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PREVALENCE OF TEMPOROMANDIBULAR JOINT DISORDERS IN PATIENTS WITH CHRONIC MIGRAINE

Original Research

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ABSTRACT

Background: Chronic migraine is a debilitating neurological disorder frequently accompanied by comorbid conditions, including temporomandibular joint disorders (TMDs). Due to overlapping symptomatology and shared pathophysiological mechanisms such as central sensitization, TMD may influence the severity and management of chronic migraine. However, limited data exist regarding the prevalence and clinical profile of TMD in chronic migraine populations, particularly in South Asian contexts.

Objective: To determine the prevalence and clinical characteristics of temporomandibular joint disorders in individuals diagnosed with chronic migraine.

Methods: A cross-sectional study was conducted at a tertiary care medical and dental hospital in Lahore over an eight-month period (October 2024 to June 2025). A total of 210 patients aged 18–55 years with chronic migraine, diagnosed per ICHD-3 criteria, were evaluated for TMD using the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD). Data on TMD subtypes and pain-related disability were also collected using the Graded Chronic Pain Scale (GCPS). Statistical analysis was performed using SPSS v28.0 with a significance level of $p<0.05$.

Results: TMD was present in 94 of 210 chronic migraine patients (44.8%). Myofascial pain was the most common subtype (40.4%), followed by disc displacement (23.4%) and arthralgia (14.9%). Mixed-type TMD was observed in 21.3% of cases. Among TMD-positive patients, 33.0% exhibited Grade 3 disability and 18.1% were categorized in Grade 4 by GCPS.

Conclusion: TMDs, particularly pain-related subtypes, are highly prevalent in patients with chronic migraine. Early identification and multidisciplinary management of TMD may improve clinical outcomes and quality of life in this population.

Keywords: Chronic migraine, Comorbidity, Cross-sectional studies, Headache disorders, Myofascial pain, Temporomandibular joint disorders, Tertiary care.

INTRODUCTION

Chronic migraine represents a debilitating neurological condition characterized by frequent headache episodes occurring on 15 or more days per month, with at least eight of those having migrainous features. Affecting an estimated 1–2% of the global population, chronic migraine poses substantial personal and societal burdens, including diminished quality of life, impaired daily functioning, and increased healthcare utilization (1). While the primary pathology of migraine has long been ascribed to neurovascular dysfunction and central nervous system sensitization, recent attention has turned toward comorbid conditions that may influence its clinical presentation and treatment responsiveness (2). Among these, temporomandibular joint disorders (TMDs) have emerged as a particularly compelling area of investigation, given their overlapping symptomatology and potential shared pathophysiological mechanisms with migraine. Temporomandibular joint disorders encompass a range of conditions affecting the temporomandibular joint (TMJ), masticatory muscles, and associated structures (3). They are commonly associated with jaw pain, joint sounds, and limitations in mandibular movement. Epidemiological data suggest that TMDs affect up to 15% of the adult population, with a higher prevalence reported among women and individuals with chronic pain syndromes. Importantly, several clinical and experimental studies have highlighted a potential bidirectional relationship between TMD and migraine (4-6). For instance, both conditions have been independently associated with central sensitization, altered pain modulation, and heightened trigeminal system activation (5). This neurobiological convergence suggests a shared vulnerability that may not only exacerbate symptom severity but also complicate the diagnosis and treatment of either condition when they co-occur.

Moreover, observational research has demonstrated a disproportionately higher prevalence of TMD symptoms among patients with migraine, particularly in those with chronic forms. A study found that patients with migraine were significantly more likely to report TMD-related symptoms compared to headache-free controls (7). Similarly, a recent investigation reported an elevated incidence of myofascial pain and TMJ dysfunction among individuals with chronic migraine (8). These findings underscore the clinical significance of identifying comorbid TMDs in migraine populations, as their presence may affect the course and severity of headache episodes, contribute to treatment resistance, and necessitate a more multidisciplinary therapeutic approach (9). Despite these compelling associations, much of the existing literature has focused on episodic migraine or mixed headache samples, leaving a gap in knowledge regarding the specific prevalence and clinical profile of TMDs in individuals with chronic migraine. Furthermore, few studies have employed standardized diagnostic criteria for TMD, such as those outlined in the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), which limits the comparability and generalizability of findings across studies (10-12). In clinical practice, this lack of clarity often results in underdiagnosis or mismanagement of TMD symptoms in chronic migraine patients, which may perpetuate ongoing pain cycles and reduce treatment efficacy.

The biopsychosocial implications of this comorbidity are also noteworthy. Patients with both chronic migraine and TMD often experience increased disability, emotional distress, and reduced health-related quality of life. Their combined symptom burden can amplify perceived pain, complicate pharmacologic treatment strategies, and contribute to heightened psychological vulnerability. Identifying and characterizing this co-occurrence through well-designed studies is therefore not only of academic interest but of practical importance for improving patient outcomes. Given these considerations, the present cross-sectional study aims to determine the prevalence and clinical characteristics of temporomandibular joint disorders in individuals with chronic migraine. By employing standardized diagnostic tools and focusing exclusively on chronic migraine patients, this research seeks to fill a critical gap in the current understanding of migraine comorbidities. The objective is to provide evidence that may guide more comprehensive diagnostic practices and inform integrative treatment strategies tailored to the complex clinical profiles of these patients.

METHODS

This cross-sectional study was conducted over a period of eight months, from October 2024 to June 2025, at a tertiary care medical and dental hospital in Lahore. The objective was to determine the prevalence and clinical characteristics of temporomandibular joint disorders (TMDs) among individuals diagnosed with chronic migraine. The study was approved by the Institutional Review Board of the hospital and written informed consent was obtained from all participants prior to inclusion in the study. Participants were recruited

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from the neurology and dental outpatient departments of the hospital through purposive sampling. The sample size was calculated using the OpenEpi sample size calculator for cross-sectional studies, assuming an expected prevalence of TMDs in chronic migraine patients to be approximately 40%, with a 95% confidence interval and a 7% margin of error. This yielded a required sample size of 188 participants. To account for potential non-response or incomplete data, the final target was increased to 210 participants (2,3). Eligibility criteria included adults aged 18 to 55 years who had a confirmed diagnosis of chronic migraine as per the International Classification of Headache Disorders, 3rd edition (ICHD-3) criteria, which defines chronic migraine as headache occurring on 15 or more days per month for more than three months, with features of migraine on at least eight of those days. Exclusion criteria were the presence of other primary or secondary headache disorders (e.g., cluster headache, tension-type headache), a prior diagnosis of TMD, history of facial trauma, active systemic musculoskeletal disorders (such as fibromyalgia or rheumatoid arthritis), or recent use of muscle relaxants or analgesics beyond regular migraine management that might interfere with TMD assessment (13,14).

Data collection was performed in two phases. First, demographic and clinical data were obtained using a structured questionnaire that included age, gender, migraine duration, headache frequency, associated symptoms, and medication history. In the second phase, TMD diagnosis was conducted by trained dental clinicians using the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), a standardized tool widely employed in both clinical and research settings. The DC/TMD includes both a physical examination component (Axis I) and an evaluation of psychosocial status (Axis II), thereby offering a comprehensive view of TMD presentation. Axis I involved clinical examination of the jaw and associated musculature to assess for joint sounds, range of mandibular motion, pain on palpation, and deviations during opening or closing. Axis II evaluated the psychological and behavioral impact of orofacial pain using the Graded Chronic Pain Scale (GCPS) and the Jaw Functional Limitation Scale (JFLS) (15,16). To enhance diagnostic reliability, all examiners underwent calibration sessions prior to data collection, and inter-rater reliability was monitored throughout the study period. All data were recorded and managed using SPSS version 28.0. Continuous variables such as age, headache frequency, and duration of migraine were described using means and standard deviations.

Categorical variables, including gender, presence of TMD, and TMD subtype, were summarized using frequencies and percentages. Since the normality of the data was established through the Shapiro-Wilk test, parametric statistical analyses were applied. The primary outcome—prevalence of TMD among chronic migraine patients—was calculated as a proportion with a 95% confidence interval. To explore associations between TMD presence and clinical variables (e.g., gender, migraine frequency, pain intensity), independent t-tests and chi-square tests were employed. Logistic regression analysis was conducted to identify predictors of TMD presence, adjusting for age, gender, duration of migraine, and medication usage. Throughout the study, adherence to ethical standards was strictly maintained. Participants were informed of their right to withdraw at any point without any impact on their ongoing care. Confidentiality of personal health data was ensured by anonymizing all collected information and storing it in a password-protected database accessible only to the research team. All assessments and interviews were conducted in a private setting to preserve participant dignity and comfort. By integrating validated diagnostic tools, calibrated clinical assessment, and robust statistical analysis, this methodology was structured to yield reliable insights into the prevalence and clinical characteristics of TMD in the chronic migraine population. This approach ensures reproducibility while maintaining high ethical and clinical standards.

RESULTS

The study enrolled a total of 210 participants diagnosed with chronic migraine, with a mean age of 34.6 years (SD ± 7.2). Of these, 62 (29.5%) were male and 148 (70.5%) were female. The average duration of migraine was 6.2 years (SD ± 2.9), and the mean number of headache days per month was 19.3 (SD ± 3.5). Table 1 summarizes the demographic characteristics of the study population. Temporomandibular joint disorder was identified in 94 of the 210 participants, indicating a prevalence rate of 44.8%, whereas 116 participants (55.2%) were free from any TMD diagnosis (Table 2). This was visually represented in a pie chart showing the distribution of TMD presence within the chronic migraine cohort. Among the 94 individuals diagnosed with TMD, the most common subtype was myofascial pain, accounting for 38 cases (40.4%). Disc displacement was observed in 22 participants (23.4%), while arthralgia was noted in 14 cases (14.9%). Additionally, 20 individuals (21.3%) exhibited mixed types involving multiple TMD classifications (Table 3). These subtype distributions are illustrated in a bar chart for clarity and comparison. To evaluate the functional and psychosocial impact of TMD, the Graded Chronic Pain Scale (GCPS) was applied to all patients with confirmed TMD. None of the participants fell into Grade 0 (no pain). Grade 1 (low pain intensity, minimal interference) was reported in 18 participants (19.1%), while Grade 2 (high pain intensity, low interference) was observed in 28 (29.8%). A substantial proportion, 31 individuals (33.0%), experienced moderate limitations consistent with Grade 3, and 17 participants (18.1%) were categorized as Grade 4, reflecting high pain-related disability

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(Table 4). The data suggest a considerable burden of TMD among individuals with chronic migraine, with a substantial proportion experiencing moderate to severe pain interference in daily activities, as measured by GCPS.

Table 1: Demographic Characteristics of Participants (n = 210)

Variable	Value
Total Participants	210
Mean Age (years)	34.6
Gender (Male)	62 (29.5%)
Gender (Female)	148 (70.5%)
Mean Duration of Migraine (years)	6.2
Mean Headache Days/Month	19.3

Table 2: Prevalence of Temporomandibular Joint Disorder (TMD)

TMD Status	Frequency	Percentage
TMD Present	94	44.8%
TMD Absent	116	55.2%

Table 3: Distribution of TMD Subtypes Among Affected Participants (n = 94)

Subtype	Frequency	Percentage
Myofascial Pain	38	40.4%
Disc Displacement	22	23.4%
Arthralgia	14	14.9%
Mixed	20	21.3%

Table 4: Graded Chronic Pain Scale (GCPS) in TMD Patients (n = 94)

GCPS Grade	Frequency	Percentage
Grade 0	0	0%
Grade 1	18	19.1%
Grade 2	28	29.8%
Grade 3	31	33.0%
Grade 4	17	18.1%

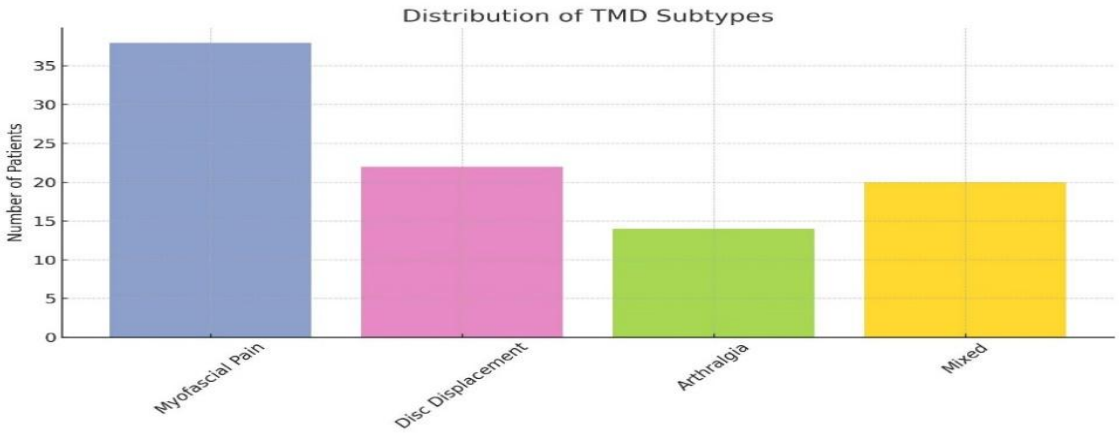

Figure 1 Distribution of TMD Subtypes

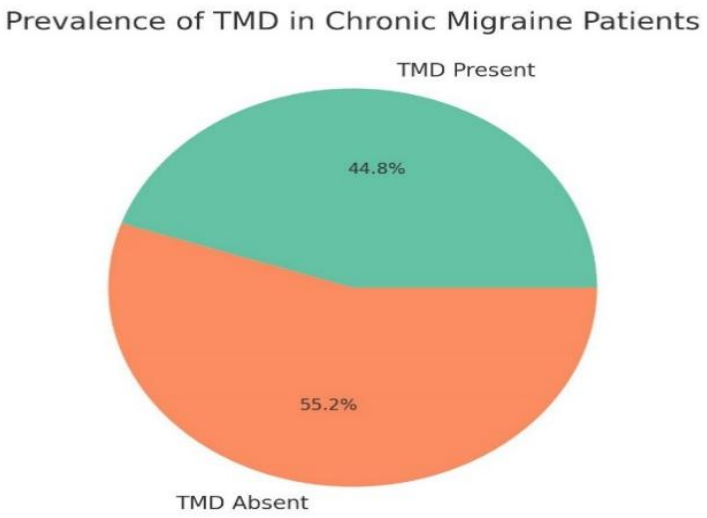

Figure 2 Prevalence of TMD in Chronic Migraine Patients

DISCUSSION

The results of this cross-sectional study demonstrated that temporomandibular joint disorders (TMDs) were present in 44.8% of patients with chronic migraine, with myofascial pain emerging as the most frequent subtype. These findings support the growing body of evidence that suggests a strong comorbidity between chronic migraine and TMDs, particularly pain-related forms of the disorder. The clinical implications of this relationship are considerable, as the coexistence of both conditions may amplify symptom burden and complicate treatment outcomes. Comparative data from earlier studies reinforce these observations. For instance, a prospective analysis revealed a significantly higher prevalence of TMD signs, including masticatory muscle tenderness and TMJ sensitivity, among chronic migraine patients compared to control groups, with 73% of chronic migraine patients exhibiting joint tenderness (14). Similarly, a study found that 30% of migraine sufferers exhibited clinical TMD signs, significantly higher than in tension-type headache patients (15). These outcomes align closely with the prevalence rates observed in the current study. Importantly, the subtype distribution observed—where myofascial pain accounted for over 40% of TMD cases—mirrors prior reports. A study emphasized a particularly strong association between muscular TMDs and migraine in female cohorts, suggesting that central sensitization may underpin the comorbidity (16). This interpretation is reinforced by findings from a study, who noted that masticatory muscle tenderness and increased headache frequency were key predictors of TMD-related headaches in chronic migraineurs (17).

The psychological and functional burden reported in this study, where nearly one-third of patients with TMD were classified in GCPS Grade 3 or higher, further emphasizes the debilitating nature of this comorbidity. Comparable findings were noted in a study, where over 50% of primary headache patients with TMD exhibited six or more clinical symptoms, strongly suggesting a shared pathophysiological mechanism, possibly involving chronic nociceptive activation and stress-related muscle tension (18,19). From a methodological standpoint, this study was strengthened by its exclusive focus on chronic migraine patients and the use of validated diagnostic tools (DC/TMD), ensuring standardization and replicability. Additionally, the multidisciplinary setting of a tertiary care hospital enhanced the diagnostic accuracy and clinical evaluation process. However, several limitations warrant consideration. First, the study's cross-sectional design restricts causal inferences. While the association between TMD and chronic migraine is evident, the temporal sequence remains unclear. Second, reliance on a hospital-based sample may limit generalizability to broader community populations. Third, psychosocial variables such as stress, anxiety, and sleep quality—factors known to influence both migraine and TMD—were not explicitly measured.

Another critical aspect is the gender disparity, with female predominance observed in both migraine and TMD cases. This mirrors patterns reported in other studies, who explored sex differences in the comorbidity and emphasized the role of hormonal fluctuations and altered nociceptive thresholds in female patients (19,20). These sex-based differences underscore the need for gender-sensitive approaches in clinical assessment and management strategies. Future research should explore the longitudinal trajectory of TMD in chronic migraine populations and evaluate whether targeted treatment of one condition alleviates the other. Integrating behavioral interventions, physical therapy, and pharmacologic strategies aimed at central sensitization may yield more favorable outcomes. It is also essential to assess the potential role of stress-induced bruxism as a mediating factor, as noted in recent case-based literature (21,22). In conclusion, this study reinforces the high prevalence and functional impact of temporomandibular disorders in chronic migraine patients, particularly myofascial subtypes. Acknowledging and assessing this comorbidity in routine migraine management is crucial to improving diagnostic precision and therapeutic outcomes.

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CONCLUSION

This study highlighted a substantial prevalence of temporomandibular joint disorders among patients with chronic migraine, with myofascial pain being the most common subtype. The findings underscore the importance of routine TMD screening in migraine management to enhance diagnostic accuracy and optimize patient care. Integrating multidisciplinary approaches may significantly improve outcomes in this clinically overlapping population.

AUTHOR CONTRIBUTION

Author	Contribution
Saiyyadah Tahzeeb*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Almeera Ashfaq	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Haifa Saquib Baqai	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Muhammad Adnan Aslam	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Syeda Batool Zehra Naqvi	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Naila Abdul Waheed	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Javeria Saeed	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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