

ORIGINAL ARTICLE

Assessing the Impact of Academic Stress on Tension-Type Headache Among Medical Students: Triggers, Remedies and Frequency

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Abstract

Tension-Type Headaches (TTH) are common neurological disorders having a significant impact on lifestyle and academic performance of medical students. The purpose of our study is to assess self-reported triggers and relieving interventions of headaches among medical students. Additionally, it evaluates the frequency and severity of headaches and investigates the relationship between medical students' academic stress levels and TTH. A quantitative, cross-sectional study was conducted from June to November 2024. Probability stratified sampling was employed to gather data online using a previously validated questionnaire which was ethically reviewed by ERC FUMC. Participants in this study included both genders and the age group (>17). Descriptive (frequency, mean, range, variance,

SD) and Inferential statistics tests (chi square) were analysed using IBM SPSS26. The sample consisted of medical students [n=201] between the ages of 18 and 24y [Mean=21y SD $\pm$ 3.33]. A total of n=125 [62.2%] females and n=76[37.8%] males participated in this study. Among them, n=144 [71.6%] people reported experiencing headaches at least twice in the preceding trimester. The two most common triggering factors were emotional discomfort n=133 [68.7%] and sleep deprivation n=167 [83.6%]. Paracetamol was the most often used analgesic n=139 [69.5%]. The chi-square test showed that TTH was significantly associated with gender with females reporting a higher incidence (n=98 (48.75%), p=0.006). It was also significantly associated with academic stress (n=125 (62.18%), p=0.000). Tension-type headaches were reported by more than two-thirds of the sample and show a strong significant relationship with sleep deprivation.

Key Words: *Tension-type headache; Medical students; Academic stress; Sleep deprivation; Mental health; Stress management*

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Introduction

Tension-Type Headache (TTH) is the most prevalent neurological disorder. It is characterized by recurrent headaches of mild to moderate intensity, either unilateral or bilateral. TTHs are differentiated as being either episodic or chronic [1]. More than 15 headache-affected days per month for more than three months might result in Chronic TTH (CTTH), which can be extremely painful and crippling. The Etiology involves the trigemino vascular system [2]. Because of the lack of precise diagnostic techniques and biomarkers, differentiating between TTH and migraine in clinical practice, research, and epidemiological studies can be difficult. Stress is widely demonstrated as a contributing factor in TTH [3]. In migraine and TTH patients, mental/cognitive stress and perceived daily stress were linked to increased pain perception, headache development, or increased transitory pain intensity. Although Myofascial Trigger Points (MTrPs) have been assessed using a variety of modalities, including MRI, micro dialysis, and ultrasound, ultrasound has the greatest potential [4]. However, there is currently no gold standard, and these techniques have not been thoroughly tested on headache patients. Findings indicate that using the anterior neck, jaw, and cranial muscles in CTTH treatment plans may also help reduce headache frequency and impairment [2,5,6].

Globally, multiple studies have been done assessing the impact of TTH among medical students. A study on medical students of Nepal suggested that the prevalence of headaches was 26.86% with TTH (69.23%) being the commonest one. It was found highest among fourth-year students (37.84%). Due to this problem, 63.09% students couldn't do their daily activities efficiently. More than half of them (53.85%) practiced self-medication with Non-Steroidal Anti-Inflammatory Drugs

(NSAIDs) in-case of pain not resolving on its own [6]. A study on Saudi female students found 29.5% prevalence of TTH. 61.1% of them reported family history. Paracetamol was the most commonly used analgesic [7]. Out of total of 352 individuals in a study on medical students of Kathmandu valley, prevalence of TTH was 40.3%. A study was conducted on the medical and dental students of Syria which stated that medical students have a higher prevalence of TTH (19.7%) as compared to dental and pharmaceutical students, but the difference is not statistically significant [8]. The most observed triggers were lack of sleep (70%), exam time (67%) and stress (61%). The common associated psychological factors were depressed mood (60.5%), anxiety (57.9%) and dissatisfaction with educational performance (52.7%). A study conducted on the medical undergraduates of Saudi Arabia reported that more than half of the participants (56.1%) experienced TTH [9,10].

TTH is recognized as one of the most troublesome primary headache disorders, and the findings of multiple research studies conducted across the globe highlight a global pattern of stress-related TTH among medical students. Limited research has been published regarding the occurrence of TTH among medical students of Pakistan [6-10]. A retrospective review of clinical data on different types of headache disorders in Pakistan reported that TTH was 2nd common type of headache with 58 patients out of 255 consecutive patients who presented at a headache clinic. Another cross-sectional nationwide prevalence survey regarding the headache disorders in adult general population suggested that 44.6% of them experienced TTH [11]. TTH was more prevalent in males. While other headaches peaked in the age group 40-49, TTH peaked a decade later. Out of 413 medical students in Karachi, 326 (79%) had TTH [12]. It was found to be significantly associated with self-reported disturbed sleep

patterns and stress TTH were also found to be present significantly in depressed patients. In a tertiary care hospital in Karachi, 16.9% depressed patients had TTH [13,14].

Tension-Type Headache (TTH) is one of the most common primary headache disorders and is frequently observed among medical students, primarily due to high levels of academic stress. Despite its widespread occurrence, there is limited research focusing specifically on the prevalence and contributing factors of TTH among medical students in Pakistan. Understanding the frequency, common trigger factors, and coping strategies for TTH in this population is essential for promoting student well-being and academic performance. This study aims to fill the existing knowledge gap by providing valuable insights into the patterns, causes, and management approaches of TTH among Pakistani medical students.

Methodology

Study setting

The proposed study is a quantitative, cross-sectional study that was conducted at Fauji Foundation Hospital (FFH), Islamabad over a period of 6 months from february to july 2024 following ethical approval from Ethical Review Committee (ERC). The informed and written consent of the students was also signed before data collection. Probability stratified sampling was employed to gather data online using a previously validated questionnaire.

Study population

The study population consisted of both genders and age group (18-24). The sample size was estimated to be 201 using RaoSoft sample size calculator with a 95% confidence interval, 5% margin of error, and 50% prevalence. The inclusion criteria consisted of male and female adults (>18 years of age and medical students of all academic levels. Exclusion criteria include

medical students with a prior diagnosis of migraine disorders or neurological conditions and those who do not consent to the study.

Data analysis

The dependent variables included Tension-Type Headaches (TTH), triggers, remedies and frequency. While the independent variables were academic stress, gender, year of study, sleep quality and screen time. Academic stress, emotional stress and sleep deprivation were assessed using single self-report items included in the validated questionnaire. Data was analyzed using SPSS version 26, with both descriptive (mean, median, mode, frequency) and inferential statistics (chi-square) applied with statistical significance set at $p < 0.05$.

Data reporting

Results will be presented through textual summaries, tables, and graphical representations such as bar charts, pie charts, and histograms.

Results

Participant characteristics

In this research study, we analyzed 201 responses from different years of MBBS study which included $n=76$ (37.8%) males and $n=125$ (62.2%) female participants as shown in Table 1. The maximum participation was shown by 3rd Year $n=91$ (45.3%) and least participation was shown by 5th Year $n=13$ (6.5%) shown in Table 2. The participants were surveyed regarding the trigger and psychological factors associated with Tension-Type Headaches (TTH).

Prevalence of TTH

Figure 1 shows the percentages of study participants who experienced TTH and of those who did not. A significant number of individuals $n=144$ (71.6%) reported having experienced headaches at two or more occasions in the last three months.

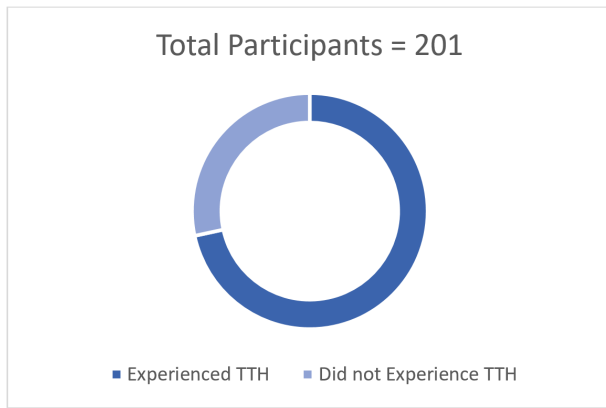


Figure 1) Prevalence of tension-type headache among study participants.

Tables 1, 2 and 3 represent the demographic profile of the participants.

TABLE 1

Gender distribution of study participants.

Gender	No. of participants
Male	76
Female	125

TABLE 2

Distribution of study participants according to academic year.

Academic year	No. of participants
First year	57
Second year	21
Third year	91
Fourth year	19
Final year	13

TABLE 3

Participants distribution according to marital status.

Marital status	No. of participants
Single	192
Engaged	7
Married	2

Headache severity across academic years

10 out of 57 (17.54%) first year students, 5 out of 21 (23.81%) second year students, 14 out of 91 (15.38%) third year students, 3 out of 19 (15.79%) fourth year students and 1 out of 13 (7.69%) final year students reported

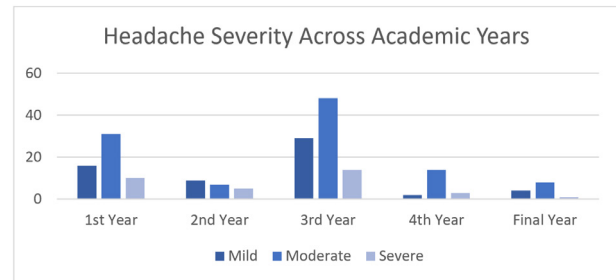


Figure 2) Headache severity across various academic years.

severe headaches. Figure 2 represents headache severity (mild, moderate, severe) across various academic years.

Trigger factors

When asked about trigger factors that most caused their episode of TTH, following results were obtained. Lack of sleep (83.6%), emotional distress (68.7%) and noise (65.2%) were the most common trigger factors. Figure 3. represents all the trigger factors experienced by the participants.

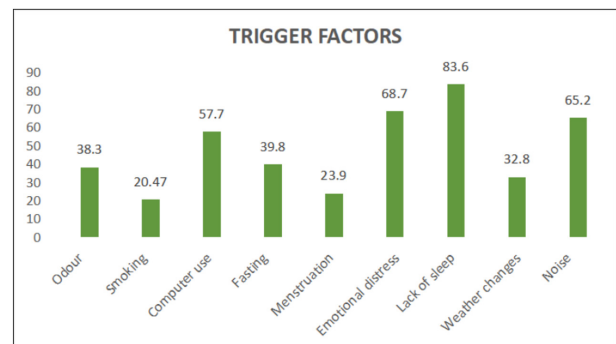


Figure 3) Trigger factors.

Stress, sleep and psychological factors

Higher levels of stress and insufficient sleep were associated with increased frequency and intensity of TTH. People who reported higher levels of stress had a higher prevalence of TTH, which supports the idea that psychological stress is a major cause. Insomnia symptoms also increased the likelihood of frequent and persistent TTH episodes in subjects. Figures 4 and 5 represent the prevalence of insomnia and stress in the participants with tension-type headaches.

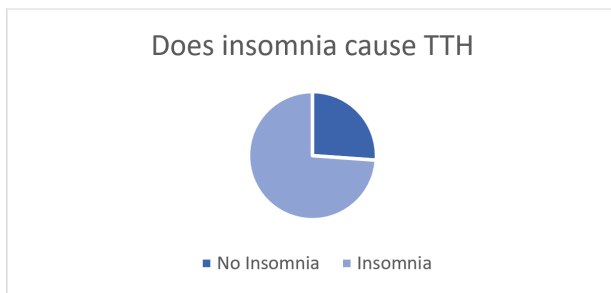


Figure 4) Association of insomnia with TTH.

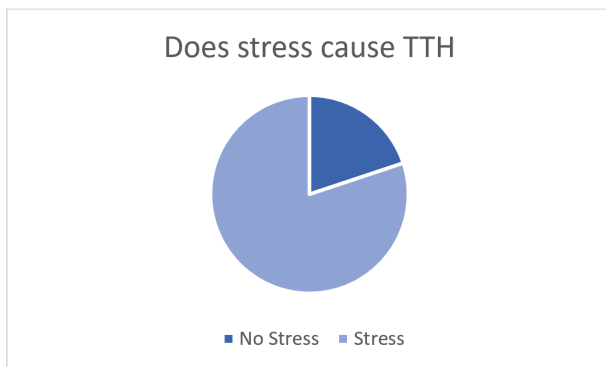


Figure 5) Association of stress with TTH.

Chi-square associations

Chi-square analysis was performed to evaluate the association between various independent variables and the presence of Tension-Type Headache (TTH) among medical students. A statistically significant association was observed between gender and TTH, with a higher prevalence among female participants ($n=98$ (48.75%), $p=0.006$). Similarly, academic stress showed a strong and statistically significant association with TTH occurrence ($n=125$ (62.18%), $p=0.000$). Other variables, including sleep duration, screen time, and year of study, did not demonstrate a statistically significant association with TTH ($p>0.05$) (Table 4).

TABLE 4

Association between independent variables and presence of tension-type headache using the Chi-square test.

Independent variable	TTH present n (%)	TTH absent n (%)	P-value
Stress			
Yes	125 (62.18)	35 (17.41)	0.000*
No	19 (9.45)	20 (9.95)	
Gender			
Female	98 (48.75)	27 (13.43)	0.006*
Male	46 (22.88)	30 (14.92)	
Academic year			
First year	41	16	0.961
Second year	15	6	
Third year	64	27	
Fourth year	15	4	
Final year	9	4	

Note: indicates p-value is significant

Discussion

This study highlights a significantly high prevalence of Tension-Type Headache (TTH) among medical students in Pakistan, with 71.6% of participants reporting recurrent episodes within the last three months. These findings are consistent with earlier studies from various countries that documented high rates of

TTH among medical students, with prevalence ranging between 26% to 79% [6-10,13]. The elevated rates in our sample align more closely with the higher end of that spectrum, which could be due to differences in academic stress levels, cultural stigma around help-seeking, or inadequate mental health support structures in Pakistani medical institutions, pointing to an urgent need for psychological or institutional

interventions to support well-being of the students.

A notable outcome of the study was the statistically significant association between female gender and TTH ($p=0.006$), which mirrors previous research suggesting that women are more susceptible to primary headache disorders, potentially due to hormonal fluctuations and other stressors [1,4]. Highlighting how susceptible they are to stress-related diseases like TTH, female medical students may also encounter particular difficulties like gender discrimination, security concerns, and caregiving responsibilities outside of their academic lives. Therefore, implementing gender-sensitive mental health therapies may provide focused relief. Similarly, a strong association was observed between academic stress and the incidence of TTH ($p=0.000$), reinforcing the concept that chronic stress is strongly related to the development and maintenance of TTH, especially in high-pressure environments like medical colleges [4,9].

The most common trigger factors reported by participants were lack of sleep (83.6%), emotional distress (68.7%), and noise (65.2%). These findings are consistent with prior studies in Syria, Saudi Arabia, and Nepal, where lack of sleep, examination periods, and psychological factors such as anxiety and dissatisfaction with academic performance were common indicating that lifestyle related and environmental factors often precipitate TTH episodes [7,9,10,13]. Additionally, the presence of insomnia and elevated stress levels were strongly correlated with both the frequency and intensity of TTH episodes. This supports the biopsychosocial model of headache Etiology, which posits that physical, emotional, and environmental stressors collectively influence headache pathophysiology [4,5]. Insufficient exposure to stress management training during the curriculum may result in students lacking strategies for adaptive coping. Chronic headaches are facilitated by these complex factors, particularly when they are coupled

with inconsistent dietary behaviours, irregular routines, and inadequate sleep.

Interestingly, no statistically significant association was observed between TTH and variables such as academic year, sleep duration, or screen time in our sample, in contrast with some international studies where year of study or screen exposure showed stronger links [6,10]. This could reflect a uniform exposure to stressors across academic levels in our context, or the presence of more dominant influencing factors such as chronic stress and gender-related vulnerability.

It is possible that students across all academic years are similarly exposed to the stressors that contribute to TTH, and the lack of variability in these exposures might explain the non-significant association. On the other hand, research from other countries has demonstrated that advanced academic year and screen time surpassing 6 hours per day are predictive of higher headache frequency. Cultural perspectives on the usage of digital media or structural variations in medical curricula may be the cause of this disparity. The lack of association between screen time and TTH may reflect uniform technology habits across students or cultural differences in device use compared to other countries.

Despite its strengths, this study is not without limitations. First, the use of a self-reported questionnaire introduces the potential for recall bias and underreporting, particularly regarding headache frequency and severity. Second, the study's cross-sectional design restricts our ability to infer causality between identified risk factors and TTH. Lastly, factors such as family history of headaches and caffeine consumption, were not explored, though they may have contributed to the headache burden.

The current study's findings are crucial as they help fill a knowledge gap in the Pakistani context, where research on TTH among medical students remains limited. Previous local studies either focused on the general population or lacked detailed analysis of

psychosocial correlates [11-13]. Our findings emphasize the need for preventive and coping strategies to be incorporated into student health programs. Mental health counselling, sleep hygiene education, and stress management workshops could serve as effective tools in mitigating TTH prevalence among medical students. Furthermore, qualitative research could investigate medical students' subjective experiences of stress and coping mechanisms, providing more in-depth understandings that quantitative data can miss. This study was student-led and conducted without external funding, which limited the scope and sample

size. Despite these constraints, the research provides valuable insight into academic stress and tension-type headache among medical students.

Conclusion

Medical students frequently get tension-type headaches, which are strongly linked to sleep deprivation, mental distress, and academic stress. Reducing the burden of TTH and enhancing students' general well-being and academic achievement may be possible by addressing these causes through stress management and lifestyle interventions.

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