals (CI). All tests were performed with a significance level of $p < 0.05$.

RESULTS

The study comprised 349 patients diagnosed with migraine, with a mean age of 38.2 years (SD = 12.5), reflecting a considerable age range among the sample. A significant majority of the participants were female (70.8%), underscoring the higher incidence of migraine among women. The predominant ethnic groupings were Pashtun (34.1%, n = 119) and Baloch (24.4%, n = 85), indicating their substantial representation among the sample population. Educational attainment was notably low, as more than half of the participants (51.9%, n = 181) possessed no formal education beyond basic school, a significant aspect to consider for healthcare access and disease management. The distribution of migraine subtypes showed that 38.1% (n = 133) experienced migraine with aura, 45.0% (n = 157) experienced migraine without aura, and 16.9% (n = 59) suffered chronic migraine. The mean frequency of migraine episodes was 6.5 per month (SD = 3.2), with a duration averaging 12.1 hours (SD = 4.8). A significant percentage of participants (64.2%, n = 224) indicated feeling extreme pain intensity, highlighting the considerable impact of this illness on the study population (Table 1).
The research demonstrated a significant occurrence of psychiatric comorbidities in individuals with migraines. Depression was observed in 44.7% of individuals (n = 156), with a mean PHQ-9 score of 16.2 (SD = 5.8), signifying moderate to severe depressive symptoms in this subgroup. Anxiety was prevalent, impacting 38.1% of participants (n = 133), with a mean GAD-7 score of 12.4 (SD = 4.3), indicating moderate levels of anxiety.

Patients with chronic migraines demonstrated significantly higher prevalence rates of depression (67.8%, n = 40) and anxiety (61.0%, n = 36) in contrast to those with episodic migraines (depression: 40.0%, n = 116; anxiety: 33.4%, n = 97). This underscores the increased psychiatric burden linked to chronic migraine. Infrequent comorbidities were PTSD (12.0%, n = 42), bipolar disorder (8.0%, n = 28), and OCD (6.0%, n = 21) (Table 2). Although infrequent, these illnesses still constitute a considerable comorbidity burden in this population.

Participants with psychiatric comorbidities exhibited a higher incidence of migraine attacks (mean of 8.2 per month, SD = 3.6) in contrast to those without comorbidities (mean of 5.1 per month, SD = 2.1). Attacks persisted for a greater duration in individuals with comorbidities (mean of 14.5 hours, SD = 5.2) compared to those without (mean of 9.3 hours, SD = 3.8). Moreover, the prevalence of severe pain intensity was greater in patients with psychiatric comorbidities (77.6%, n = 166) compared to those without (42.2%, n = 57).

Stress was recognized as a more prevalent migraine trigger in patients with psychiatric comorbidities (88.8%, n = 190) than in those without (51.1%, n = 69). The migraine-related impairment, assessed using MIDAS, was twofold more in patients with psychiatric disorders (mean of 12.0 days per month, SD = 4.5) than in those without such disorders (mean of 6.0 days per month, SD = 2.8) (Table 3).

In adjusted logistic regression models, many predictors independently forecasted the presence of depression. Chronic migraine (aOR = 2.8, 95% CI: 1.9–4.0) emerged as a significant predictor, with female gender (aOR = 2.1, 95% CI: 1.4–3.2), illiteracy (aOR = 1.7, 95% CI: 1.1–2.6), and elevated stress levels (aOR = 3.5, 95% CI: 2.3–5.4). The findings indicate that individuals with chronic migraine, women, illiterate persons, and those with high stress levels are at a markedly increased risk for depression. Comparable correlations were identified for anxiety, with chronic migraine, female sex, illiteracy, and elevated stress serving as significant predictors. Nevertheless, low income (<$30,000) did not achieve statistical significance as a predictor of anxiety (aOR = 1.4, 95% CI: 0.9–2.1) (Table 4). Patients with psychiatric comorbidities exhibited significantly reduced quality of life scores in both the physical (SF-36: mean of 52.3, SD = 12.1 versus mean of 78.6, SD = 10.4) and mental health domains (SF-36: mean of 41.8, SD = 11.7 versus mean of 74.2, SD = 9.8) relative to those without comorbidities. These findings demonstrate a significant deterioration in overall well-being among migraine patients with concurrent psychiatric disorders. Migraine-related impairment, assessed by MIDAS, was substantially greater in patients with psychiatric disorders (mean of 12.0 days per month, SD = 4.5) compared to those without such disorders (mean of 6.0 days per month, SD = 2.8) (Table 5). This underscores the significant influence of psychiatric comorbidities on the everyday functioning and productivity of migraine patients.

Table 1

Baseline Demographic and Clinical Characteristics of Participants (N = 349)

Variable	Category/ Statistic	n (%)	Mean ± SD	Range
Age (years)	—	—	38.2 ± 12.5	18–65
Gender	Male	102 (29.2%)	—	—
	Female	247 (70.8%)	—	—
Ethnicity	Pashtun	119 (34.1%)	—	—
	Baloch	85 (24.4%)	—	—
	Hazara	55 (15.8%)	—	—
	Urdu-speaking	45 (12.9%)	—	—
	Other	45 (12.9%)	—	—
Education	Illiterate (Primary)	181 (51.9%)	—	—
	Secondary	90 (25.8%)	—	—
	Bachelor's	60 (17.2%)	—	—
	Postgraduate	18 (5.2%)	—	—
Socioeconomic Status	<50k Per Month	237 (67.9%)	—	—
	50–50*k*–70k	84 (24.1%)	—	—
	>70k	28 (8.0%)	—	—
Migraine Type	With Aura	133 (38.1%)	—	—
	Without Aura	157 (45.0%)	—	—
	Chronic	59 (16.9%)	—	—
Attack Frequency	Attacks/month	—	6.5 ± 3.2	1–15
Attack Duration	Hours/attack	—	12.1 ± 4.8	4–24
Severe Intensity	Yes	224 (64.2%)	—	

Table 2

Prevalence of Psychiatric Comorbidities

Disorder	Total (N = 349)	Mean Score (SD)	Chronic Migraine (n = 59)	Episodic Migraine (n = 290)
Depression (PHQ-9)	44.7% (156/349)	16.2 ± 5.8	67.8% (40/59)	40.0% (116/290)
Anxiety (GAD-7)	38.1% (133/349)	12.4 ± 4.3	61.0% (36/59)	33.4% (97/290)
Bipolar Disorder	8.0% (28/349)	—	15.3% (9/59)	6.6% (19/290)
PTSD	12.0% (42/349)	—	20.3% (12/59)	10.3% (30/290)
OCD	6.0% (21/349)	—	10.2% (6/59)	5.2% (15/290)

Table 3

Migraine Features Stratified by Psychiatric Comorbidity

Variable	With Comorbidity (n = 214)	Without Comorbidity (n = 135)
Attack Frequency	8.2 ± 3.6 attacks/month	5.1 ± 2.1 attacks/month
Attack Duration (hours)	14.5 ± 5.2	9.3 ± 3.8
Severe Intensity	77.6% (166/214)	42.2% (57/135)
Stress as Trigger	88.8% (190/214)	51.1% (69/135)
MIDAS Disability Days	12.0 ± 4.5 days/month	6.0 ± 2.8 days/month

Table 4

Multivariate Analysis – Adjusted Odds Ratios (aOR)

Predictor	Depression (aOR)	Anxiety (aOR)
Chronic Migraine	2.8 (1.9–4.0)	2.5 (1.7–3.6)
Female Gender	2.1 (1.4–3.2)	1.9 (1.2–2.8)
Illiteracy	1.7 (1.1–2.6)	1.6 (1.0–2.4)
Income <$30k	1.5 (1.0–2.3)	1.4 (0.9–2.1)
High Stress (PSS-10 >25)	3.5 (2.3–5.4)	3.1 (2.0–4.8)

Table 5

Quality of Life (SF-36) and Disability (MIDAS)

Metric	With Comorbidity (n = 214)	Without Comorbidity (n = 135)
SF-36 Physical Health	52.3 ± 12.1	78.6 ± 10.4
SF-36 Mental Health	41.8 ± 11.7	74.2 ± 9.8
MIDAS Disability Days	12.0 ± 4.5	6.0 ± 2.8

DISCUSSION

This study investigated the prevalence of psychiatric comorbidities and their correlation with migraine characteristics in a cohort of adult patients in Quetta, Pakistan. The results underscore a substantial prevalence of psychiatric illnesses among individuals with migraines, with critical implications for clinical management and healthcare planning in this area.

The primary finding of the study is the significant prevalence of psychiatric comorbidities among patients with migraines. The incidence of depression and anxiety aligns with findings from global studies, which indicate rates of 20-50% for these conditions within migraine populations (Antonaci et al., 2011). The prevalence of PTSD, bipolar disorder, and OCD was notable, highlighting the variety of psychiatric illnesses that may co-occur with migraine[24].

Multiple characteristics were identified as correlating with elevated probabilities of psychiatric comorbidity.

Chronic migraine, female sex, and elevated stress levels were recognized as significant predictors of both depression and anxiety. The correlation between chronic migraine and psychiatric conditions is well-documented, as individuals with chronic migraines endure a higher frequency and severity of headaches, potentially leading to the onset or worsening of mental health issues (Buse et al., 2018)[25]. The elevated incidence of psychiatric comorbidities in women with migraine aligns with other studies indicating that women are disproportionately impacted by both migraine and mood disorders (Jette et al., 2008)[26]. The correlation between elevated stress levels and psychiatric comorbidities underscores the significance of stress management in the holistic treatment of migraine sufferers (Kelman, 2007)[27].

This study revealed that migraine patients with psychiatric comorbidities encountered an increased frequency of migraine attacks, prolonged attack duration, and increased migraine-related disabilities. These findings align with the concept that psychiatric problems may intensify migraine symptoms and lead to a more severe and debilitating progression (Minen et al., 2016)[28]. Comorbid psychiatric problems may hinder patients' capacity to manage their migraines effectively, resulting in suboptimal treatment outcomes.

The results of this study align with earlier studies about the correlation between migraines and psychiatric issues[25, 29, 30]. This study offers significant insights into this interaction within a distinct socio-cultural environment. Previous studies in low- and middle-income countries (LMICs) have frequently indicated reduced prevalence of diagnosed psychiatric disorders relative to high-income nations, potentially due to factors including restricted access to mental health services, insufficient awareness, and cultural stigma associated with mental illness[31-33]. The findings of this study indicate that, notwithstanding these limitations, the prevalence of mental comorbidity among migraine patients in Pakistan is significant and equivalent to that seen globally.

This study possesses limitations. The cross-sectional design prevents the determination of causal links between migraines and psychiatric disorders. The dependence on self-report tools can cause recall bias, especially on the frequency and duration of migraines. The study sample was sourced from a single neurology department, perhaps constraining the generalizability of the findings to migraine patients in the wider community. Subsequent studies ought to utilize longitudinal methodologies and community-based sampling to mitigate these limitations and further clarify the intricate relationship between migraine and psychiatric illness.

CONCLUSION

This study underscores the significant interaction between migraines and psychiatric comorbidities in Quetta's unique sociocultural community, highlighting the necessity for integrated care methods that address both issues. Chronic migraine, female sex, low literacy, and socioeconomic disparities have been identified as significant risk factors, highlighting the influence of psychosocial stressors in exacerbating disability. The cross-sectional methodology restricts causal inferences; however, the findings support regular mental health screening in migraine care and culturally specific therapies for high-risk populations.

Future research should include longitudinal studies to elucidate temporal correlations and assess multimodal approaches. Addressing these difficulties with comprehensive, patient-centered strategies could alleviate disability and enhance quality of life in marginalized communities.

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