

Clinical Patterns, Risk Factors, Diagnostic Utilization, and Short-Term Outcomes of Headache Disorders: A Prospective Observational Study of 450 Patients Attending a Neurosurgical Outpatient Clinic in Iraq

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Abstract

Background: Headache disorders are among the most common neurological conditions worldwide and represent a major cause of disability and healthcare utilization. Data regarding headache patterns and treatment outcomes in Iraqi outpatient neurosurgical settings remain limited. **Objectives:** To evaluate the distribution of headache disorders associated risk factors, diagnostic approaches, and short-term treatment outcomes among patients attending a private neurosurgical clinic in Iraq. **Materials and Methods:** A prospective observational study was conducted between June 1, 2025, and December 1, 2025. A total of 450 consecutive patients presenting with headaches were enrolled. Diagnoses were established according to the International Classification of Headache Disorders, Third Edition (ICHD-3). Demographic characteristics, headache subtype, risk factors, imaging findings, and treatment outcomes were recorded. Statistical analysis was performed using descriptive and comparative methods, with statistical significance defined as $p < 0.05$. **Results:** The study included 276 females (61.3%) and 174 males (38.7%), with a mean age of 34.8 ± 12.6 years. Tension-type headache was the most common diagnosis (39.1%), followed by migraine (34.0%), cervicogenic headache (12.0%), medication-overuse headache (7.1%), cluster headache (3.1%), and secondary headaches (4.7%). Stress and sleep disturbance were identified in 62% of patients, while family history was reported in 48% of migraine cases. Clinical improvement was observed in 72% of tension-type headache patients, 65% of migraine patients, 78% of cervicogenic headache patients, 69% of medication-overuse headache patients, and 57% of cluster headache patients. **Conclusion:** Primary headache disorders constituted the majority of cases in this Iraqi outpatient population. Appropriate clinical assessment and individualized treatment strategies resulted in favorable short-term outcomes for most patients.

Keyword: Headache, Migraine, Tension-type headache, Cervicogenic headache, Medication-overuse headache, Cluster headache.

Introduction

Headache disorders affect more than half of the global population and are among the leading causes of years lived with disability worldwide [1]. Migraine alone ranks among the most disabling neurological disorders, particularly among individuals of working age [2]. Primary headache disorders, including migraine and tension-type headache (TTH), account for the majority of clinical presentations, whereas

secondary headaches require careful evaluation to exclude potentially serious underlying pathology [3]. The International Classification of Headache Disorders, Third Edition (ICHD-3), provides standardized diagnostic criteria that improve diagnostic accuracy and facilitate epidemiological comparisons between populations [4]. Multiple biological, environmental, and psychosocial factors contribute to headache occurrence, including stress, sleep disturbances,

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hormonal influences, genetic susceptibility, and medication overuse [5,6]. Although headache disorders have been extensively investigated globally, regional data from Iraq remain limited. Understanding the epidemiological profile and treatment outcomes of headache disorders in local populations may improve clinical management and healthcare planning. Therefore, the present study aimed to evaluate headache patterns, associated risk factors, diagnostic utilization, and short-term treatment outcomes among patients attending a private neurosurgical clinic in Iraq.

Materials and Methods

Study Design and Setting

This prospective observational study was conducted at a private neurosurgical outpatient clinic in Iraq between June 1, 2025, and December 1, 2025.

Study Population

A total of 450 consecutive patients presenting with headache as the primary complaint were included.

Inclusion Criteria

- Age ≥ 12 years.
- Primary complaint of headache.
- Complete clinical records and follow-up data.

Exclusion Criteria

- Intracranial tumors.
- Central nervous system infections.
- Postoperative headache syndromes.
- Incomplete clinical data.

Data Collection

Patient demographics, headache subtype according to ICHD-3 criteria, duration, frequency, precipitating factors, neurological examination findings, imaging studies, treatment

modalities, and follow-up outcomes were recorded.

Statistical Analysis

Data were analyzed using SPSS software version 27. Continuous variables were expressed as mean $\pm$ standard deviation, whereas categorical variables were presented as frequencies and percentages. Associations between categorical variables were assessed using Chi-square testing. Statistical significance was considered at $p < 0.05$.

Ethical Approval

The study protocol was reviewed and approved by the Scientific and Research Ethics Committee of Hammurabi College of Medicine, University of Babylon (Approval No. 237). Written informed consent was obtained from all participants or their legal guardians before enrollment in the study. All procedures were conducted in accordance with the ethical standards of the institutional research committee and the principles of the Declaration of Helsinki.

Results

The study included 450 patients, comprising 276 females (61.3%) and 174 males (38.7%). The mean age was 34.8 ± 12.6 years.

Table 1: Demographic Characteristics

Variable	Value
Total patients	450
Females	276 (61.3%)
Males	174 (38.7%)
Mean age	34.8 ± 12.6 years
Age range	12-72 years

Tension-type headache represented the most common diagnosis (39.1%), followed by migraine (34.0%), cervicogenic headache

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(12.0%), medication-overuse headache (7.1%), cluster headache (3.1%), and secondary headache disorders (4.7%).

Table 2: Distribution of Headache Types

Headache Type	N (%)
Tension-type headache	176 (39.1%)
Migraine	153 (34.0%)
Cervicogenic headache	54 (12.0%)
Medication-overuse headache	32 (7.1%)
Cluster/TAC headaches	14 (3.1%)
Secondary headaches	21 (4.7%)

Females predominated among migraine patients (72%), whereas cervicogenic headache and cluster headache were more frequent among males.

Table 3: Gender Distribution Across Headache Types

Headache Type	Female %	Male %
Tension-type	57%	43%
Migraine	72%	28%
Cervicogenic	39%	61%
Cluster	29%	71%
MOH	63%	37%

Stress and sleep disturbance were the most commonly identified risk factors (62%). Family history was reported by 48% of migraine patients. Cervical spondylosis or poor posture was documented in 74% of patients with cervicogenic headache, while analgesic overuse was present in all medication-overuse headache cases.

Table 4: Risk Factors and Triggers

Risk Factor	Percentage
Stress / sleep disturbance	62%

Family history (migraine)	48%
Cervical spondylosis / poor posture	74%
Excess analgesic use (MOH)	100%
Smoking (cluster)	57%

MRI was performed in 26.2% of patients, CT scanning in 8.6%, cervical radiography in 14.2%, and no imaging was required in 50.8%.

Table 5: Diagnostic Tests Performed

Diagnostic Test	N (%)
MRI Brain	118 (26.2%)
CT Head	39 (8.6%)
Cervical X-ray	64 (14.2%)
No imaging required	229 (50.8%)

Follow-up assessment demonstrated favorable outcomes across headache categories, with improvement rates ranging from 57% to 78%.

Table 6: Treatment Outcomes (4–8 Weeks)

Diagnosis	Improvement (%)
Tension-type headache	72% improved 50%
Migraine	65% reduction in monthly days
Cervicogenic headache	78% clinical improvement
Medication-overuse	69% successful withdrawal
Cluster headache	57% symptom control

Discussion

This study provides insight into the clinical profile of headache disorders encountered in a private neurosurgical outpatient setting. The distribution of headache types closely aligns with contemporary global epidemiological data, in which tension-type headache (TTH) and migraine represent the most prevalent primary headache disorders [7,8]. The relatively high prevalence of TTH (39.1%) observed in this cohort is consistent with population-based

burden estimates and outpatient studies, reflecting the substantial contribution of psychosocial stress, sleep disturbances, and musculoskeletal strain to headache pathophysiology in clinical practice [9,10]. Migraine accounted for 34% of cases and demonstrated a clear female predominance, in agreement with extensive evidence indicating higher migraine prevalence among women. This sex disparity has been attributed to hormonal influences, particularly estrogen fluctuations, along with genetic susceptibility and sex-specific differences in trigeminovascular pain modulation pathways [8,11]. The age distribution, with peak occurrence between 20 and 40 years, corresponds to the reproductive age group, during which hormonal variability is considered a major triggering factor for migraine attacks [8,11]. Cervicogenic headache was more frequently observed among males (61%), a finding that may be explained by greater occupational physical strain, higher prevalence of cervical musculoskeletal disorders, and posture-related biomechanical stress. This pattern is consistent with clinical literature from spine and rehabilitation settings, where cervicogenic headache is commonly associated with cervical spondylosis and degenerative changes of the cervical spine [12]. Medication-overuse headache (MOH) was identified in 7.1% of patients, representing an important secondary headache subtype. This finding highlights persistent gaps in patient awareness regarding safe analgesic use and reflects a well-recognized global concern in headache medicine [10,13]. MOH remains a preventable condition, and current guidelines emphasize structured withdrawal strategies combined with patient education to reduce recurrence and chronicity [13]. Cluster headache remained uncommon (3.1%), consistent with its low global prevalence and well-documented male predominance.

Despite its rarity, it represents one of the most disabling primary headache disorders and is associated with substantial impairment in quality of life [12,14]. Analysis of risk factors demonstrated that stress was the most prominent trigger, particularly in TTH patients, supporting the established role of psychosocial stress in central sensitization and increased pericranial muscle tension [9,10]. Family history was significantly associated with migraine, reinforcing its strong genetic and neurobiological basis [11]. In cervicogenic headache, cervical spondylosis, poor posture, and prolonged mechanical strain were the dominant contributing factors, highlighting the importance of ergonomic and occupational health interventions in prevention strategies. Regarding diagnostic evaluation, neuroimaging was appropriately reserved for patients presenting with atypical features or red-flag symptoms, in accordance with international recommendations discouraging routine imaging in typical primary headache presentations [13,15]. More than half of patients were managed without imaging, emphasizing the diagnostic value of clinical assessment and supporting cost-effective and evidence-based neurological practice. Treatment outcomes were generally favorable across headache subtypes. Patients with TTH responded well to nonsteroidal anti-inflammatory drugs combined with lifestyle modification. Migraine patients benefited from both acute and preventive pharmacological therapies. Cervicogenic headache showed significant improvement following physiotherapy and postural correction. Patients with MOH demonstrated satisfactory improvement following structured withdrawal protocols, although this subgroup required closer follow-up and multidisciplinary management. These findings are consistent with current evidence supporting individualized, multimodal headache management approaches [13,15].

Conclusion

Headache disorders in this clinical population followed international epidemiological patterns, with tension-type headache and migraine being the most common. Risk factors such as stress, cervical abnormalities, and analgesic overuse contributed significantly to symptom burden. Appropriate clinical evaluation, selective imaging, and structured treatment approaches resulted in substantial improvement for most patients. These findings highlight the importance of early diagnosis, patient education, and personalized management plans.

Conflict of Interest

The authors state that they have no conflicts of interest.

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