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Original Article

Prevalence of Probable Migraine and Episodic Tension-Type Headache among Working Adults and their association with Headache-Related Quality of Life in Lahore, Pakistan.

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Abstract

Background:

Migraine and episodic tension-type headache (ETTH) are among the most common primary headache disorders worldwide and represent a major cause of disability, impaired productivity, and reduced quality of life among working-age populations. Despite their substantial public health burden, epidemiological evidence regarding headache-related disorders among working adults in Pakistan remains limited. This study aimed to estimate the prevalence of probable migraine and probable ETTH among working adults in Lahore, Pakistan, and to evaluate their association with headache-related quality of life across physical, social, and mental domains.

Methodology:

A descriptive cross-sectional study was conducted among 320 working adults using convenience sampling. Data were collected using the Headache Screening Questionnaire (HSQ) and the Comprehensive Headache-Related Quality of Life Questionnaire (CHQQ). Since HSQ is a screening instrument and not a diagnostic tool, all classifications were interpreted as probable headache-related conditions rather than clinically confirmed diagnoses. Statistical analysis was performed using the Mann–Whitney U test and Kruskal–Wallis H test. A p-value of <0.05 was considered statistically significant.

Results:

Among the participants, 35.9% demonstrated features suggestive of probable ETTH, while 16.3% demonstrated features suggestive of probable migraine. Approximately 32.8% of participants showed no headache-related features. Migraine-like symptom profiles were associated with significantly poorer overall headache-related quality of life compared with ETTH-related symptoms ($p < 0.001$). Females demonstrated significantly greater impairment in quality of life than males ($p < 0.05$). Domain-wise analysis further revealed significant differences in physical, social, and mental quality of life dimensions, particularly among participants with migraine-related symptoms. No consistent statistically significant associations were observed with age, marital status, sleep duration, or working hours.

Conclusion:

The findings demonstrate a considerable burden of headache-related symptoms among working adults, with probable migraine associated with greater functional and psychological impairment than probable ETTH.

Keywords:

Migraine, Episodic Tension-Type Headache, Headache-Related Quality Of Life, Working Adults, Screening, Occupational Health

Introduction

Primary headache disorders, particularly migraine and episodic tension-type headache (ETTH), are among the most prevalent neurological disorders globally and contribute substantially to disability, impaired daily functioning, and reduced quality of life. Although these disorders are rarely life-threatening, their recurrent nature and chronic burden significantly affect occupational productivity, emotional well-being, and social functioning. Headache disorders are especially important among working-age populations, where they contribute to absenteeism, presenteeism, reduced concentration, decreased efficiency, and economic loss. Consequently, migraine and ETTH are increasingly recognized as major public health concerns worldwide.

Migraine is a complex neurovascular and neurobiological disorder characterized by recurrent attacks of moderate-to-severe headache, commonly unilateral and pulsating in nature, often accompanied by nausea, vomiting, photophobia, and phonophobia. In some individuals, transient neurological symptoms known as aura may precede headache onset. Migraine is influenced by multiple biological, genetic, hormonal, environmental, and psychosocial factors. Epidemiological evidence indicates that migraine affects approximately 10–20% of the global population and occurs more frequently among females, particularly during reproductive years [1]. The disorder most commonly affects individuals during their most productive years of life, thereby contributing significantly to functional disability and socioeconomic burden.

Episodic tension-type headache (ETTH), in contrast, is generally characterized by bilateral, pressing, or tightening headache pain of mild-to-moderate intensity and is usually not associated with severe neurological symptoms such as nausea or sensory hypersensitivity. ETTH is considered the most common primary headache disorder worldwide, with prevalence estimates ranging from 30–40% in adult populations [2]. Although ETTH is often considered less disabling than migraine, recurrent episodes may still impair concentration, emotional well-being, workplace productivity, and overall quality of life.

Several shared risk factors have been identified for both migraine and ETTH, including psychological stress, sleep disturbances, fatigue, prolonged working hours, irregular dietary habits, dehydration, and environmental stimuli such as noise and bright light. Occupational stress is particularly recognized as an important precipitating factor among working adults. However, migraine is more strongly associated with neurovascular mechanisms, sensory hypersensitivity, and hormonal fluctuations, whereas ETTH is more commonly linked to musculoskeletal tension, stress, and psychosocial strain.

The burden of headache disorders extends beyond pain symptoms and has multidimensional effects on quality of life. Individuals suffering from recurrent headaches frequently report physical limitations, reduced work performance, emotional distress, impaired interpersonal relationships, and decreased participation in social activities. Studies using validated assessment instruments such as the Migraine Disability Assessment Scale (MIDAS), WHOQOL-BREF, and headache-related quality of life tools have consistently demonstrated substantial impairment among individuals with migraine and tension-type headache [3,4]. Migraine, in particular, has been associated with moderate-to-severe disability, workplace absenteeism, reduced productivity, and significant economic losses.

Global epidemiological studies have demonstrated considerable variation in the prevalence of migraine and tension-type headache

across populations due to differences in diagnostic approaches, demographic characteristics, and study methodology. Migraine prevalence estimates range between 2.6% and 21.7% worldwide, while tension-type headache remains the most prevalent headache disorder overall [1]. Population-based studies consistently demonstrate higher prevalence rates among females, supporting the role of hormonal and biological influences in headache pathophysiology [5]. Similarly, headache-related disability has been widely reported among occupational populations exposed to high workload, irregular work schedules, and chronic stress.

Despite the increasing global recognition of headache disorders as an important neurological and public health concern, there remains limited epidemiological evidence from Pakistan, particularly among working adult populations. Existing local studies have primarily focused on students or clinical populations and have rarely examined both migraine and ETTH simultaneously in relation to quality of life outcomes [6,7]. Furthermore, under-recognition of headache disorders, limited access to healthcare services, and widespread self-medication practices may contribute to inadequate diagnosis and management in developing countries.

An important methodological consideration in community-based headache research is the distinction between screening-based classification and definitive clinical diagnosis. The Headache Screening Questionnaire (HSQ) is a validated epidemiological screening tool designed to identify individuals with features suggestive of migraine or tension-type headache; however, it does not establish clinical diagnosis according to the International Classification of Headache Disorders (ICHD-3) criteria [8]. Therefore, the present study uses the terms “probable migraine” and “probable episodic tension-type headache (ETTH)” to accurately reflect screening-based classification rather than clinically confirmed disorders. This distinction is important for accurate interpretation of prevalence estimates and aligns with methodological standards in epidemiological headache research.

Given the limited occupational epidemiological data available from Pakistan, the present study was designed to estimate the prevalence of probable migraine and probable ETTH among working adults in Lahore, Pakistan, and to evaluate their association with headache-related quality of life across physical, social, and mental dimensions. By providing screening-based evidence regarding headache burden in occupational populations, this study aims to contribute toward improved awareness, early identification strategies, workplace health interventions, and policies aimed at reducing headache-related disability and improving quality of life among working adults.

Methodology

Study Design

A descriptive cross-sectional study was conducted to estimate the prevalence of probable migraine and probable episodic tension-type headache (ETTH) among working adults and to evaluate their association with headache-related quality of life. The study utilized a questionnaire-based approach to assess headache characteristics, screening-based headache classification, and multidimensional quality of life outcomes in occupational settings.

Ethics

Ethical principles were strictly followed throughout the study. Participation was entirely voluntary, and informed consent was obtained from all participants before data collection. Participants

were informed regarding the objectives of the study, confidentiality of responses, and their right to withdraw from participation at any stage without penalty. Anonymity was maintained by avoiding the collection of personally identifiable information, and all collected data were used solely for academic and research purposes. The study procedures were conducted in accordance with ethical standards for human participant research.

Setting

The study was conducted in Lahore, Pakistan, among working adults recruited from different occupational environments. Data collection was carried out in workplace and community settings where participants were accessible during the study period. The selected setting provided access to a diverse working population with varying occupational schedules, lifestyle characteristics, and work-related stress exposures, which are considered important factors associated with primary headache disorders.

Participants

The study included working adults aged 20 years and above. Individuals currently engaged in occupational activities and willing to participate were eligible for inclusion. Participants who submitted incomplete questionnaires or provided insufficient responses required for headache classification and quality of life assessment were excluded from the final analysis. A total of 320 complete responses were included in the study analysis.

Variables

The primary dependent variable was headache-related quality of life, assessed across physical, social, and mental domains. The primary independent variable was headache classification based on the Headache Screening Questionnaire (HSQ), including probable migraine, probable episodic tension-type headache (ETTH), and no headache-related features. Additional demographic and lifestyle variables included gender, age, marital status, average working hours, sleep duration, daily meal frequency, and tea/coffee consumption. These variables were evaluated to determine their association with headache-related quality of life outcomes.

Data Sources / Measurement

Data were collected using a structured self-administered questionnaire comprising demographic information and two validated assessment instruments. The Headache Screening Questionnaire (HSQ) was used to identify participants with features suggestive of probable migraine or probable episodic tension-type headache (ETTH). The HSQ is a validated screening instrument designed for epidemiological assessment and does not provide definitive clinical diagnosis according to the International Classification of Headache Disorders (ICHD-3) criteria. Therefore, all headache classifications in the present study were interpreted as probable or screening-based headache categories rather than clinically confirmed diagnoses [8]. The Comprehensive Headache-Related Quality of Life Questionnaire (CHQQ) was used to assess the impact of headache symptoms on physical, psychological, and social dimensions of quality of life. The CHQQ is a validated multidimensional instrument specifically developed for headache-related functional assessment [9]. Participants completed the questionnaires independently, and all responses were reviewed for completeness and consistency before inclusion in the final statistical analysis.

Bias

Several measures were considered to minimize potential bias during the study. Standardized validated questionnaires were used to improve consistency of data collection and reduce measurement

variability. However, because the study relied on self-reported responses, the possibility of recall bias and response bias cannot be excluded. Participants may have underreported or overreported headache symptoms and lifestyle behaviors due to subjective interpretation or difficulty recalling previous headache experiences. Selection bias may also have occurred because convenience sampling was employed, limiting equal representation of all occupational groups. Furthermore, since screening tools rather than clinical diagnostic interviews were used, misclassification bias may have occurred in categorizing headache disorders.

Study Size

The required sample size was initially calculated as 382 participants based on prevalence estimation requirements and statistical considerations. However, due to incomplete questionnaires and exclusion of insufficient responses, 320 complete questionnaires were included in the final analysis. Despite the reduced sample size, the final dataset remained adequate to perform the planned inferential statistical analyses and compare headache-related quality of life outcomes between groups.

Quantitative Variables

Quantitative variables included age, headache frequency, headache duration, headache days per month, working hours, sleep duration, meal frequency, tea/coffee intake, and quality of life scores. For analytical purposes, several continuous variables were categorized into clinically and epidemiologically meaningful groups. Age was categorized into predefined age intervals, while headache frequency and headache duration were categorized according to questionnaire response options. Quality of life outcomes were analyzed using ranked scores generated from CHQQ responses.

Statistical Methods

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize demographic characteristics, headache-related variables, and screening-based headache classifications. Frequencies and percentages were calculated for categorical variables. Since the data did not meet assumptions of normal distribution, non-parametric statistical tests were applied. The Mann-Whitney U test was used for comparison between two independent groups, while the Kruskal-Wallis H test was used for comparisons involving more than two groups. Mean rank values were reported for inferential comparisons. Statistical significance was defined at a p-value of less than 0.05. The analysis focused on identifying associations between headache classifications, demographic variables, lifestyle factors, and headache-related quality of life dimensions.

Results

Participants

A total of 320 working adults were included in the final analysis after exclusion of incomplete questionnaires. The study population consisted predominantly of females, with 205 participants (64.1%), while males accounted for 115 participants (35.9%). The majority of participants belonged to the younger working-age group, with 211 individuals (65.9%) aged between 20–25 years. Smaller proportions were observed in the 26–30 years (13.8%), 31–35 years (8.1%), 36–40 years (6.3%), 41–46 years (4.4%), and >46 years (1.6%) age categories. Most participants were unmarried (70.3%), reflecting the relatively younger age distribution of the study sample. Occupational characteristics showed that more than half of the participants (52.5%) worked between 5–8 hours daily, while 34.1% reported working more than 8 hours per day. Lifestyle-related characteristics demonstrated

variability in sleep duration, dietary habits, and tea/coffee intake among participants. Detailed demographic characteristics are presented in Table 1.

Descriptive data

Headache-related characteristics were assessed using the Headache Screening Questionnaire (HSQ), which identifies probable headache-related conditions rather than clinically confirmed diagnoses. The findings demonstrated that headache symptoms were common among working adults. Nearly half of the participants (48.8%) reported experiencing 1–4 lifetime headache episodes, while approximately one-third (32.5%) reported more than 10 lifetime headache episodes. Monthly headache frequency analysis revealed that 69.1% of participants experienced 0–4 headache attacks per month, whereas 20.9% and 10.0% reported 5–9 attacks and more than 10 attacks per month, respectively.

Regarding headache duration, most participants (69.1%) experienced headache episodes lasting between 30 minutes and 4 hours without medication. Tight or pressure-like headache pain was the most frequently reported symptom (53.8%), followed by pulsating headache pain (36.9%). Headache severity was predominantly moderate in intensity (52.5%), while 26.9% reported severe headache symptoms. Approximately half of the participants (50.6%) reported avoiding routine daily activities during headache episodes, indicating a considerable level of functional limitation associated with headache symptoms. A detailed summary of headache screening characteristics is shown in Table 2.

Outcome data

Screening-based headache classification demonstrated that 32.8% ($n = 105$) of participants showed no headache-related features suggestive of migraine or episodic tension-type headache (ETTH). Among participants with headache-related features, 35.9% ($n = 115$) were classified as having probable ETTH, while 16.3% ($n = 52$) were classified as probable migraine according to HSQ screening criteria. Additionally, 11.9% ($n = 38$) demonstrated features consistent with screened ETTH, whereas 3.1% ($n = 10$) demonstrated features suggestive of screened migraine. Overall, ETTH-related features were more prevalent than migraine-related features within the study population. These screening-based classifications are illustrated in Graph 1.

For inferential analysis, 215 participants who screened positive for headache-related conditions were included in quality of life

comparisons. The Comprehensive Headache-Related Quality of Life Questionnaire (CHQQ) demonstrated variability in physical, social, and mental quality of life dimensions across demographic and headache-related categories. Significant differences were observed particularly in relation to gender and headache classification. Females demonstrated significantly poorer overall headache-related quality of life compared with males ($U = 4083.50$, $p = 0.016$). Similarly, participants classified as probable migraine showed significantly greater impairment in quality of life compared with participants classified as probable ETTH ($U = 1867.00$, $p < 0.001$). Detailed inferential findings are presented in Table 3.

Main results

The present study demonstrated that headache-related conditions are highly prevalent among working adults and are associated with measurable impairment in multiple dimensions of quality of life. Probable ETTH was the most common headache-related presentation, followed by probable migraine. Participants with migraine-like features consistently demonstrated poorer headache-related quality of life compared with those with ETTH-like symptoms, indicating a greater functional and psychological burden associated with migraine-related symptom profiles.

Dimension-wise analysis further revealed that headache disorders affected physical, social, and mental aspects of quality of life differently. In the physical domain, no statistically significant associations were observed for most demographic variables; however, tea/coffee intake demonstrated a statistically significant association ($p = 0.010$). In the social domain, females demonstrated significantly poorer social quality of life compared with males ($U = 4215.50$, $p = 0.035$). Participants classified as probable migraine also demonstrated significantly poorer social functioning compared with those classified as probable ETTH ($U = 2141.50$, $p = 0.003$).

In the mental domain, significant differences were observed for gender ($U = 4125.50$, $p = 0.022$) and age ($H = 11.042$, $p = 0.048$), indicating relatively poorer mental quality of life among females and older participants. Furthermore, participants with probable migraine demonstrated significantly greater psychological impairment compared with participants with probable ETTH ($U = 1937.50$, $p < 0.001$). Overall, migraine-related features were consistently associated with poorer quality of life outcomes across multiple domains compared with ETTH-related features. Detailed comparisons of physical, social, and mental quality of life dimensions are provided in Table 4.

Table 1: Demographic Characteristics of Working Adults ($n = 320$).

Variables		n (%)
Gender	Male	115 (35.9)
	Female	205 (64.1)
Age (Years)	20–25	211 (65.9)
	26–30	44 (13.8)
	31–35	26 (8.1)
	36–40	20 (6.3)
	41–46	14 (4.4)
	>46	5 (1.6)
Marital Status	Married	95 (29.7)
	Unmarried	225 (70.3)
Average Working Hours/Day	1–4	43 (13.4)
	5–8	168 (52.5)
	>8	109 (34.1)
Average Sleep Duration (hours)	1–2	2 (0.6)

Average Daily Meals	3–4	75 (23.4)
	5–6	112 (35.0)
	7–8	113 (35.3)
	>8	18 (5.6)
	1	8 (2.5)
	2	128 (40.0)
	3	167 (52.2)
	>3	17 (5.3)
Average Daily Tea/Coffee Intake (cups)	None	96 (30.0)
	1–2	152 (50.6)
	3–4	54 (16.9)
	>4	8 (2.5)

Table 2: Assessment of Headache Screening Questionnaire Among Working Adults (n = 320).

Variables	n (%)
Lifetime Headache Frequency	1–4
	5–9
	>10
Headache Attacks/Month	0–4
	5–9
	>10
Headache Days/Month	<1
	1–15
	>15
Headache Duration (without medication)	0–30 min
	30 min–4 hrs
	4 hrs–3 days
	3–7 days
	>7 days
	Pulsating
Headache Type	Tight/Pressure
	Burning/Stabbing
	Other
	One-sided
Laterality	Two-sided
	Mild
	Moderate
Severity	Severe
	Very Severe
Physical Activity Worsens Headache	Yes
	No
Avoid Daily Activities During Headache	Yes
	No

Table 3: Comparison of Comprehensive Headache-Related Quality of Life in Relation to Different Demographics (n = 215).

Variables	n	Mean Rank	Test Statistic	p-value
Gender	Male	71	U = 4083.50	0.016*
	Female	144		
Age (years)	20–25	144	H = 6.33	0.286
	26–30	35		
	31–35	20		
	36–40	4		
	41–46	8		
	>46	4		
Marital Status	Married	59	U = 4179.50	0.305
	Unmarried	156		
Working Hours/Day	1–4	27	H = 2.58	0.283
	5–8	114		
	>8	74		
Sleep Duration	1–2	1	H = 5.16	0.269
Tea/Coffee Intake	None	64	H = 6.37	0.149

Probable Headache	Migraine	115	93.77	U = 1867.00	<0.001***
	ETTH	52	62.40		
Confirmed Headache	ETTH	38	27.41	U = 79.50	0.003**
	Migraine	10	13.45		

Mann–Whitney U test was used for two-group comparisons and Kruskal–Wallis H test for multiple-group comparisons. *p < 0.05, **p < 0.01, ***p < 0.001.

Table 4: Comparison of Physical, Social, and Mental Dimensions of Headache-Related Quality of Life in Relation to Different Demographics (n = 215).

Variables		Physical (Mean Rank)	p-value	Social (Mean Rank)	p-value	Mental (Mean Rank)	p-value
Gender	Male	122.64	0.013*	120.64	0.035*	121.91	0.022*
	Female	100.78		101.78		101.00	
Age (years)	20–25	105.02	0.749	103.81	0.645	99.91	0.048*
	26–30	107.99		107.83		115.20	
	31–35	115.20		123.88		134.80	
	36–40	140.63		131.00		170.00	
	41–46	111.31		123.00		122.06	
	>46	140.13		127.88		112.25	
Marital Status	Married	110.84	0.326	114.03	0.186	117.39	0.092
	Unmarried	106.93		105.72		104.46	
Working Hours/Day	1–4	121.69	0.217	125.50	0.143	118.24	0.665
	5–8	110.62		109.88		106.86	
	>8	98.97		98.72		106.02	
Sleep Duration (hours)	1–2	204.00	0.403	212.50	0.240	194.50	0.362
	3–4	112.13		108.57		111.65	
	5–6	104.14		101.15		101.46	
	7–8	111.40		115.47		114.06	
	>8	90.85		96.54		94.08	
Daily Meals	1	103.42	0.839	110.17	0.444	91.50	0.445
	2	103.88		100.18		103.80	
	3	110.55		112.45		109.66	
	>3	117.33		123.83		132.00	
	None	120.56		122.39		108.97	
Tea/Coffee Intake	1–2 cups	107.15	0.010*	103.00	0.070	107.06	0.660
	3–4 cups	100.22		104.60		113.96	
	>4 cups	36.08		65.75		79.00	

Higher mean rank scores indicate poorer headache-related quality of life. Mann–Whitney U test was used for two-group comparisons and Kruskal–Wallis H test for multiple-group comparisons. Statistical significance was defined as *p < 0.05, **p < 0.01, and ***p < 0.001.

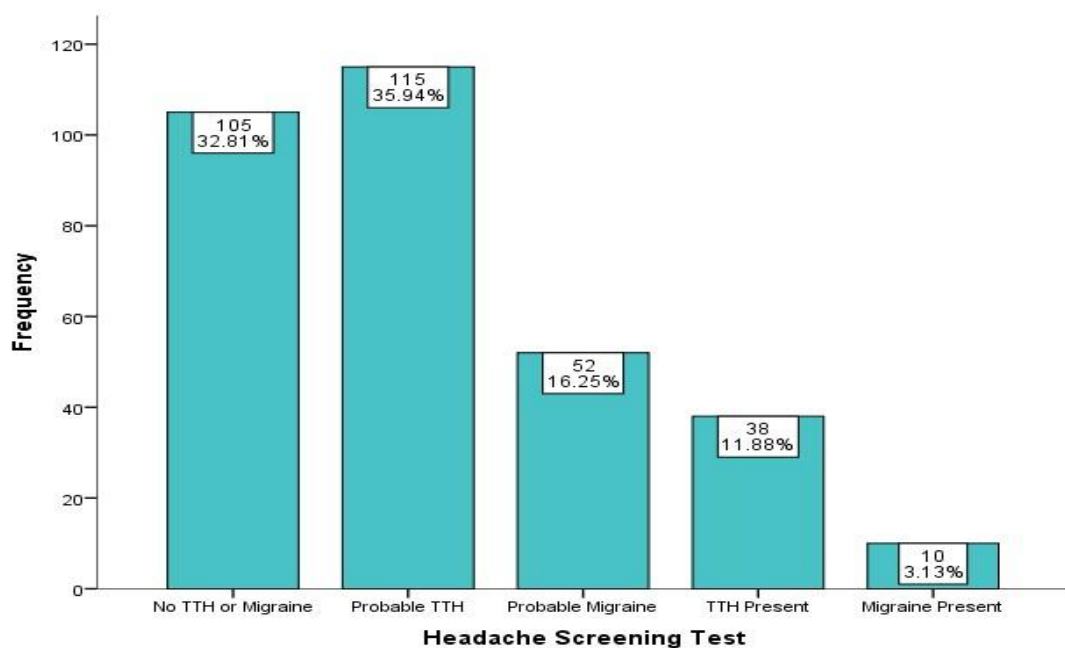


Figure 1: Screening-Based Classification of Headache Disorders Among Working Adults.

Discussion

The present study provides important epidemiological evidence regarding the burden of headache-related disorders among working adults in Lahore, Pakistan, and their association with headache-related quality of life. Using validated screening instruments, the findings demonstrated that a substantial proportion of working adults experienced headache-related symptoms suggestive of probable episodic tension-type headache (ETTH) and probable migraine. The results further indicate that headache-related conditions are associated with multidimensional impairment involving physical, social, and psychological aspects of quality of life. These findings are particularly relevant in occupational populations, where headache disorders may negatively influence productivity, work performance, concentration, emotional well-being, and social functioning.

The study findings demonstrated that ETTH-related features were more prevalent than migraine-related features among participants. This observation is consistent with global epidemiological literature reporting tension-type headache as the most prevalent primary headache disorder worldwide [2]. Similarly, migraine prevalence in the present study aligns with previous international reports indicating that migraine affects a substantial proportion of adults during their most productive years of life [10]. The relatively high prevalence of headache-related symptoms observed in this occupational population may reflect increasing workplace stress, prolonged screen exposure, irregular lifestyle patterns, sleep disturbances, and psychosocial strain commonly associated with modern working environments.

An important finding of the present study was the significantly greater impairment in headache-related quality of life among participants classified with probable migraine compared with those classified with probable ETTH. Participants with migraine-related features consistently demonstrated poorer overall quality of life scores, particularly within physical, social, and mental domains. These findings are supported by previous studies demonstrating that migraine is associated with greater disability, emotional burden, reduced social functioning, and impaired occupational performance compared with tension-type headache [3,10]. Migraine attacks are often characterized by moderate-to-severe pain intensity, sensory hypersensitivity, nausea, and functional incapacitation, which may explain the greater degree of impairment observed in migraine-related symptom profiles.

The physical dimension of headache-related quality of life revealed notable functional limitations among participants with headache symptoms. Many participants reported moderate-to-severe headache intensity and avoidance of daily activities during headache episodes. These findings are clinically relevant because recurrent headaches may interfere with occupational functioning, reduce concentration, and negatively affect physical productivity. Previous studies have similarly reported that migraine and tension-type headache contribute substantially to reduced work efficiency and absenteeism [4]. Although physical impairment was observed across both headache categories, migraine-related symptoms appeared to produce greater overall burden.

The study also demonstrated significant impairment within the social dimension of quality of life. Participants with migraine-like symptoms showed poorer social functioning and reduced engagement in routine activities compared with participants with ETTH-like symptoms. Headache disorders may restrict participation in occupational, recreational, and interpersonal activities due to recurrent pain episodes, fatigue, irritability, and sensory discomfort. These findings are consistent with previous evidence suggesting that

recurrent headache disorders adversely affect social interaction, interpersonal relationships, and participation in daily life activities [10].

Similarly, the mental dimension of quality of life was significantly affected among participants with headache-related symptoms, particularly among those classified with probable migraine. Psychological distress, emotional exhaustion, reduced concentration, and mental fatigue are frequently associated with recurrent headache disorders. The present findings support earlier research demonstrating that migraine is associated with increased psychological burden, stress, anxiety, and reduced emotional well-being [11-13]. The significant association observed between age and mental quality of life further suggests that psychological burden may increase with advancing age and chronicity of headache-related symptoms.

Gender differences observed in the present study demonstrated that females experienced significantly poorer headache-related quality of life compared with males. This finding is consistent with global epidemiological literature reporting higher prevalence and greater disability associated with migraine among females [5]. Hormonal influences, psychosocial stressors, biological susceptibility, and differences in pain perception may contribute to this gender-related disparity. In addition, females often experience greater exposure to combined occupational and domestic responsibilities, which may further increase stress-related vulnerability to headache disorders. However, due to the cross-sectional design, causal relationships cannot be established.

Interestingly, several demographic and lifestyle variables, including marital status, working hours, sleep duration, and dietary habits, did not demonstrate statistically significant associations with overall headache-related quality of life. Although these factors are commonly recognized as potential headache triggers, their relationship with headache burden may vary depending on population characteristics, stress adaptation, occupational environment, and individual coping mechanisms. Nevertheless, tea/coffee intake demonstrated a significant association with the physical domain of quality of life, suggesting that caffeine consumption patterns may influence headache-related symptom severity or coping responses. Previous studies have similarly reported complex relationships between caffeine consumption and headache disorders, where caffeine may act as both a relieving and triggering factor depending on consumption patterns and individual sensitivity.

The findings of the present study have important public health implications, particularly in occupational settings within low- and middle-income countries. Despite the high prevalence and functional burden associated with headache disorders, migraine and ETTH often remain under-recognized and inadequately managed. Many individuals rely on self-medication practices and do not seek formal medical evaluation, potentially contributing to chronic symptom burden and reduced quality of life. Workplace-based awareness programs, routine screening initiatives, stress management interventions, and early referral strategies may help reduce headache-related disability and improve occupational productivity. In addition, increasing public awareness regarding headache disorders may encourage earlier identification and more appropriate healthcare-seeking behavior.

It is important to emphasize that the present study relied on screening-based classification using the Headache Screening Questionnaire (HSQ), which identifies probable headache-related conditions rather than clinically confirmed diagnoses according to ICHD-3 criteria [8].

Therefore, the prevalence estimates should be interpreted as screening-based epidemiological findings rather than definitive diagnostic prevalence rates. Nevertheless, the use of validated screening tools provides valuable insight into the burden of headache-related symptoms within occupational populations and supports the need for further clinically oriented research.

Limitations

Several limitations should be considered while interpreting the findings of this study. First, the study utilized a cross-sectional design, which limits the ability to establish causal relationships between headache-related conditions and quality of life outcomes. The findings therefore represent associations rather than causative effects. Second, data collection relied on self-administered questionnaires, which may introduce recall bias, response bias, and subjective misinterpretation of headache characteristics. Participants may have underreported or overreported symptoms, lifestyle behaviors, or functional impairment. Third, the study used the Headache Screening Questionnaire (HSQ), which is a validated screening tool but does not provide definitive clinical diagnosis according to International Classification of Headache Disorders (ICHD-3) criteria. Consequently, all headache classifications should be interpreted as probable or screening-based headache conditions rather than clinically confirmed disorders. Fourth, convenience sampling was used for participant recruitment, which may introduce selection bias and limit the generalizability of findings to the broader working population of Pakistan.

Additionally, the relatively younger age distribution and predominance of female participants may have influenced prevalence estimates and quality of life outcomes. Finally, important clinical and psychosocial variables such as stress severity, psychiatric comorbidities, medication use, occupational categories, and family history of headache were not comprehensively assessed, which may have influenced the observed associations.

Conclusion

The present study demonstrates a considerable burden of headache-related symptoms among working adults in Lahore, Pakistan, with episodic tension-type headache (ETTH)-related features being more prevalent than migraine-related features. Despite the higher prevalence of ETTH-like symptoms, participants with probable migraine consistently demonstrated greater impairment in overall headache-related quality of life across physical, social, and mental domains. Females exhibited significantly poorer quality of life outcomes compared with males, further highlighting the importance of gender-related vulnerability in headache disorders. The findings indicate that recurrent headache-related symptoms substantially affect occupational functioning, emotional well-being, and daily activities among working adults. Although the study relied on screening-based classification rather than definitive clinical diagnosis, the findings provide valuable epidemiological evidence regarding the burden of headache-related conditions within occupational populations. These results emphasize the importance of increasing awareness regarding headache disorders, promoting early screening strategies, and implementing workplace-based interventions focused on stress management, lifestyle modification, and timely referral for clinical evaluation. Future longitudinal and clinically diagnostic studies using representative sampling approaches are recommended to further clarify the epidemiology, risk factors, and long-term impact of migraine and ETTH in Pakistani populations.

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