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DIFFERENT TYPES OF HEADACH IN PATIENTS PRESENTING TO OUTPATIENT DEPARTMENT AT PAK EMIRATES MILITARY HOSPITAL, RAWALPINDI

Dr. Shabana Baloch[1], Prof. Dr. Khurram Haq Nawaz[2], Dr. Ijaz Alam[3], Dr. Anosha Tariq[4], Dr. Munawar Khan[5], Dr. Muhammad Jamil[6], Dr. Zahidullah[7],

[1, 3,4,5,6,7]*Resident Neurology Pak Emirate Military Hospital (PEMH), Rawalpindi*
[2,] *Professor of Medicine and* Neurology *Pak Emirate Military Hospital (PEMH), Rawalpindi*

[1]banobaloch88@gmail.com, [2]khurramhaq@gmail.com, [3]dr.ijazalam@gmail.com, [4]anoshatariq48@gmail.com, [5]khanmunawar188@gmail.com, [6]jamildawar76@gmail.com, [7]zahidullahzahid154@gmail.com,

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Corresponding Author: *
Dr. Shabana Baloch

Abstract

Background: *Headache disorders are among the leading causes of global neurological disability. However, clinical epidemiological data from Pakistan remain scarce, particularly regarding diagnostic patterns and comorbid profiles.* ***Objectives:*** *This study aimed to characterize the spectrum of primary headache disorders using the International Classification of Headache Disorders, 3rd edition (ICHD-3) criteria, in patients presenting to the Neurology Outpatient Department at Pak Emirates Military Hospital (PEMH), Rawalpindi.* ***Methods:*** *This prospective observational study was conducted between July 2024 and April 2025, enrolling 250 adult patients presenting with primary headache complaints. Patients with secondary headaches due to trauma, infections, or intracranial pathology were excluded. Data were collected through structured interviews conducted by trained neurologists and supplemented by medical record reviews. Variables included demographic characteristics, headache type and frequency, triggers, associated symptoms, comorbidities, and diagnostic history.*

Results: *Migraine was the most prevalent diagnosis (68.4%, n = 171), followed by tension-type headache (TTH, 24.8%, n = 62), medication-overuse headache (MOH, 4.4%, n = 11), and cluster headache (2.4%, n = 6). The cohort had a female predominance (72.8%) and a median age of 34 years (IQR: 25–49). Chronic daily headache (≥15 days/month) affected 28.8% of patients, with 64% being migraineurs. Menstruation was a major trigger among female migraineurs (95%), and migraine attacks were more likely to last >24 hours and be associated with photophobia (82.5%), nausea (76.6%), and vomiting (44.4%). Comorbidities included obesity (31.6%), hypertension (22.4%), and depression (18.8%), with obesity correlating positively with headache frequency (r = 0.24, p = 0.01). Misdiagnosis occurred in 14.8% of cases, primarily as sinusitis or temporomandibular joint disorders.*

Conclusion: *Migraine is the predominant primary headache disorder in Pakistani clinical cohort. The study highlights diagnostic challenges, high chronicity rates and significant comorbidities, emphasizing the need for improved adherence to ICHD-3 criteria and multidisciplinary headache management approaches.*

INTRODUCTION

Headache disorders are a significant global health concern, profoundly impacting individuals' quality of life and placing a substantial burden on healthcare systems. According to the Global Burden of Disease (GBD) study, migraine alone ranks as the second most prevalent disorder worldwide and seventh in terms of disability-adjusted life years [1]. The World Health Organization (WHO) similarly identifies headache disorders as a leading cause of global disability, with the greatest impact observed among working-age adults [1-2]. The economic consequences—stemming from direct healthcare costs and lost productivity—are considerable, reinforcing the importance of accurate diagnosis and timely management [2]. Despite this, headache disorders often remain underdiagnosed or misdiagnosed, particularly in low- and middle-income countries such as Pakistan, where clinical data remain limited.

Headaches are broadly classified as primary or secondary. Primary headaches occur independently and include migraine, tension-type headache (TTH) and cluster headache, while secondary headaches are symptomatic of underlying pathologies such as infections, trauma, or neoplasms [2]. Migraine is typically characterized by recurrent, unilateral, moderate-to-severe headaches lasting 4 to 72 hours and frequently accompanied by nausea, photophobia and phonophobia. Attacks often worsen with routine physical activity [3]. TTH, the most prevalent primary headache, presents as bilateral, pressing or tightening pain of mild to moderate intensity, usually without nausea or vomiting [3]. Cluster headaches, though less common, are marked by severe unilateral pain in the orbital region and associated autonomic symptoms such as lacrimation and nasal congestion [2].

The ICHD-3, provides a globally recognized framework for diagnosing primary headache disorders based on clinical characteristics [2]. These diagnostic criteria are crucial for differentiating primary headaches from secondary causes with overlapping features. However, in real-world clinical settings—especially those with limited neurological expertise or diagnostic infrastructure—accurate classification remains a challenge. Studies have shown that migraine is frequently misdiagnosed as sinusitis, temporomandibular joint (TMJ) disorders, or ocular strain, leading to inappropriate treatments and persistent symptoms [4].

In Pakistan, while population-based studies have highlighted a high prevalence of headache disorders, there is a paucity of clinical research exploring diagnostic accuracy, subtype distribution and comorbidities in healthcare settings [5-7]. Existing evidence suggests that psychiatric comorbidities such as depression and anxiety, along with obesity, are frequently associated with chronic headache disorders, further complicating diagnosis and management [6-8]. Moreover, hormonal fluctuations—particularly during menstruation, pregnancy, and menopause—have been shown to significantly exacerbate migraine in women [9-11].

This study aimed to fill these gaps by evaluating the clinical profiles, diagnostic patterns, and associated comorbidities of patients presenting with headache using ICHD-3 criteria, to assess the prevalence of primary headache subtypes, accuracy of diagnoses and influence of demographic and systemic factors.

MATERIALS AND METHODS

This prospective observational study was conducted at Neurology Outpatient Department of PEMH, Rawalpindi, Pakistan, over a two-year period from July 2024 to April 2025. The primary objective was to assess the clinical profiles, diagnostic patterns, and prevalence of various primary headache disorders among patients attending the neurology clinic.

Ethical approval was obtained from the Institutional Review Board of PEMH prior to study initiation. Informed consent was obtained from all participants, who were assured of confidentiality and the voluntary nature of their participation.

A total of 250 consecutive adult patients (aged ≥18 years) presenting with primary headache complaints were enrolled. Patients with secondary headaches

attributed to trauma, infections, intracranial pathology, or other neurological conditions were excluded. Recruitment continued until the target sample size of 250 was achieved.

Data collection involved structured face-to-face interviews conducted by trained neurologists, supplemented by a detailed review of each patient's medical records. The interview captured comprehensive data on headache characteristics, including frequency, duration, intensity, laterality, and associated symptoms such as nausea, vomiting, photophobia, and phonophobia. Additional information on potential headache triggers, prior diagnostic history, family history of headache disorders, and presence of comorbidities was also recorded (Figure 1).

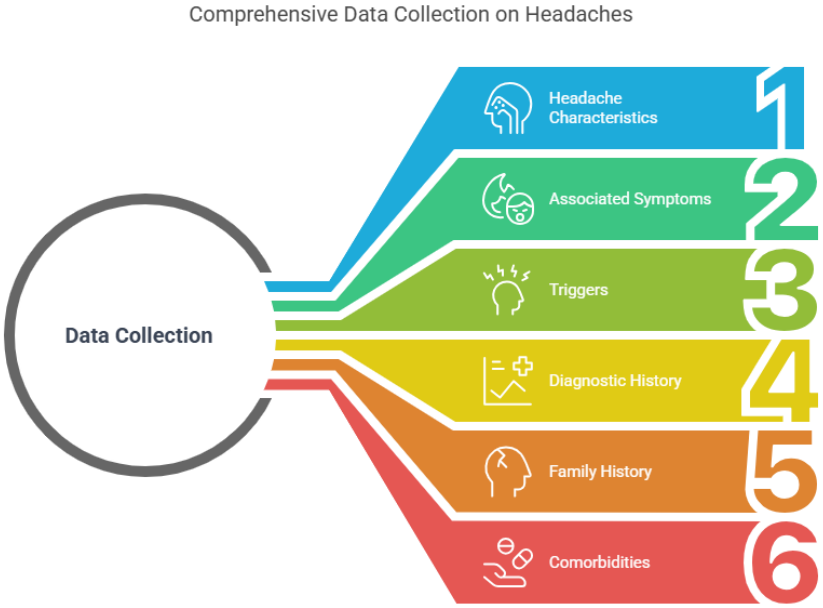

Figure 1: Data Collection Tools for Headache

Diagnosis

Headache classification was based on the ICHD-3.

- Migraine was diagnosed when patients reported at least five attacks lasting 4–72 hours with at least two of the following features: unilateral location, pulsating quality, moderate to severe intensity, and worsening with physical activity.
- Tension-Type Headache (TTH) was diagnosed when patients reported at least ten episodes of bilateral, pressing or tightening headache lasting 30 minutes to 7 days, without significant nausea or aggravation by routine activity.
- Cluster Headache was identified based on at least five attacks of severe unilateral orbital or temporal pain lasting 15–180 minutes, accompanied by autonomic features such as lacrimation or nasal congestion.

Comorbidities such as hypertension, depression, and obesity were documented. The association between these conditions and headache frequency was also evaluated.

Data were analyzed using SPSS version 26. Descriptive statistics were computed for demographic and clinical variables. Continuous variables were summarized as means and standard deviations, while categorical variables were presented as frequencies and percentages. Group comparisons were performed using chi-square tests for categorical variables and independent t-tests for continuous variables. Correlation analyses were conducted to assess relationships between headache frequency and comorbidities. A binary logistic regression model was applied to identify predictors of chronic headache, defined as headache occurring on ≥15 days per month.

RESULTS

The demographic characteristics of the study population, revealing a clear female predominance, with 72.8% of the 250 participants being women. The mean age of the cohort was 34.6 years, and the majority of patients (52.4%) belonged to the 25–44 age group, followed by 28.4% in the 45–64 age range. Notably, female representation was consistently high across all age groups, particularly among young adults and middle-aged individuals, suggesting a potential gender-related predisposition to primary headache disorders (Table 1).

Migraine was the most frequently diagnosed condition, accounting for 68.4% of all cases, with an average age of 33.1 years and a strong female predominance (73.1%). Tension-type headache was the second most common, representing 24.8% of cases, and exhibited slightly higher average age and a more balanced gender ratio. Medication-overuse headache and cluster headache were relatively rare, comprising 4.4% and 2.4% of the cohort, respectively. MOH patients tended to be older, while cluster headache showed equal gender distribution, though the absolute number of cases was small (Table 2).

Migraine was characterized by a median of 12 headache days per month and prolonged attack duration, often exceeding 24 hours. The majority of migraine patients reported associated symptoms such as photophobia (82.5%), nausea (76.6%), and vomiting (44.4%), with 64% experiencing chronic headache defined as 15 or more days per month. In contrast, TTH patients reported higher frequency of headache days (median 18) but shorter attacks and milder symptomatology. MOH cases demonstrated high chronicity (81.8%) and moderate symptom burden, highlighting the clinical significance of medication overuse in persistent headache presentations. Cluster headache, although infrequent, presented with intense symptomatology, including universal photophobia and nausea, and a high incidence of vomiting, despite having the shortest attack duration (Table 3). Menstruation emerged as the predominant trigger, reported by 95% of women, underscoring the strong hormonal influence in migraine pathophysiology. Stress was identified by 62% of participants, followed by sleep deprivation (56%) and specific food items (47%). These findings highlight the multifactorial nature of migraine triggers in women, with both physiological and lifestyle-related factors contributing significantly to migraine onset (Figure 2).

Stress was the leading trigger, cited by 78% of patients, followed by poor posture at 64%, indicating the impact of psychosocial and ergonomic factors. Environmental factors such as noise or lighting were reported by 45%, while sleep disturbances were identified by 34% (Figure 3). Among patients with medication-overuse headache (MOH), obesity (46%) and hypertension (36%) were notably prevalent, indicating a significant association with metabolic and cardiovascular risk factors. In migraine patients, obesity (35%) and depression (30%) were more common, while anxiety (19%) and hypertension (20%) were less prominent. TTH showed a moderate comorbidity profile, with obesity (28%) and hypertension (25%) being more frequent than depression or anxiety (both ~15%). Interestingly, cluster headache patients demonstrated a relatively balanced distribution across comorbidities, with hypertension (50%) being the most dominant. Overall, the total population showed obesity as the most prevalent comorbidity (32%), followed by hypertension (22%), depression (19%), and anxiety (17%) (Figure 4). Out of all misdiagnosed cases, sinusitis was the most commonly incorrect diagnosis, reported in 12 cases (32.4%), followed by temporomandibular joint disorders (TMJ) in 9 cases (24.3%). In total, 37 patients (14.8% of the cohort) were initially misdiagnosed, underscoring the need for increased adherence to standardized criteria such as ICHD-3 to reduce diagnostic error and improve headache management (Figure 5).

Table 1. Demographic Characteristics of the Study Cohort (n = 250)

Age Group (Years)	Frequency (n)	Percentage (%)	Mean Age ± SD	Male (n)	Female (n)	Female Proportion (%)
18–24	12	4.8	21.8 ± 1.9	3	9	75.0

25–44	131	52.4	33.5 ± 5.2	34	97	74.0
45–64	71	28.4	52.7 ± 5.1	20	51	71.8
≥65	36	14.4	68.1 ± 3.6	11	25	69.4
Total	**250**	**100**	**34.6 ± 11.2**	**68**	**182**	**72.8**

Table 2. Distribution of Headache Types, Age Profiles, and Gender Patterns

Headache Type	Frequency (n)	Proportion (%)	Mean Age ± SD (Years)	Median Age (IQR)	Female (n)	Female Proportion (%)
Migraine	171	68.4	33.1 ± 9.2	33 (25–47)	125	73.1
Tension-Type Headache (TTH)	62	24.8	36.4 ± 10.5	36 (28–50)	36	58.1
Medication-Overuse Headache (MOH)	11	4.4	40.7 ± 11.3	39 (31–51)	7	63.6
Cluster Headache	6	2.4	32.5 ± 6.2	33 (28–37)	3	50.0
Total	**250**	**100**	**34.6 ± 11.2**	–	**182**	**72.8**

Table 3. Headache Characteristics by Subtype: Frequency, Duration and Associated Symptoms

Headache Type	Median Headache Days/Month (IQR)	Median Attack Duration (Hours, IQR)	Photophobia (%)	Nausea (%)	Vomiting (%)	Chronic Headache ≥15 Days/Month (%)
Migraine	12 (8–18)	24 (18–48)	82.5	76.6	44.4	64.0
Tension-Type Headache (TTH)	18 (10–24)	12 (8–16)	35.7	28.6	5.0	14.0
Medication-Overuse Headache (MOH)	18 (12–24)	10 (8–14)	50.0	54.5	36.4	81.8
Cluster Headache	6 (4–8)	2.0 (1.5–3)	100	100	83.3	16.7

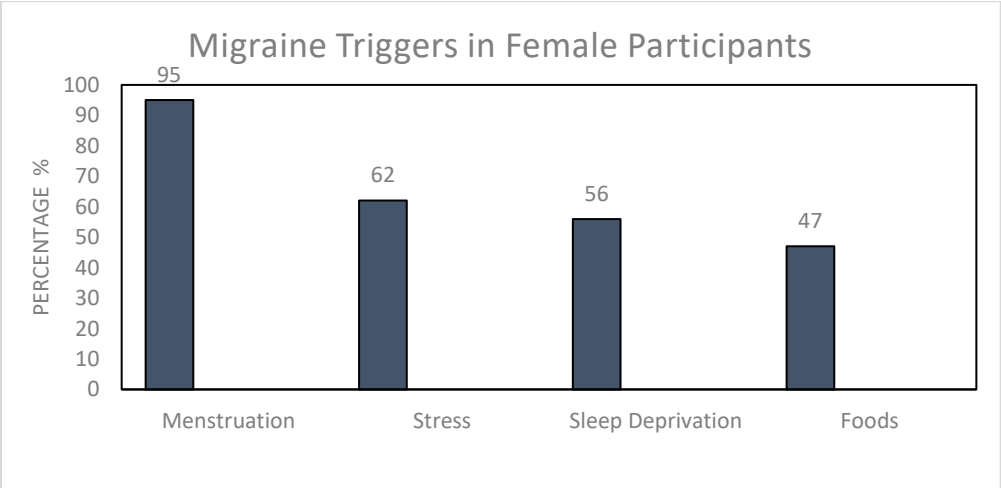

Figure 2: Migraine Triggers in Female Participants (n = 182)

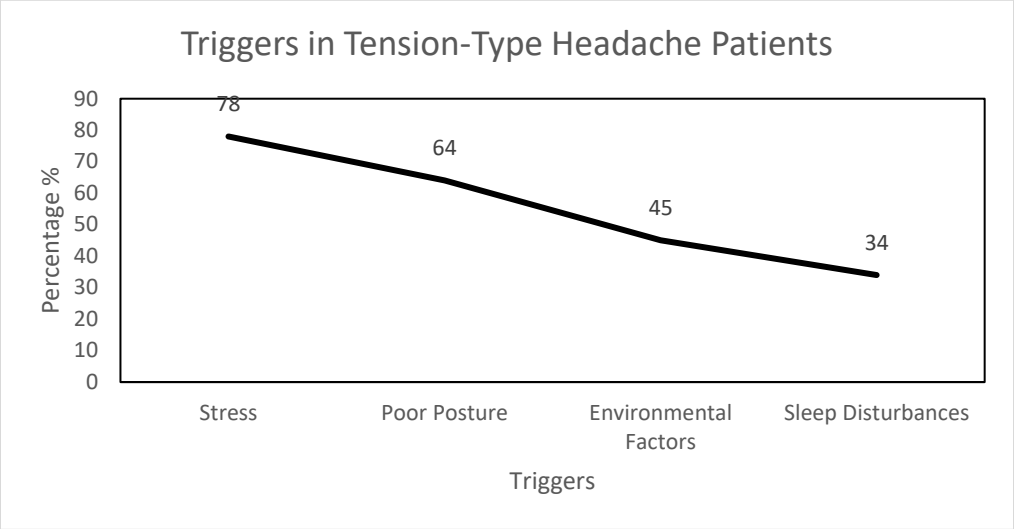

Figure 3: Common Triggers in Tension-Type Headache Patients

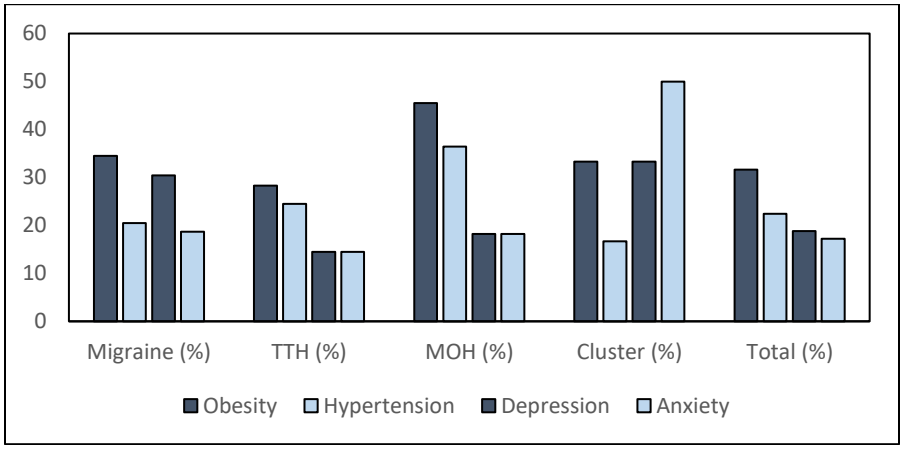

Figure 4: Prevalence of Comorbidities in Study Participants

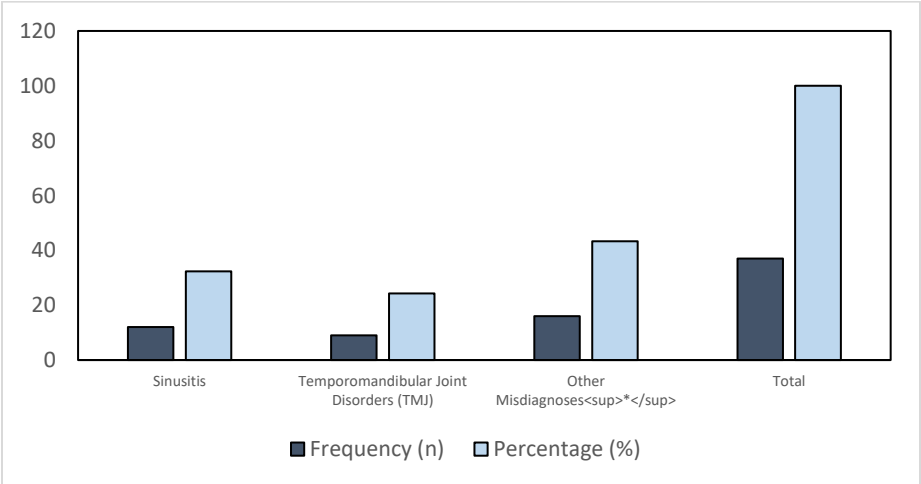

Figure 5: Distribution of Misdiagnoses among Headache Patients

DISCUSSION

Headache disorders, particularly migraine and TTH, constitute a significant public health burden globally, and this trend is mirrored in the Pakistani population. Our findings revealed that migraine was the most prevalent headache disorder (68.4%), followed by TTH (24.8%), which is consistent with global epidemiological trends indicating migraine as a leading cause of years lived with disability [8-9]. This high prevalence underscores the substantial impact of migraine on healthcare systems and the urgency of effective diagnostic and therapeutic strategies [10].

A marked gender disparity was observed, with women comprising 72.8% of the study cohort. This finding aligns with global literature demonstrating higher migraine prevalence in females, largely attributed to hormonal variations [11-12]. Supporting this, menstruation was identified as a migraine trigger by 95% of female participants, reinforcing the well-documented association between hormonal fluctuations and migraine exacerbation [13-14].

Our study also revealed a high burden of comorbid conditions among migraine patients, particularly depression (30.4%), anxiety (18.7%), and obesity (34.5%). These associations are consistent with previous studies that link psychiatric and metabolic disorders to increased migraine frequency and severity [15-16]. Depression and anxiety are recognized contributors to poorer migraine outcomes and may serve as both triggers and consequences of chronic pain states [17]. Additionally, we observed a positive correlation between obesity and headache frequency ($r = 0.24$, $p = 0.01$), echoing the findings of Lutz & Willi (2022) [18], who reported a similar relationship in population-based studies.

A particularly concerning finding was the 14.8% rate of misdiagnosis, with sinusitis (32.4%) and TMJ disorders (24.3%) being the most common incorrect diagnoses. This highlights a diagnostic gap, especially for patients with atypical or overlapping symptoms. Similar patterns have been reported in other clinical studies, which attribute such errors to limited awareness of standardized diagnostic criteria in primary care settings [19-20]. These findings emphasize the importance of systematic implementation of (ICHD-3 for accurate and reproducible diagnosis [21].

Furthermore, our data revealed that 28.8% of participants experienced chronic daily headache (≥15 headache days/month), with the majority being migraineurs (64%). This figure is comparable to global estimates of chronic migraine, which affects approximately 2–3% of the general population [22-23]. Chronic headaches are particularly disabling and are associated with higher healthcare utilization and functional impairment. Given the high proportion of female patients with hormonally influenced migraines and chronicity, hormonal modulation and preventive therapy may offer effective long-term solutions, as supported by recent research [18-19].

Taken together, these findings underscore the need for multidisciplinary management approaches that address both the neurological and systemic components of headache disorders. Integrating mental health screening, weight management, and hormonal assessment into clinical pathways may improve outcomes and reduce the risk of chronification in patients with primary headache disorders.

This single-center study limits external generalizability, particularly to rural or non-specialist settings. The use of self-reported data introduces potential recall bias, and psychiatric comorbidities were not evaluated using standardized diagnostic tools. Future studies should employ multi-center designs, standardized psychometric assessments, and objective diagnostic protocols to enhance the precision and applicability of findings across diverse clinical contexts.

CONCLUSION

This study demonstrates that migraine and TTH are the predominant headache disorders in Pakistan, with a substantial comorbidity burden and a high rate of diagnostic inaccuracy. The findings emphasize the critical need for standardized diagnostic application, particularly ICHD-3 criteria, to reduce misclassification. The high prevalence of chronic headache and hormonally mediated triggers among females underscores the importance of individualized, multidisciplinary management approaches. Enhanced clinician awareness and targeted research into region-specific risk factors are essential to optimize diagnostic precision and therapeutic outcomes.

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