

Identifying Barriers to Migraine Care for Female Over-The-Counter Users in Pakistan's Corporate Sector

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Abstract

Objective: This study aimed to identify the barriers to formal migraine care for female over-the-counter (OTC) analgesic users working in Pakistan's corporate sector, and to explore the association between these barriers and medication-overuse headache.

Methods: A cross-sectional questionnaire-based study was conducted from April to August 2025 in two neurology clinics in Skardu and Lahore. Data on demographics, migraine characteristics, OTC use patterns, and barriers to care were collected. Descriptive and inferential statistics were employed to analyze the relationship between the dependent and independent variables. Multivariable logistic regression was used to identify predictors of MOH.

Results: a total of 321 patients participated in the study with 100% response rate. The prevalence of MOH was 25.9%. Heavy OTC use (≥ 10 days/month) was the strongest predictor of MOH (AOR= 4.28, 95% CI: 1.07–17.16, $p = 0.040$). Financial barriers were also independently associated with MOH (AOR = 1.24 per unit increase, 95% CI: 1.03–1.50, $p = 0.024$). The primary reason for delaying medical consultation was workplace inflexibility (49.2%), followed by internalized stigma

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(29.9%); financial cost was cited by only 11.5%. Financial barrier scores were significantly higher among participants with the lowest monthly income (<36,000 PKR) compared to the highest (>50,000 PKR) ($p<0.001$).

Conclusion: Among female corporate employees in Pakistan, reliance on OTC analgesics is high and driven predominantly by workplace inflexibility and stigma, leading to a significant risk of MOH. Targeted interventions, including workplace policy reforms and awareness campaigns, are urgently needed to mitigate these barriers and improve migraine care.

Introduction

Migraine is a disabling neurovascular disorder, which is characterised by recurrent attacks of unilateral pulsating headache (Amiri et al., 2022). Migraine is often accompanied by nausea, photophobia, phonophobia, and visual disturbances (McGinley et al., 2025). Approximately 14–15% of the global population suffers from migraine, with higher prevalence in Europe and North America (9%) and lower in Asia and Africa (5%) (Dong et al., 2025). Migraine is the second leading cause of years lived with disability worldwide. This imposes a significant socioeconomic burden, including lost productivity and increased healthcare costs. In Asia, approximately 683.5 million individuals experienced migraine. South Asia has witnessed a sharp rise in migraines, which accounted for 294.4 million cases in 2021, with women aged 30–34 disproportionately affected. In Pakistan, a population-based study reported a one-year prevalence of 22.5% (Choudry et al., 2022; Dong et al., 2025).

Migraine remains underdiagnosed and undertreated despite its high prevalence. The international CaMEO survey found that only 35.1% of people with migraine had ever consulted a healthcare professional, only 23.0% were accurately diagnosed, and a mere 11.5% navigated consultation, diagnosis, and treatment barriers successfully (Lanteri-Minet et al., 2024). Pakistani data reveal similarly poor care-seeking behaviour among patients suffering from Migraine. For example, a physician-led survey showed that 62.3% of adults with headaches had never consulted a doctor, and most physicians lacked familiarity with the diagnostic criteria (Choudry et al., 2022). Consequently, many patients resort to over-the-counter (OTC) medicine. These include Non-steroidal anti-inflammatory drugs (NSAIDs), paracetamol, and caffeine and are easily accessible and inexpensive (Peck et al., 2020). This is supported by a recent real-world study across 19,590 migraine sufferers, which found that at least 62 % used OTC medications in the past year (Ishii et al., 2025). However, frequent use can precipitate medication-overuse headache (MOH). MOH is defined as headaches occurring on ≥ 15 days per month in individuals who regularly use analgesics on ≥ 10 –15 days/month for >3 months (Da Silva and Lake, 2014). MOH complicates primary migraine management and increases disability. Still, only 8 % of patients realise that regular analgesic use can worsen headaches (Lagman-Bartolome et al., 2018).

Pakistan's corporate sector has expanded rapidly over the last two decades, with an increasing number of women being employed (Razzak et al., 2023). However, working women in Pakistan continue to face deep-rooted socio-cultural and structural barriers (Rana et al., 2024; Ryan, 2023). A recent socioeconomic analysis notes that Pakistani women face gender discrimination, workplace harassment, unequal pay, limited promotion opportunities, and inadequate maternity benefits (Ali et al., 2022). Traditional patriarchal norms expect men to be breadwinners and women to focus on household duties. These norms may influence women's health-seeking behaviour and may discourage them from seeking medical care for migraine (Parikh et al., 2021). Women also face structural barriers that impede access to neurologists in Pakistan.

Out-of-pocket payments for diagnostic imaging are a common occurrence (Iftikhar et al., 2021). According to a report, only the top 10–20% of households can afford neuroimaging without incurring catastrophic expenditure (Mortel et al., 2022). Moreover, Workplace policies often lack flexibility, with limited provisions for sick leave, restrooms, and remote work options. Qualitative studies on migraine self-management in the workplace show that rigid shifts, unsympathetic supervisors, and a lack of private spaces exacerbate the condition (Knauf et al., 2024). Such workplace inflexibility is common in Pakistan, where labour laws are weak and job insecurity is high. Many women may therefore choose to self-medicate using OTC analgesics rather than risk job loss.

While the high prevalence of migraine and the widespread reliance on OTC analgesics are well-documented, the specific barriers faced by women in the corporate sector remain unexplored. Existing literature outlines broad structural barriers to migraine care. Still, a significant gap exists in understanding the factors that uniquely drive OTC dependence among women suffering from migraine in Pakistan. Therefore, to address this gap, this study aims to investigate the barriers to formal migraine care for female OTC analgesic users within Pakistan's corporate environment.

Methods

Study design and setting

The present study was conducted as a cross-sectional, questionnaire-based study from April to August 2025. The study was conducted in two outpatient neurology clinics in Skardu and Lahore

Participants

Inclusion criteria were: (1) adult women aged 18–60 years; (2) working in the formal corporate sector; (3) presenting to outpatient neurology for their first migraine consultation; and (4) confirmed diagnosis of migraine according to the International Classification of Headache Disorders (ICHD-3).

Exclusion criteria were: (1) other primary headache disorders; (2) prior neurologist consultation for migraine; (3) pregnancy; (4) women with psychiatric illness; (5) inability to provide informed consent; (6) not able to understand, read, or write English; and (7) not working in the corporate sector.

Sample Size

The sample size was determined based on an estimated prevalence of OTC analgesic use of 62.5% from a previous local survey. Using this proportion with a 95% confidence level and 5% margin of error, the initial calculation yielded a minimum sample. This was adjusted to a target of 300 participants to enhance the power for subgroup analyses. Overall, 321 patients were approached for the study.

Data Collection Instrument

The questionnaire was administered in English and comprised four sections: Section one comprised demographic and occupational characteristics. These contain age, marital status, industry, current role, and monthly income. The second section acquired information about Migraine characteristics. This section included the questions related to the type of migraine, duration since onset, attack frequency, typical episode length, aura frequency, perceived disease severity, typical pain type, and pain location. To quantify associated symptoms, participants rated eight common symptoms such as nausea, vomiting, sensitivity to light, sensitivity to sound, sensitivity to smell, visual disturbances, tingling/numbness in hands or feet, and difficulty speaking/confusion on a 5-point Likert scale (1 = never, 5 = always).

The third section of the questionnaire pertained to the Barriers-to-Care module (Pellowski, 2013). We adapted items from the Barriers to Care Evaluation (Clement et al., 2012) and the WHO's Service Availability and Readiness Assessment (Van Huy et al., 2018) to measure three domains: financial, access, and stigma. Each item was rated on an 11-point visual analogue scale (0 = strongly disagree, 10 = strongly agree). Financial barriers included statements such as "I cannot afford consultation fees or diagnostic tests" and "I cannot risk losing wages to attend appointments." Access barriers comprised "I cannot take time off work due to strict schedules," "My workplace is far from clinics," and "Appointments are not available at convenient times." Stigma items captured internalised attitudes "Migraines are just an excuse," "People with migraines are complainers/lazy," "I would feel embarrassed telling my boss about my migraine". Higher scores indicated greater perceived barriers.

The fourth and final section comprised questions related to OTC use and MOH. Participants listed all OTC medications used for migraine in the past month and reported the number of days with analgesic use (0–30). We classified frequency as: no use (0 days), low use (1–4 days), moderate use (5–9 days), and heavy use (≥ 10 days/month). We also asked them to select the primary reason(s) for delaying professional consultation: financial cost, workplace inflexibility, stigma/fear of judgement, or other.

Ethical Considerations

The study adhered to the principles of the Declaration of Helsinki (Goodyear et al., 2007). Ethical approval was obtained from the institutional review board and written permissions were obtained from outpatient neurology departments.

Statistical analysis

Data were entered in SPSS version 29.0 and analysed in R 4.2. Descriptive statistics were used to summarize the data. Among inferential statistics, non-parametric tests were used to examine the association between the dependent and independent variables. Categorical variables are reported as counts and percentages. Chi-square tests assessed associations between categorical variables. Spearman's rank correlation was used to measure monotonic relationships between continuous variables. We considered $p < 0.05$ statistically significant.

For multivariable analysis, logistic regression was used to estimate odds ratios (ORs) and adjusted odds ratios (AORs) for the outcome of MOH (binary). Model diagnostics included Hosmer–Lemeshow goodness-of-fit and assessment of multicollinearity (variance inflation factors < 5 indicated acceptable multicollinearity). Results were presented with 95 % confidence intervals (CIs).

Results

Participant demographics and occupational profile

A total of 321 female corporate employees with newly diagnosed migraine were included in the study (mean age 35.1 ± 7.7 years; range 20–60 years). The demographic and occupational characteristics of the participants are summarised in Table 1. Approximately half of the participants were unmarried (50.5%), while 42.4% were married, and a smaller proportion were divorced (4.7%) or widowed (2.5%). The cohort was distributed across a range of industries, with the largest representation from IT (27.1%), followed by finance and banking (14.6%), healthcare (9.3%), and education (7.8%). 24.3% occupying entry-level positions, 39.6% working at mid-level, 19.9% at senior level, and 16.2% holding management roles. For the Monthly income, 19.7% of participants reported earnings below 36,000 PKR. The mean delay between migraine onset and the first medical consultation was 9.6 ± 1.9 months (median, 9.5 months; interquartile range, 8.4–10.7 months).

Table 1. Demographic and occupational characteristics (n = 321)

Variable	Category	Count	Percentage
Age (years)	mean $\pm$ SD	35.1 $\pm$ 7.7	–
	median (IQR)	34.9 (30.6–39.8)	–
Marital status	Unmarried	162	50.5 %
	Married	136	42.4 %
	Divorced	15	4.7 %
	Widowed	8	2.5 %
Industry	IT	87	27.1 %
	Finance/Banking	47	14.6 %
	Healthcare	30	9.3 %
	Education	25	7.8 %
	Manufacturing	25	7.8 %
	Retail	31	9.7 %
	Government sector	34	10.6 %
	Telecommunications	28	8.7 %
	Hospitality	14	4.4 %
Role	Entry-level	78	24.3 %
	Mid-level	127	39.6 %
	Senior-level	64	19.9 %
	Management/executive	52	16.2 %
Monthly income	Below 18,000 PKR	31	9.7 %
	18,001–36,000 PKR	32	10.0 %
	36,001–50,000 PKR	101	31.5 %
	>50 000 PKR	157	48.9 %
Delay in care	mean $\pm$ SD (months)	9.6 $\pm$ 1.9	–

Migraine Characteristics

Most participants reported migraine without aura (64.5%), followed by migraine with aura (20.6%), chronic migraine (10.0%), and hemiplegic migraine (4.9%). Duration since onset varied, with 44.2% experiencing migraines for 1–5 years, while 17.4% reported a history exceeding 10 years. Attack frequency was most commonly 1–3 per month (38.6%), and episodes typically lasted 4–8 hours (49.8%). Aura was absent in 44.6% of cases, occasionally present in approximately one-third, and persistent in 10.8% of cases. Perceived severity clustered around the moderate to severe categories, with fewer than 7% describing their migraines as mild. Throbbing pain predominated (68.2%), and pain was usually unilateral (55.8%), though 23.4% experienced bilateral pain. Migraine characteristics are described in Table 2.

Table 2. Migraine characteristics and symptom burden (N=321)

Variable	Category	Count	Percentage
Type of migraine	Migraine without aura	207	64.5 %
	Migraine with aura	66	20.6 %
	Chronic migraine	32	10.0 %
	Hemiplegic migraine	15	4.9 %
Duration since onset	<1 year	43	13.4 %
	1–5 years	142	44.2 %
	6–10 years	80	24.9 %

	>10 years	56	17.4 %
Attack frequency	<1/month	38	11.8 %
	1–3/month	124	38.6 %
	4–6/month	95	29.6 %
	>6/month	65	20.2 %
Episode length	<4 hours	68	21.2 %
	4–8 hours	160	49.8 %
	>8 hours	93	29.0 %
Aura frequency	Never	143	44.6 %
	Rarely	66	20.6 %
	Sometimes	77	24.0 %
	Always	34	10.8 %
Perceived severity	Not at all severe	6	1.9 %
	A little severe	16	5.0 %
	Somewhat severe	32	10.0 %
	Moderately severe	109	34.0 %
	Quite severe	84	26.2 %
	Very severe	51	15.9 %
	Extremely severe	17	5.3 %
Pain type	Throbbing/pulsating	219	68.2 %
	Constant/dull	64	19.9 %
	Sharp/stabbing	38	11.8 %
Pain location	One side of head	179	55.8 %
	Both sides of head	75	23.4 %
	Around/behind eyes	44	13.7 %
	Neck/shoulders	25	7.8 %

OTC Drug Use Pattern

Paracetamol was the most frequently reported analgesic (33.0%), followed by NSAIDs such as ibuprofen, naproxen, and diclofenac (28.7%). Combination preparations containing paracetamol and caffeine were used by 17.8% of respondents. A smaller proportion alternated paracetamol with NSAIDs (8.7%), while the use of soluble aspirin remained limited (4.7%). Herbal and traditional remedies were reported by 4.0% of participants, and only 3.1% did not use any regular OTC treatment. This pattern reflects local prescribing culture and the easy availability of low-cost analgesics through community pharmacies. Drug use pattern is summarized in Table 3 and Figure 1.

Table 3. OTC drug use patterns among female migraine patients in Pakistan (N = 321)

OTC medication pattern	Count	Percentage
Paracetamol alone	106	33.0 %

NSAIDs alone	92	28.7 %
Paracetamol + caffeine combinations	57	17.8 %
Paracetamol + NSAID (alternating or together)	28	8.7 %
Aspirin	15	4.7 %
Other OTC (herbal remedies and homeopathic)	13	4.0 %
No regular OTC use	10	3.1 %

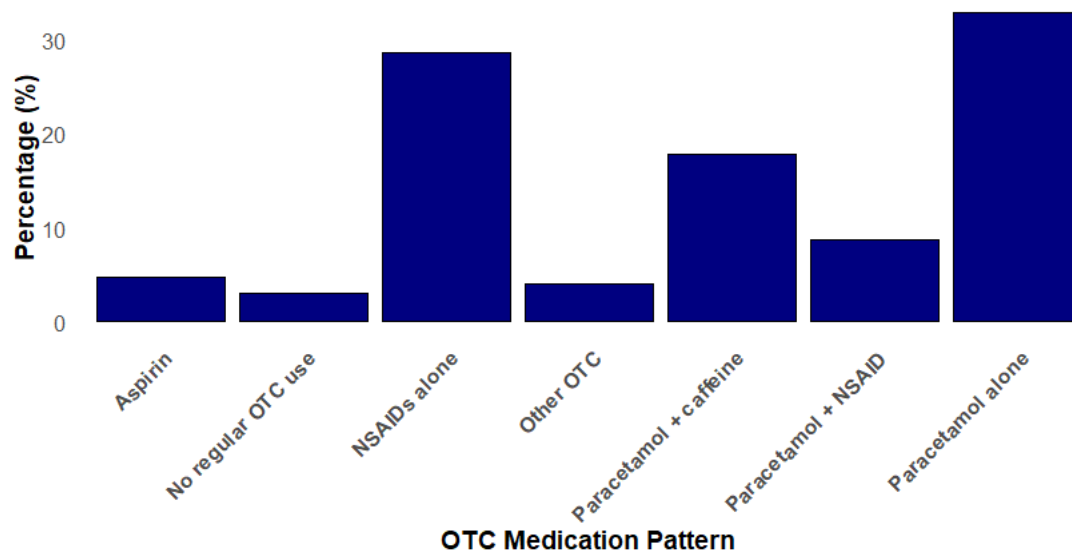


Figure 1. OTC medication use pattern

A small proportion of participants (6.5%) reported no OTC use, while 26.5% were classified as low users (1–4 days per month). Nearly half of the sample (48.3%) reported moderate use (5–9 days per month), and 18.7% reported heavy use (≥ 10 days per month). The mean frequency of OTC use was 7.3 days per month (± 5.5). Pattern is described in Table 4 and Figure 2..

Table 4. Patterns of OTC analgesic use

OTC use category	Days of use	Participants	Percentage
0 days	0	21	6.5 %
Low use	1–4 days	85	26.5 %
Moderate use	5–9 days	155	48.3 %
Heavy use	≥ 10 days	60	18.7 %
Mean OTC days	–	–	7.3 (± 5.5)

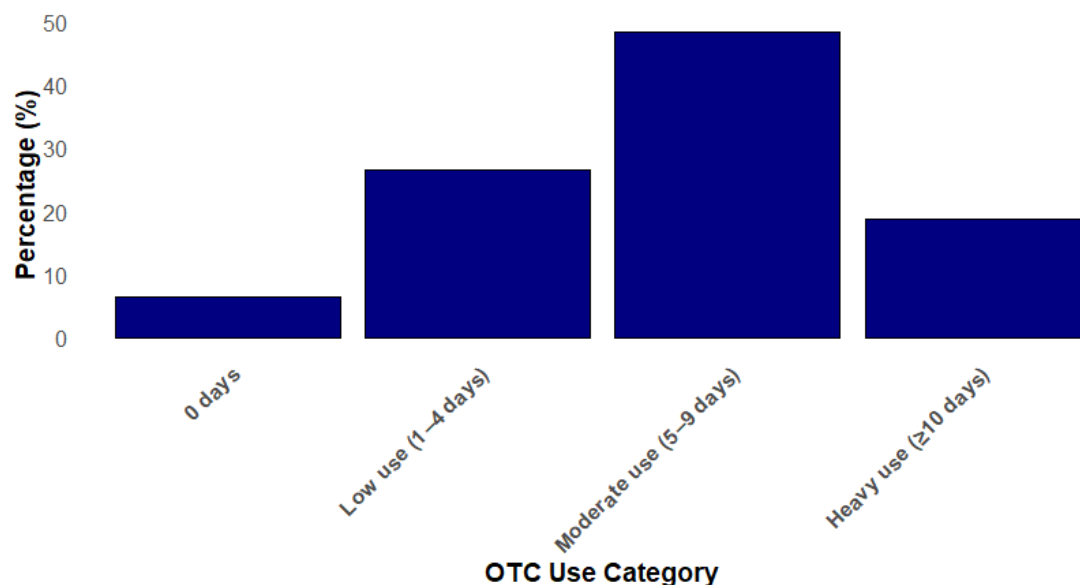


Figure 2. Frequency of OTC use among migraine patients

Prevalence of medication-overuse headache (MOH)

Overall, 25.9% (83/321) of participants met the criteria for MOH based on self-reported headache days and analgesic use. Prevalence rose with increasing OTC frequency as described in Table 5. Among non-users, only 3 of 21 participants (14.3%) met criteria for MOH, likely reflecting underlying chronic migraine independent of medication use. In contrast, nearly half of heavy OTC users (46.7%) fulfilled criteria for MOH. The linear gradient across categories remained significant ($\chi^2 \approx 21$, $p < 0.001$).

Table 5. MOH prevalence by OTC use category (N = 321)

OTC use category	MOH cases (n)	Total (n)	Risk (%)
0 days	3	21	14.3 %
1–4 days	14	85	16.5 %
5–9 days	36	155	23.2 %
≥10 days	28	60	46.7 %
Overall	83	321	25.9 %

Barrier scores

For financial barriers, mean scores were 6.3 (± 2.5) for consultation fees, 6.0 (± 2.4) for diagnostic tests, and 6.1 (± 2.3) for wage loss. Access-related barriers were reported as 5.9 (± 2.6) for inability to take time off work, 5.5 (± 2.7) for distance from clinics, and 5.7 (± 2.5) for inconvenient appointment times. Stigma-related barriers were 4.8 (± 2.9) for perceptions of migraine as an excuse, 5.0 (± 2.7) for perceptions of being complainers or lazy, and 5.1 (± 2.8) for workplace embarrassment. Domain means were 6.1 (± 2.4) for financial, 5.7 (± 2.6) for access, and 5.0 (± 2.8) for stigma, with an overall mean barrier score of 5.6 (± 2.2).

Table 6. Barriers-to-care scores among female corporate employees with migraine (n = 321)

Domain	Item	Mean ($\pm$ SD)
Financial barriers	I cannot afford consultation fees for migraine treatment.	6.3 $\pm$ 2.5

	I cannot afford the cost of diagnostic tests or investigations.	6.0 ± 2.4
	I cannot risk losing wages or income to attend appointments.	6.1 ± 2.3
	Overall	6.1 ± 2.4
Access barriers	I cannot take time off work because of strict schedules.	5.9 ± 2.6
	My workplace is far from healthcare facilities or clinics.	5.5 ± 2.7
	Appointments are not available at convenient times for me.	5.7 ± 2.5
	Overall	5.7 ± 2.6
Stigma barriers	Migraines are just an excuse and not a real illness.	4.8 ± 2.9
	People with migraines are seen as complainers or lazy.	5.0 ± 2.7
	I would feel embarrassed telling my boss or colleagues about my migraine.	5.1 ± 2.8
	Overall	5.0 ± 2.8
Overall barriers	Average across all 9 items	5.6 ± 2.2

Associations between demographic factors and barriers

Financial barriers were significantly higher among those with the lowest monthly income (<36,000 PKR; median=8.5, IQR: 7.3-9.0) compared to the highest (>50,000 PKR; median=5.3, IQR: 4.2-6.7) ($p<0.001$). Similarly, participants in entry-level roles reported higher financial barriers (median = 7.5, IQR: 6.1-8.6) than those in management roles (median = 5.4, IQR: 4.3-6.9) ($p = 0.002$). Participants who were divorced or widowed reported the highest financial barriers (median = 7.4, IQR: 6.2-8.9) ($p = 0.038$). Heavier OTC analgesic use was associated with increased financial barriers (heavy use: median=7.4, IQR: 6.1-8.8; $p<0.01$). Perceived migraine severity was significantly associated with stigma barriers ($p=0.047$). A weak but significant negative correlation was found between age and access barriers ($\rho = -0.09$, $p < 0.05$).

Table 7. Association of Participant Characteristics with Barriers-to-Care Scores

Independent Variable	Category	Financial Barriers, median (IQR)	Access Barriers, median (IQR)	Stigma Barriers, median (IQR)	p-value
Demographic & Occupational Factors					
Age (years)		$\rho = -0.11$	$\rho = -0.09$	$\rho = -0.02$	>0.05
Marital Status	Unmarried	6.8 (5.2 - 8.1)	6.1 (4.3 - 7.5)	5.4 (3.1 - 6.9)	0.038*
	Married	5.9 (4.1 - 7.4)	5.4 (3.6 - 7.2)	4.7 (2.8 - 6.3)	
	Divorced/Widowed	7.4 (6.2 - 8.9)	6.7 (5.1 - 8.2)	6.1 (4.4 - 7.5)	
Monthly	< 36,000	8.5 (7.3 -	6.9 (5.4 -	5.8 (4.2 -	<0.001

Income (PKR)		9.0)	8.3)	7.1)			
	36,001 - 50,000	6.4 (5.1 - 7.8)	6.2 (4.6 - 7.5)	5.1 (3.5 - 6.4)			
	> 50,000	5.3 (4.2 - 6.7)	5.5 (3.8 - 6.9)	4.4 (2.9 - 5.8)			
Occupational Role	Entry-level	7.5 (6.1 - 8.6)	6.8 (5.2 - 8.1)	5.5 (4.1 - 6.8)			
	Mid-level	6.3 (5.0 - 7.7)	6.1 (4.3 - 7.4)	5.0 (3.4 - 6.3)			
	Senior-level	5.8 (4.4 - 7.3)	5.6 (3.9 - 6.8)	4.5 (2.7 - 5.9)			
	Management	5.4 (4.3 - 6.9)	5.7 (4.0 - 7.1)	4.6 (3.1 - 6.0)			
Clinical & Migraine Factors							
Migraine Type	Without Aura	6.2 (4.9 - 7.6)	5.9 (4.2 - 7.3)	5.0 (3.3 - 6.4)			
	With Aura	6.4 (5.0 - 7.9)	5.7 (3.8 - 7.1)	5.2 (3.4 - 6.5)			
	Chronic	7.1 (6.0 - 8.4)	6.4 (5.3 - 8.0)	5.9 (4.3 - 7.2)			
	Hemiplegic	7.3 (5.8 - 8.7)	6.3 (4.9 - 7.8)	5.7 (4.0 - 7.1)			
Attack Frequency	<1/month	5.7 (4.5 - 7.2)	5.3 (3.7 - 6.8)	4.3 (2.8 - 5.9)			
	1-3/month	6.3 (5.0 - 7.7)	6.0 (4.4 - 7.4)	5.1 (3.5 - 6.6)			
	4-6/month	6.5 (5.2 - 7.9)	6.1 (4.5 - 7.6)	5.2 (3.6 - 6.7)			
	>6/month	7.2 (6.0 - 8.5)	6.5 (5.1 - 8.0)	5.8 (4.2 - 7.3)			
Perceived Severity	Mild	5.4 (4.2 - 6.9)	5.2 (3.6 - 6.7)	4.2 (2.9 - 5.8)			
	Moderate	6.1 (4.8 - 7.5)	5.8 (4.1 - 7.2)	4.9 (3.2 - 6.3)			
	Severe	6.9 (5.5 - 8.2)	6.3 (4.8 - 7.7)	5.4 (3.8 - 6.9)			
	Very Severe	7.3 (6.2 - 8.7)	6.8 (5.3 - 8.1)	6.0 (4.5 - 7.4)			
OTC Use Category	0 days	5.9 (4.6 - 7.3)	5.4 (3.9 - 6.9)	4.5 (3.0 - 6.1)			
	Low (1-4 days)	6.1 (4.9 - 7.6)	5.7 (4.0 - 7.1)	4.9 (3.3 - 6.4)			
	Moderate (5-9 days)	6.4 (5.1 - 7.8)	6.0 (4.3 - 7.4)	5.2 (3.6 - 6.7)			
	Heavy (≥10 days)	7.4 (6.1 - 8.8)	6.7 (5.2 - 8.2)	5.9 (4.3 - 7.3)			

0.002

0.183

0.134

0.047*

<0.01

Associations between MOH and demographic variables

A significantly higher prevalence of MOH was associated with lower monthly income ($p=0.028$), higher migraine attack frequency ($p<0.001$), greater perceived migraine severity ($p=0.007$), and heavier OTC analgesic use ($p<0.001$). No significant associations were found between MOH and age, marital status, occupational role, or migraine type.

Table 8. Associations between Demographic/Clinical Variables and MOH

Variable	Category	No MOH	MOH	p-value
Demographic Factors				
Age (years)		35.3 (30.1 - 40.0)	34.5 (29.8 - 39.1)	0.441
Marital Status	Unmarried	117 (49.2%)	45 (54.2%)	0.589
	Married	104 (43.7%)	32 (38.6%)	
	Divorced/Widowed	17 (7.1%)	6 (7.2%)	
Monthly Income (PKR)	< 36,000	43 (18.1%)	20 (24.1%)	0.028
	36,001 - 50,000	69 (29.0%)	32 (38.6%)	
	> 50,000	126 (52.9%)	31 (37.3%)	
Occupational Role,	Entry-level	53 (22.3%)	25 (30.1%)	0.103
	Mid-level	97 (40.8%)	30 (36.1%)	
	Senior-level	50 (21.0%)	14 (16.9%)	
	Management	38 (16.0%)	14 (16.9%)	
Clinical Factors				
Migraine Type	Without Aura	157 (66.0%)	50 (60.2%)	0.317
	With Aura	47 (19.7%)	19 (22.9%)	
	Chronic	22 (9.2%)	10 (12.0%)	
	Hemiplegic	12 (5.0%)	4 (4.8%)	
Attack Frequency	<1/month	32 (13.4%)	6 (7.2%)	<0.001
	1-3/month	99 (41.6%)	25 (30.1%)	

Variable	Category	No MOH	MOH	p-value
	4-6/month	64 (26.9%)	31 (37.3%)	
	>6/month	43 (18.1%)	22 (26.5%)	
Perceived Severity	Mild/Moderate	92 (38.7%)	19 (22.9%)	
	Severe	106 (44.5%)	46 (55.4%)	0.007
	Very Severe	40 (16.8%)	18 (21.7%)	
OTC Use Category	0 days	18 (7.6%)	3 (3.6%)	
	Low (1-4 days)	71 (29.8%)	14 (16.9%)	<0.001
	Moderate (5-9 days)	119 (50.0%)	36 (43.4%)	
	Heavy (≥ 10 days)	32 (13.4%)	28 (33.7%)	

Multivariable Regression Analyses

In the unadjusted analyses, **heavy OTC analgesic use (≥ 10 days/month)** was strongly associated with **MOH** with an **odds ratio (OR)** of 4.82 (95% CI: 2.31–9.99, $p < 0.001$). Increased **financial** and **stigma barrier scores** were also significantly linked to higher odds of MOH, with odds ratios of 1.31 (95% CI: 1.11–1.54, $p = 0.001$) and 1.18 (95% CI: 1.02–1.36, $p = 0.028$), respectively. Being **married** was associated with **lower odds of MOH** (OR = 0.59, 95% CI: 0.36–0.98, $p = 0.041$). No significant associations were found for **access barriers or monthly income**. These statistics are summarized in Tabel 9.

Table 9. Unadjusted Associations with MOH

Predictor	Category / Reference	OR	95% CI	p-value	Beta	VIF
OTC Use (days/month)	1–4 days vs. 0 days	1.14	0.53 – 2.48	0.740	0.13	1.2
	5–9 days vs. 0 days	1.64	0.84 – 3.19	0.150	0.35	1.3
	≥ 10 days vs. 0 days	4.82	2.31 – 9.99	<0.001	1.57	1.5
Financial Barrier	Per 1-unit increase	1.31	1.11 – 1.54	0.001	0.27	1.4
Stigma Barrier	Per 1-unit increase	1.18	1.02 – 1.36	0.028	0.16	1.6
Access Barrier	Per 1-unit increase	1.09	0.93 – 1.27	0.300	0.08	1.3
Marital Status	Married vs. Others	0.59	0.36 – 0.98	0.041	-0.53	1.2

Monthly Income	Per ordinal category decrease	1.07	0.86 – 1.33	0.530	0.07	1.5
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In the **multivariable model**, after adjusting for **OTC use categories**, **barrier scores**, **marital status**, and **income**, **heavy OTC use** remained a strong predictor of MOH (adjusted OR = 4.28, 95% CI: 1.07–17.16, $p = 0.040$). The **financial barrier score** also remained significantly associated with MOH (AOR = 1.24, 95% CI: 1.03–1.50, $p = 0.024$), while the association with **stigma barriers** became non-significant after adjustment (AOR = 1.06, $p = 0.62$). **Access barriers**, **marital status**, and **monthly income** were not significant in the adjusted model. These results are summarized in

Table 10.

Table 10. Adjusted Associations with MOH

Predictor	Category Reference	/ AOR	95% CI	p-value	Beta	VIF
OTC (days/month)	Use 1–4 days vs. 0 days	1.03	0.25 – 4.18	0.970	0.03	1.2
	5–9 days vs. 0 days	1.46	0.39 – 5.52	0.580	0.38	1.3
	≥10 days vs. 0 days	4.28	1.07 – 17.16	0.040	1.45	1.5
Financial Barrier	Per 1-unit increase	1.24	1.03 – 1.50	0.024	0.22	1.4
Stigma Barrier	Per 1-unit increase	1.06	0.85 – 1.31	0.620	0.06	1.6
Access Barrier	Per 1-unit increase	1.09	0.89 – 1.33	0.390	0.09	1.3
Marital Status	Married vs. Others	0.65	0.36 – 1.16	0.140	-0.43	1.2
Monthly Income	Per ordinal category decrease	0.99	0.71 – 1.39	0.950	0.01	1.5

Delay in care and reasons for avoiding professional consultation

Delay in medical consultation was primarily due to workplace inflexibility (49.2%), followed by internalized stigma (29.9%) and financial constraints (11.5%). Summarized in Table 11.

Table 11. Primary Reason for Delaying Medical Consultation for Migraine (N=321)

Reason	n	%
Workplace Inflexibility	158	49.2
Internalized Stigma	96	29.9
Financial Cost	37	11.5
Other Reasons	30	9.3

Discussion

This cross-sectional study examines barriers to formal migraine care among female corporate employees in Pakistan who heavily rely on OTC analgesics. Among the 321 participants, the average age was 35, with a majority being single (50.5%) or married

(42.4%). Migraine without aura was prevalent (64.5%), and about half experienced moderate to severe attacks, averaging 9.6 months before seeking consultation. Self-medication was common, with 33.0% using paracetamol and 28.7% using NSAIDs. Nearly half were moderate users of OTC analgesics, with 25.9% meeting criteria for MOH. Higher financial barriers were associated with lower income and entry-level positions. The main reasons for delaying consultation were workplace inflexibility (49.2%) and internalized stigma (29.9%), with financial cost cited by only 11.5%. Heavy OTC use was strongly linked to MOH (AOR 4.28), and financial barriers were independent predictors of MOH.

The observed MOH prevalence of 25.9 % among this cohort is markedly higher than estimates from the general population. A recent review of MOH management reported that worldwide, 0.5–2.6% of adults have MOH, with higher rates up to 7.6% in Russia, and that 11–70% of people with chronic headaches have MOH (Engelstoft et al., 2019; Gosalia et al., 2024). MOH is more common in adults aged 30–50 years and affects women three to four times more than men (Koonalintip et al., 2024). This aligns with our female, working-age sample. The high prevalence in our cohort likely reflects the selection of individuals with newly diagnosed migraine who are heavy users of OTC analgesics. It also reflects a broader cultural pattern of self-medication in Pakistan. An observational study of medication selling in Punjab found that analgesics constituted 39.4% of OTC purchases and that 47.8% of consumers considered their illness too minor to consult a doctor (Aziz et al., 2018). Analgesics, antibiotics, and other drugs are available without prescription from community pharmacies, and more than half of all medicines sold in Pakistan are supplied without a prescription (Aziz et al., 2018). Easy access and low cost, combined with inadequate enforcement of pharmacy regulations and heavy marketing of painkillers. In our Sample, nearly two-thirds were moderate to heavy users, which supports this trend.

Comparatively, a survey of 19,590 people in Japan with migraine reported that at least 62% used OTC medications in the past year and that 51.3% of those who consulted a doctor used OTC drugs at a higher frequency than prescription drugs (Ishii et al., 2025). Only 14.6 % discussed OTC use with their physicians, and one-third avoided medical consultation because they believed they could manage their migraine with OTC medication. Similarly, the US-based study found that only 35.1% of people with migraine had ever consulted a health professional (Lanteri-Minet et al., 2024). Our participants' heavy reliance on OTC drugs thus reflects both international patterns of self-management and context-specific drivers.

A key local driver is the cost and availability of migraine-specific medications. A two-year cohort study of migraineurs in Karachi reported that NSAIDs and combination analgesics were the most prescribed drugs and that around 33% of patients discontinued triptan therapy due to high cost (Khan et al., 2021). The total cost of migraine treatment for the cohort exceeded 297,000 Pakistani rupees (US\$1,901). Because Pakistan lacks universal healthcare and more than 60% of total health expenditure is paid out-of-pocket (Shaikh and Ali, 2023), few people can afford specialist consultations and neuroimaging. These financial constraints likely contribute to the preference for cheap OTC analgesics observed in our cohort and to the high MOH prevalence.

Despite significant financial barriers, workplace inflexibility emerged as the primary reason for delayed consultation (49.2%). Qualitative research on migraine self-management at work in Germany found that self-management is influenced by social interactions, job decision latitude and workplace design; greater autonomy and private spaces facilitate management whereas rigid schedules and unsupportive supervisors hinder it (Knauf et al., 2024). Our participants reported that strict schedules and fear of losing wages prevented them from seeking care. Pakistan's

labour laws provide limited protections for flexible work and maternity leave. According to the World Bank's Women, Business, and the Law 2024 report, Pakistan's legal framework score is 42.5/100, and the country lacks laws on flexible work arrangements and specialized bodies to handle complaints of gender discrimination (Bedford, 2024). Such policies could reduce the need for women to self-medicate because of fear of job loss or lost wages.

Stigma is a recognised barrier to migraine care. A comprehensive review on migraine stigma can lead individuals to hide their condition, avoid medical care and experience lower self-esteem (Casas-Limón et al., 2024). Historical gender stereotypes have portrayed migraine as a "women's disease", with women described as fragile (Edelstein, 2017). Male physicians historically viewed female migraineurs as psychologically unstable, which has contributed to women being dismissed when seeking care (Samulowitz et al., 2018). Women in patriarchal cultures like Pakistan may internalize such narratives and delay seeking healthcare.

Our regression analyses highlight heavy OTC use as the strongest predictor of MOH. Studies show that high baseline headache frequency and overuse of OTCs increase MOH risk (Koonalintip et al., 2024). Moreover, OTC users had higher financial barrier scores and were more likely to be unmarried. Financial barriers remained independently associated with MOH even after adjusting for OTC use. This suggests that economic constraints may exacerbate medication overuse by delaying access to appropriate care and preventive therapy (Brownlee et al., 2017).

The high prevalence of MOH and heavy OTC use among female corporate employees in Pakistan suggests an urgent need for targeted interventions. First, public health campaigns should raise awareness about the risks of medication overuse and the benefits of early consultation. The MOH review notes that prevention through education remains the most crucial management strategy (Kebede et al., 2023). Patients should be counselled that overusing NSAIDs can lead to chronic daily headaches. Second, improving access to affordable migraine care is vital. Subsidizing neurological consultations could alleviate financial barriers. Third, employers should adopt gender-sensitive workplace policies. Flexible scheduling, remote work options, private rest areas and supportive supervisors can empower employees to self-manage migraine effectively. These measures align with recommendations from the European Federation of Neurological Associations survey, where employees with migraine requested understanding managers, flexible working arrangements and private workspaces (Leonardi et al., 2024). Finally, addressing patriarchal norms is essential. Empowering women through education, equal pay, and decision-making autonomy can improve health-seeking behavior.

This study has several strengths. It is, to our knowledge, the first to examine barriers to migraine care and medication overuse among female corporate employees in Pakistan, a group exposed to unique socio-economic pressures and gender dynamics. Several limitations must be acknowledged. The cross-sectional design precludes causal inference. The study was conducted in English among women working in two urban centers and may not be generalized to rural Urdu-speaking women. Although we attempted to adjust for key covariates, unmeasured confounders such as mental health disorders, stress levels, caffeine intake, or hormonal factors may influence both analgesic use and MOH risk. The barrier scales, while adapted from validated instruments, might not capture all nuances of stigma and access relevant to the Pakistani corporate context. Finally, participants seeking their first neurology consultation may represent a subset with more severe or refractory migraines, inflating MOH prevalence. Prospective longitudinal studies with broader populations are needed to confirm these findings and evaluate the impact of interventions.

Conclusion

This study identifies those female corporate employees in Pakistan who rely on OTC analgesics for migraine face significant barriers to formal care, primarily workplace inflexibility and internalized stigma. Financial constraints, while present, were a secondary concern. Heavy OTC use was strongly linked to medication-overuse headache. These findings underscore the need for workplace policy reforms and awareness campaigns to address stigma and promote timely medical consultations.

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