Original Research

Clinical Spectrum of Primary Headache Disorders at a Tertiary-Care Hospital in Eastern India: A Prospective Observational Study

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ABSTRACT

Background: Primary headache disorders are leading contributors to disability worldwide, but prospective regional data from Eastern India remain limited. Our objective was to describe the sociodemographic profile, clinical characteristics, triggers, disability, and treatment patterns; and to explore factors associated with moderate to severe disability.

Methods: A Prospective, observational study was conducted in a tertiary-care teaching hospital over 12 months. Consecutive adults (18–65 years) meeting International Classification of Headache Disorders, 3rd Edition primary-headache criteria were included, and patients who refused to give consent were excluded. Case-record form captured demographics, phenotype, monthly headache days (MHDs), intensity (visual analogue scale), triggers, and disability (Migraine Disability Assessment [MIDAS]/ Headache Impact Test-6 [HIT-6]). Analyses included descriptive summaries, group comparisons, and multivariable logistic regression for predictors of moderate-severe disability (MIDAS III-IV).

Results: We enrolled 420 adults, of whom 286 (68.1%) were female; the mean age was 33 ± 11 years. The phenotype distribution was migraine in 269 (64.0%) – including 210 without aura, 59 with aura, and 32 chronic – tension-type headache in 134 (31.9%) – 110 episodic and 24 chronic – and cluster headache in 17 (4.0%). Common features included unilateral pain in 298 (71.0%), throbbing quality in 290 (69.0%), nausea/vomiting in 244 (58.1%), photophobia in 260 (61.9%), phonophobia in 239 (56.9%), and aura in 59 (14.0%). Frequently reported triggers were stress 260 (62.0%), sleep loss 206 (49.0%), fasting 130 (31.0%), menstruation 132/286 (46.2% of women), weather change 118 (28.1%), caffeine withdrawal 67 (16.0%), and screen exposure 155 (36.9%). Disability was substantial with MIDAS 12 (IQR 6–25), Grade III–IV in 193 (46.0%), and HIT-6 severe in 172 (41.0%), while medication-overuse headache affected 50 (12.0%). In multivariable analysis, higher MHDs (adjusted odds ratio 1.45 per 5-day increase), medication overuse (2.10), anxiety/depression (1.82), and female sex (1.39) independently predicted moderate–severe disability, all $P \leq 0.045$.

Conclusions: Migraine predominated and conferred substantial disability. Addressing modifiable triggers and MOH, routine disability screening, and timely preventive therapy may reduce burden.

Keywords: Disability, India, medication overuse, migraine disability assessment, migraine, observational study, tension-type headache

INTRODUCTION

Headache disorders are among the most common neurological complaints in practice and a leading cause of years lived with disability worldwide. Within this spectrum, migraine and tension-type headache (TTH) are the dominant primary phenotypes, while trigeminal autonomic cephalalgias such as cluster headache, though less prevalent, impose disproportionately high pain and functional burden.[1-3] Global Burden of Disease analyses consistently place migraine among the top causes of disability across ages and sexes – and the single most disabling condition in young women – with profound social and economic implications.[2,3] In low- and middle-income countries, including India, this burden is magnified by diagnostic barriers, gaps in access to evidence-based therapy, cultural perceptions of pain, and health-system priorities that favor acute, life-threatening conditions over chronic neurological disorders.[4]

India's primary headache epidemiology is heterogeneous across regions, urban–rural settings, and

levels of care. Community work from Eastern India indicates high migraine prevalence with substantial unmet need and disability; yet much of the national evidence is cross-sectional or retrospective, limiting insight into clinical nuance and health-seeking behavior.[4] Phenotypic distinctions – migraine with versus without aura, chronic versus episodic forms, and the boundary with medication-overuse headache (MOH) – are often blurred in routine care, especially with over-the-counter or fixed-dose combination use. Tertiary-care patients commonly present with more refractory disease, longer illness duration, and comorbid anxiety/depression – factors individually and collectively linked to worse outcomes.[6,9-11]

Accurate phenotyping anchored to the International Classification of Headache Disorders, 3rd Edition (ICHD-3) remains essential for clinical decision-making and research comparability.[1] Consistent application distinguishes primary from secondary headaches and guides therapy – choice of acute agents (triptans vs. simple analgesics), indications for prevention (β-blockers, topiramate, amitriptyline, flunarizine), and referral for advanced options (onabotulinumtoxinA, calcitonin gene-related peptide [CGRP]–pathway therapies).[8-12] Alongside pharmacology, contemporary care emphasizes identifying and modifying precipitating factors – stress, sleep disruption, fasting/dehydration, menstruation, and excessive screen exposure – highly relevant in South Asian contexts and amenable to counseling and behavioral interventions.[5,7,8]

Disability quantification with the Migraine Disability Assessment (MIDAS) and Headache Impact Test (HIT-6) adds a necessary dimension by capturing functional consequences beyond attack frequency [Appendix A]. MIDAS Grades III–IV correlate with lost productivity and quality-of-life impairment and often signal the need to escalate prevention and deliver structured education on medication limits to avert MOH.[8-12] MOH, a preventable e driver of chronification arising from frequent acute-medication use – including non-prescription analgesics – is associated with poorer treatment response and greater disability; systematic identification with supervised withdrawal plus initiation of prevention is central to a public-health approach in India.[10,11]

Against this backdrop, we designed a prospective, observational study in a tertiary-care teaching hospital in Eastern India to: (i) characterize the demographic and clinical profile of adults with primary headaches – phenotypes, symptoms, triggers, disability, and treatment patterns; and (ii) identify independent predictors of moderate–severe disability, focusing on modifiable factors such as monthly headache days (MHDs) and medication overuse. A prospective design allows standardized ICHD-3 phenotyping and contemporaneous capture of triggers and disability, reflecting real-world practice in a resource-constrained yet academically active setting. By situating our findings within the broader literature on epidemiology, chronification risk, MOH, and the expanding therapeutic landscape – including CGRP-targeted options – we aim to bridge global guidelines and regional realities and to inform implementable hospital-based pathways adaptable to community care.[6,8-12]

MATERIALS AND METHODS

A Single-center, prospective, observational study over 12 months (June 2023–May 2024) in the Neurology outpatient services of a tertiary-care teaching hospital in Eastern India.

Adults aged 18–65 years with primary headache per ICHD-3 were included in the study. Exclusions included secondary headache causes, major confounding neurologic/psychiatric conditions, pregnancy-related secondary causes, and refusal of consent.[1]

Institutional Ethics Committee approval obtained; written informed consent secured, and study conducted in accordance with the Declaration of Helsinki and ICMR guidelines.[4]

We recorded demographic data; headache phenotype (migraine with/without aura, chronic migraine; episodic/chronic TTH; cluster headache); MHDs; pain intensity (Visual Analogue Scale [VAS] 0–10); associated symptoms and triggers; disability (MIDAS total and grade; HIT-6); treatment patterns; and MOH per ICHD-3 thresholds.[1,8-12]

Data were summarized with descriptive statistics; group differences were tested using t-tests/analysis of variance (or non-parametric equivalents) and χ^2/Fisher's exact tests, while predictors of moderate–severe disability (MIDAS grade III–IV) were evaluated through multivariable logistic regression, with two-sided $P < 0.05$ denoting significance; values are shown as mean±SD or median (IQR) as appropriate.

RESULTS

We enrolled 420 adults (female 286 [68.1%]; urban 256 [61.0%]). Mean age was 33 ± 11 years; median illness duration 4 years (IQR 2–8). Median MHDs were 6 (IQR 3–12), with mean VAS intensity 7.2 ± 1.6 [Table 1].

Migraine accounted for 269 (64.0%) cases – without aura 210 (78.1% of migraine), with aura 59 (21.9%), and chronic migraine 32 (11.9% of migraine). TTH comprised 134 (31.9%) – episodic 110 (82.1%) and chronic 24 (17.9%). Cluster headache was identified in 17 (4.0%) [Table 2].

Unilateral pain (298, 71.0%), throbbing quality (290, 69.0%), nausea/vomiting (244, 58.1%), photophobia (260, 61.9%), and phonophobia (239, 56.9%) were common. Aura was reported by 59 (14.0%): visual 42 (10.0%), sensory 13 (3.1%), and speech 4 (1.0%). Cutaneous

Table 1: Baseline demographics and clinical summary (*n*=420)

Variable	Overall	Migraine	Tension-type	Cluster	*P*-value
Age, years (mean±SD)	33±11	32±10	34±11	35±12	0.18
Female, *n* (%)	286 (68.1)	201 (74.7)	76 (56.7)	9 (52.9)	0.002
Urban residence, *n* (%)	256 (61.0)	167 (62.1)	79 (58.9)	10 (58.8)	0.78
Duration of illness, years, median (IQR)	4 (2–8)	5 (2–9)	3 (2–6)	4 (2–8)	0.04
Monthly headache days, median (IQR)	6 (3–12)	8 (5–14)	5 (3–8)	10 (6–18)	<0.001
Visual analogue scale intensity (0–10)	7.2±1.6	7.6±1.5	6.5±1.4	8.2±1.3	<0.001

VAS: Visual analogue scale, IQR: Interquartile range

Table 2: Headache phenotype distribution and frequency

Phenotype	*n* (%)	Episodic (%)	Chronic (%)	Monthly headache day, median (IQR)
Migraine without aura	210 (50.0)	—	—	8 (5–13)
Migraine with aura	59 (14.0	—	—	9 (6–15)
Chronic migraine	32 (7.6) of total; 11.9 of migraine	—	—	15 (12–20)
Tension-type headache	134 (31.9)	82.1	17.9	5 (3–8)
Cluster headache	17 (4.0)	—	—	10 (6–18)

allodynia occurred in 97 (23.1%), and cranial autonomic symptoms in 29 (6.9%)[1,3-6] [Table 3].

Stress (260, 62.0%), sleep deprivation/shift work (206, 49.0%), fasting/dehydration (130, 31.0%), menstruation (132/286, 46.2% of women), weather change (118, 28.1%), caffeine withdrawal (67, 16.0%), and screen exposure (155, 36.9%) predominated[5,7,8] [Table 3].

MIDAS median 12 (IQR 6–25); 193 (46.0%) had Grade III–IV disability. HIT-6 severe category included 172 (41.0%). Any acute therapy was used by 386 (92.0%), predominantly non-steroidal anti-inflammatory drugs/acetaminophen (357, 85.0%); triptan use was 118 (28.1%), and ergot/combination 25 (6.0%). Preventive therapy was ongoing in 164 (39.0%): β-blockers 80 (19.0%), topiramate 59 (14.0%), amitriptyline 88 (21.0%), and others 38 (9.0%). MOH affected 50 (12.0%)[8-12] [Table 4].

In multivariable analysis, higher MHD, MOH, anxiety/depression, and female sex were independently associated with moderate–severe disability (MIDAS III–IV), while age was not. Model discrimination was acceptable [Table 5].

Table 3: Clinical features and reported triggers

Item	*n* (%)
Clinical features	
Unilateral pain	298 (71.0)
Throbbing/pulsating	290 (69.0)
Nausea/vomiting	244 (58.1)
Photophobia	260 (61.9)
Phonophobia	239 (56.9)
Aura (any)	59 (14.0)
Visual	42 (10.0)
Sensory	13 (3.1)
Speech/language	4 (1.0)
Cutaneous allodynia	97 (23.1)
Cranial autonomic symptoms	29 (6.9)
Triggers	
Stress/psychosocial	260 (62.0)
Sleep deprivation/shift work	206 (49.0)
Fasting/dehydration	130 (31.0)
Menstruation (women only)	132/286 (46.2)
Weather change	118 (28.1)
Caffeine/alcohol withdrawal	67 (16.0)
Screen exposure	155 (36.9)

DISCUSSION

In this prospective tertiary-care cohort from Eastern India, migraine was the dominant primary headache phenotype (≈ two-thirds), followed by TTH and a smaller but clinically relevant cluster-headache subset. Women comprised about two-thirds of the sample, mirroring international and Indian epidemiology and reflecting biological susceptibility and health-seeking patterns.[1-4] Within migraine, ≈20% reported aura and ≈12% met criteria for chronic migraine, indicating a meaningful burden of frequent attacks in hospital-attending patients. MHDs were higher in migraine than TTH and highest in cluster headache, paralleling greater VAS intensity – gradients that inform triage, follow-up intervals, and preventive-therapy decisions.

Associated features followed classic syndromic patterns – unilateral throbbing pain with nausea/vomiting,

Table 4: Disability (MIDAS/HIT-6) and treatment patterns

Measure	Value
MIDAS total, median (IQR)	12 (IQR 6–25)
MIDAS Grade III–IV, *n* (%)	193 (46.0)
HIT-6 severe, *n* (%)	172 (41.0)
Work/school days missed, median (IQR)	3 (IQR 1–7)
Any acute therapy, *n* (%)	386 (92.0)
Non-steroidal anti-inflammatory drugs/ acetaminophen	357 (85.0)
Triptans	118 (28.1)
Ergot/combination	25 (6.0)
Any preventive therapy, *n* (%)	164 (39.0)
β-blocker	80 (19.0)
Topiramate	59 (14.0)
Amitriptyline	88 (21.0)
Other (specify)	38 (9.0)
Medication-overuse headache, *n* (%)	50 (12.0)

MIDAS: Migraine Disability Assessment, HIT-6: Headache Impact Test-6

Table 5: Predictors of moderate–severe disability (logistic regression)

Predictor	Adjusted odds ratio (95% CI)	*P*-value
Monthly headache days (per 5-day increase)	1.45 (1.25–1.68)	<0.001
Medication overuse headache	2.10 (1.36–3.25)	0.001
Anxiety/depression	1.82 (1.22–2.71)	0.003
Female sex	1.39 (1.01–1.92)	0.045
Age (per 10 years)	0.94 (0.80–1.10)	0.44

photophobia, and phonophobia – while cutaneous allodynia occurred in about one-quarter. Because allodynia reflects central sensitization and predicts poorer acute-treatment response and higher disability, explicitly screening for it is useful in routine care.[3,6,8] Auras were predominantly visual, with fewer sensory or speech phenomena; an overall ≈14% aura prevalence aligns with population estimates, though vascular mimics should be excluded in emergency settings.[1]

Trigger profiles – stress, sleep loss/shift work, fasting or dehydration, menstrual association, weather changes, caffeine withdrawal, and prolonged screen exposure – map to contemporary lifestyle factors in urbanizing Indian contexts.[5,7,8] These are actionable: brief behavioral counseling, sleep-hygiene reinforcement, pragmatic workplace advice, and perimenstrual mini-prevention can be integrated into standard care; ergonomic measures and timed screen breaks are reasonable adjuncts.

Disability was substantial: nearly half had MIDAS Grade III–IV and two-fifths were in the severe HIT-6 category. In multivariable models, higher MHD, MOH, and anxiety/depression independently predicted moderate–severe disability.[6,9-11] Female sex showed a modest association after adjustment, while age was not independently related, underscoring the primacy of modifiable factors (attack frequency, medication patterns, mental health).[13,14]

Therapeutically, acute care relied mainly on NSAIDs/acetaminophen, with low triptan utilization – highlighting access barriers and safety misconceptions. Education on early treatment at pain onset, dose caps to prevent MOH, and judicious antiemetic use can improve outcomes. Preventive therapy penetration was <40%, with amitriptyline, β-blockers, and topiramate as cost-effective mainstays in resource-constrained settings; escalation to on a botulinum toxin A or CGRP-pathway agents remains limited by affordability but can be high-value for selected patients.[8-16]

MOH (≈12%) is both prevalent and modifiable. Embedding simple pill-count screening and explicit monthly limits (<10 days for triptans/combination analgesics; <15 for simple analgesics) helps prevention; when present, planned withdrawal with bridge therapy and concurrent preventive initiation should be routine. Given MOH's correlation with mood symptoms, integrating brief PHQ-9/GAD-7 screening and referral pathways is pragmatic.[10,11]

Strengths include a prospective design, standardized ICHD-3 phenotyping, validated disability instruments, and consecutive tertiary-care recruitment. Limitations include single-center generalizability, self-reported triggers (recall bias), potential residual confounding (e.g., socioeconomic access), and absence of longitudinal outcomes.

Implications: make disability tools (MIDAS/HIT-6) routine to guide stepped care; proactively counsel on trigger management; include written analgesic ceilings at every discharge; and embed brief mental-health screening in neurology clinics. At a system level, ensuring reliable triptan access and affordable preventives is low-hanging fruit; nurse-led education and digital reminders for medication limits and sleep hygiene could scale impact. Future work should test the cost-effectiveness of stepped prevention, evaluate culturally tailored behavioral interventions, and define implementation strategies for MOH prevention within India's mixed health system.

CONCLUSION

Our cohort demonstrates that in an Eastern Indian tertiary context, migraine predominates and disability is driven by modifiable and identifiable factors. Systematic phenotyping, vigilant prevention of medication overuse, and targeted use of preventive therapy – combined with

brief behavioral and mental-health interventions – offer a practical path to reducing the burden of primary headaches in the region.

REFERENCES

1. Headache classification committee of the international headache society (IHS). The international classification of headache disorders. 3rd edition. Cephalalgia 2018;38:1-211.
2. GBD 2019 diseases and injuries collaborators. Global burden of 369 diseases and injuries in 204 countries, 1990-2019. Lancet 2020;396:1204-22.
3. Steiner TJ, Stovner LJ, Jensen R, Uluduz D, Katsarava Z, Lifting The Burden: The Global Campaign against Headache. Migraine remains second among the world's causes of disability, and first among young women: Findings from GBD2019. J Headache Pain 2020;21:137.
4. Ray BK, Paul N, Hazra A, Das S, Ghosal MK, Misra AK, *et al*. Prevalence, burden, and risk factors of migraine: A community-based study from Eastern India. Neurol India 2017;65:1280-8.
5. Turner DP, Leffert LR, Houle TT. Appraisal of headache trigger patterns using calendars. Headache 2020;60:370-9.
6. Balasubramanian B, Nair VS, George N, Reddy A, Thomas PT, Kulkarni GB. A bio-psychosocial framework for chronic daily headaches: A mixed methods study. J Patient Exp 2021;8:23743735211049672.
7. Seng EK, Martin PR, Houle TT. Lifestyle factors and migraine. Lancet Neurol 2022;21:911-9.
8. Gawde P, Shah H, Patel H, Bharathi KS, Patel N, Sethi Y, *et al*. Revisiting migraine: The evolving pathophysiology and the expanding management armamentarium. Cureus 2023;15:e34553.
9. Lipton RB, Buse DC, Nahas SJ, Tietjen GE, Martin VT, Löf E, *et al*. Risk factors for migraine disease progression: A narrative review for a patient-centered approach. J Neurol 2023;270:5692-707.
10. Özge A, Baykan B, Biçakçı Ş, Ertaş M, Atalar AÇ, Gümrü S, *et al*. Revolutionizing migraine management: Advances and challenges in CGRP-targeted therapies and their clinical implications. Front Neurol 2024;15:1402569.
11. Gaul C, Visscher CM, Bhola R, Sorbi MJ, Galli F, Rasmussen AV, *et al*. Team players against headache: Multidisciplinary treatment of primary headaches in medication overuse headache. J Headache Pain 2011;12:511-9.
12. Blumenfeld A, Lipton RB, Silberstein SD, Tepper SJ, Charleston L 4th, Landy S, *et al*. Multimodal migraine management and the pursuit of migraine freedom: A narrative review. Neurol Ther 2023;12:1533-58.
13. Weatherall MW. The diagnosis and treatment of chronic migraine. Ther Adv Chronic Dis 2015;6:115-23.
14. Bigal ME, Lipton RB. What predicts the change from episodic to chronic migraine? Curr Opin Neurol 2009;22:269-76.
15. Delussi M, Vecchio E, Libro G, Quitadamo S, De Tommaso M. Failure of preventive treatments in migraine: An observational retrospective study in a tertiary headache center. BMC Neurol 2020;20:256.
16. Oh S, Kang J, Park H, Cho SJ, Hong Y, Kang MK, *et al*. Three-month treatment outcome of medication-overuse headache according to classes of overused medications, use of acute medications, and preventive treatments. Sci Rep 2024;14:66906.

APPENDIX

Appendix A: MIDAS and HIT-6 Scoring Guides

- A1. Migraine Disability Assessment (MIDAS)

Reference period: past 3 months. Sum of Items 1–5 gives MIDAS total. Higher scores indicate greater disability.

Item	Question	Response (days)
1	Days of missed work/school	__
2	Days with productivity reduced by half or more at work/school (not counted in Item 1)	__
3	Days of missed household work	__
4	Days with productivity reduced by half or more in household work (not counted in Item 3)	__
5	Days missed of family, social, or leisure activities	__

Grade	Score range	Interpretation
I	0–5	Little or no disability
II	6–10	Mild disability
III	11–20	Moderate disability
IV	≥21	Severe disability

- A2. Headache Impact Test (HIT-6)

Six items scored 6 (never) to 13 (always); total range 36–78. Higher scores indicate greater impact.

Score	Impact category	Interpretation
36–49	Little or no impact	Minimal functional effect
50–55	Some impact	Mild-to-moderate effect
56–59	Substantial impact	Significant limitations
60–78	Severe impact	Major limitations; consider preventive therapy