JoTH Journal of Tropical Health

Research Article

Prevalence of Migraine and its Impact on Academic Performance among Medical Undergraduates in Sri Lanka: A Cross-Sectional Study

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Abstract

Introduction: Migraine is a common and disabling neurological disorder that frequently affects young adults, particularly medical undergraduates exposed to substantial academic stress. Migraine-related symptoms may impair cognitive function and academic performance. However, evidence on its burden among Sri Lankan medical undergraduates is limited. This study aimed to determine the prevalence of migraine and its impact on academic performance.

Methods: A cross-sectional study was conducted among 384 medical undergraduates at the Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka. Data was collected using self-administered validated questionnaires. Migraine was assessed using the validated ID-Migraine screening tool, and self-reported academic performance was evaluated using the Academic Performance Scale.

Results: The prevalence of migraine was 31%, with a significantly higher prevalence rate among females (33.7%, p=0.02). Self-reported academic performance is significantly lower among individuals with migraine (mean=27.33, SD±5.46, p=0.02) compared to those without migraine (mean=28.82, SD±6.16).

Conclusion: Migraine is significantly prevalent among medical undergraduates with female preponderance. Academic performance is significantly lower among individuals with migraine compared to those without migraine. These findings highlight the need for early identification and appropriate management of migraine among medical undergraduate.

Keywords: Migraine, headache, photophobia, academic performance, medical undergraduates

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Funding: None
Competing interests: None
Received: 02 July 2026 **Accepted:** 24 October 2026 **Published:** 08 November 2026

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Cite this article as: Kumari MV et al. Prevalence of migraine and its impact on academic performance among medical undergraduates in Sri Lanka: A cross-sectional study. Journal of Tropical Health 2026;2 (3): 32-39. DOI: https://doi.org/10.4038/joth.v2i3.84

Introduction

Migraine is a common, recurrent, and disabling neurological disorder [1]. Migraine is described as a recurrent neurological disorder with attacks that may include an aura phase (visual, sensory, language, or brainstem disturbances) [2]. It is commonly associated with multiple symptoms beyond headache, including sensory, autonomic, and cognitive dysfunction across different phases of the attack [2]. It is considered one of the leading causes of disability worldwide among young adults, particularly those in high-stress academic environments with inadequate sleep, such as medical undergraduates [3,4]. Although migraine is a

benign condition in terms of mortality, its impact on quality of life, daily functioning, and academic productivity is substantial [5].

Medical undergraduates represent a particularly vulnerable population for migraine due to exposure to multiple physiological and psychological stressors. Chronic academic stress can activate the hypothalamic–pituitary–adrenal (HPA) axis and sympathetic nervous system, leading to hormonal and neurochemical changes that predispose to migraine [6]. Sleep deprivation, irregular sleep–wake cycles, missed meals, dehydration, prolonged screen exposure, and high caffeine intake further contribute to disruption of neuronal homeostasis and cortical excitability, increasing susceptibility to cortical spreading depression and trigeminovascular activation [6].

Migraine is also associated with significant functional impairment, including reduced attention, impaired working memory, decreased processing speed, and diminished executive function [7]. These neurocognitive effects, along with pain and sensory symptoms, can negatively influence academic performance and daily functioning [8]. Despite this, there is limited evidence from Sri Lanka describing the burden of migraine and its impact on academic outcomes among medical undergraduates. Therefore, this study aimed to determine the prevalence of migraine and its impact on academic performance among medical undergraduates in Sri Lanka. Understanding this relationship is important for identifying at-risk students and developing strategies to reduce disease burden and improve academic productivity in this population.

Methods

Study design, setting, and study participants

A cross-sectional study was conducted to assess the prevalence of migraine and its impact on academic performance among medical undergraduates at the Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka. In Sri Lanka, the medical degree program offers five years and is structured into two main phases: pre-clinical and para-clinical. The pre-clinical phase covers the first two academic years, and the clinical phase includes the third, fourth, and final years. As inclusion criteria, medical undergraduates from the 1st, 2nd, 3rd, 4th and final academic years were included in this study. As exclusion criteria, students already known to have neurological disorders and psychiatric disorders were excluded after data collection.

Sample size calculation

The sample size was calculated using the following formula. The proportional value was 0.5.

$$n = \frac{Z^2 p\,(100 - p)}{d^2}$$

$$n = \frac{1.96^2 \times 0.5\,(1 - 0.5)}{0.05^2}$$

$$n = 384.16$$

Minimum sample size required = 384

Data collection and ethical consideration

Ethical approval for this study was obtained from the Ethics Review Committee of the Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka (ERC/2024/36). All medical undergraduates were informed that participation was voluntary, and they were free to withdraw from the study at any point without any consequences. An information sheet detailing the study objectives and procedures was provided to each participant. Informed written consent was obtained before the commencement of data collection.

Data were collected using a self-administered questionnaire distributed through an online platform via Google Sheets. Considering the non-response rate, this online questionnaire was distributed among all the students who were present on the date of data collection (Figure 1). The questionnaire comprised two sections: Part I assessed migraine-related information, using the identification of migraine (ID-migraine) validated screening tool [9], while Part II assessed self-reported academic performance. Since the MBBS curriculum is delivered entirely in English and students are well-versed in medical terminology, the questionnaire was administered in English. However, additional clarification was offered whenever required by participants.

Assessment of migraine

The ID Migraine questionnaire was used as a screening tool for migraine [9]. It is a brief, self-administered screening instrument consisting of three yes/no questions assessing three migraine-associated features: nausea or stomach upset, headache-related disability, and photophobia (increased sensitivity to light). Each "yes" response was assigned one point, giving a total score ranging from 0 to 3. A total score of ≥2 out of 3 was considered a positive migraine screen and classified as a probable case of migraine.

The three-item questionnaire has demonstrated a sensitivity of 81% and a specificity of 75% for identifying migraine. Furthermore, a history of migraine was assessed through self-report by asking participants whether they had a previous history of migraine. This information was based on participants' responses.

Assessment of self-reported/perceived academic performance

The validated Academic Performance Scale (APS) questionnaire [10] is a self-administered instrument consisting of eight items designed to assess students' perceived academic-related behaviours and performance. Each item is rated on a 5-point Likert scale, with responses scored from 0 to 5. The total score ranges from 0 to 40, with higher scores indicating better perceived academic performance. The scale has demonstrated good internal consistency, with a reported reliability coefficient (Cronbach's alpha) of 0.89 [10]. Based on the predefined scoring criteria, total scores of 33–40 indicate excellent performance, 25–32 good performance, 17–24 moderate performance, 9–16 poor performance, and 0–8 failing performance. The APS has been validated in the population reported in the original validation study; however, it has not been specifically validated in a Sri Lankan student population.

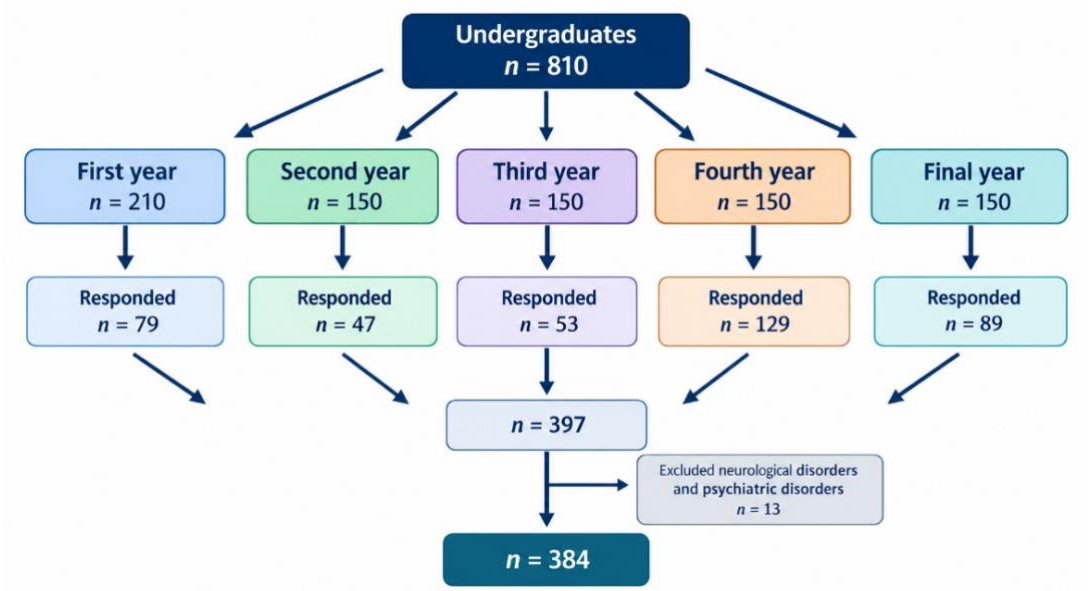


Figure 1: Flow diagram for study participants

Statistical Analysis

Data were analysed using SPSS 26 statistical software. Descriptive statistics were used to present the frequency and percentages for each dimension: prevalence of migraine. A logistic regression model was used to assess the association of migraine with recurrent headache. An unpaired t-test was used to compare the self-reported academic performance score between individuals with migraine and those without migraine.

Results

Prevalence of migraine

A total of 384 medical undergraduates participated in the study. The overall response rate was 49%. The mean age of the participants was 22.14 years (SD = 1.61), with a median age of 23 years, ranging from 18 to 29 years (IQR: 21-24 years). The study population consisted of 120 males (31.3%). The prevalence of migraine among medical undergraduates was 31%. The prevalence of migraine was significantly higher among females (33.7%) compared with males (25%; p=0.02). Fourth-year medical undergraduates recorded the highest prevalence rate of migraine (32.8%) compared with other batches (Figure 2). Recurrent headache (two or more episodes in the last 3 months) was significantly associated with migraine (OR: 6.6, 95% CI: 3.7 - 11.7, p<0.001).

Self-reported academic performance among medical undergraduates and its association with migraine

Among the medical undergraduates, 0.8% had poor performance, 29.7% had moderate performance,

45.3% had good performance, and 24.2% had excellent performance. Figure 3 demonstrates the self-reported academic performance for individual academic years. 50% of second-year students show excellent performance. Self-reported academic performance is significantly lower among individuals with migraine (mean=27.33, SD±5.46, p=0.02) compared to those without migraine (mean=28.82, SD±6.16) (Figure 4)

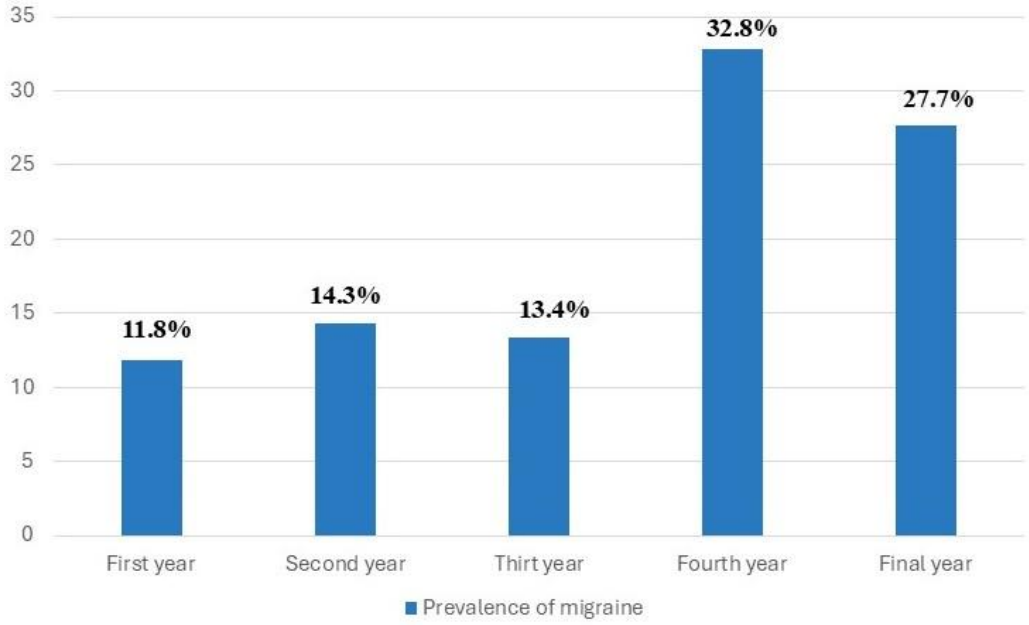


Figure 2: Prevalence of migraine across the academic year

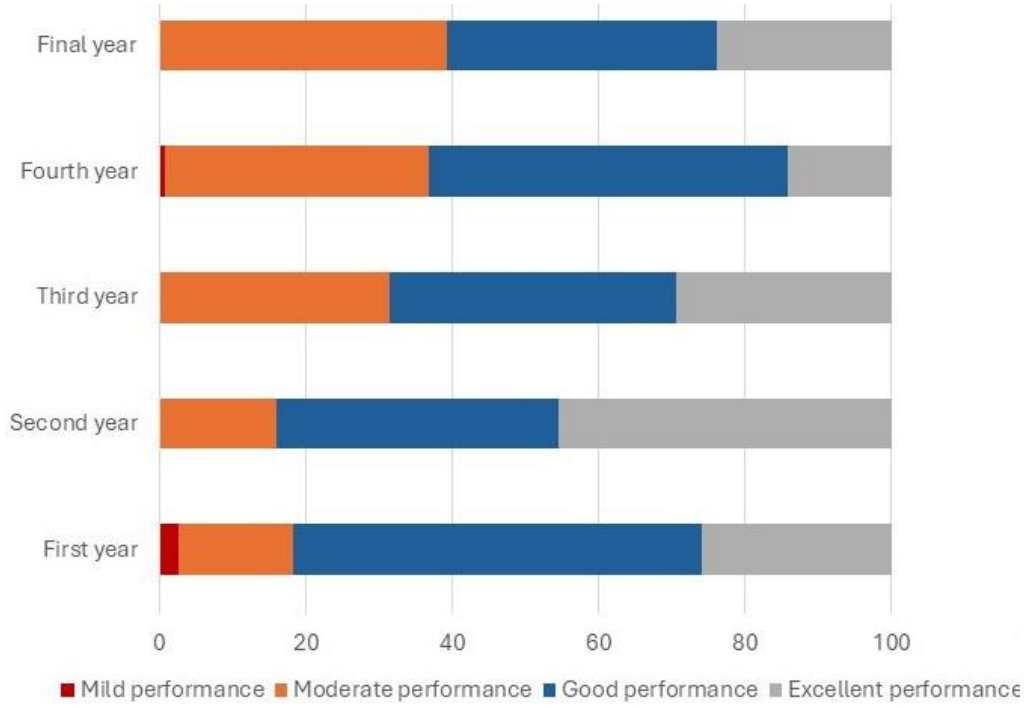


Figure 3: Self-reported academic performance across academic years

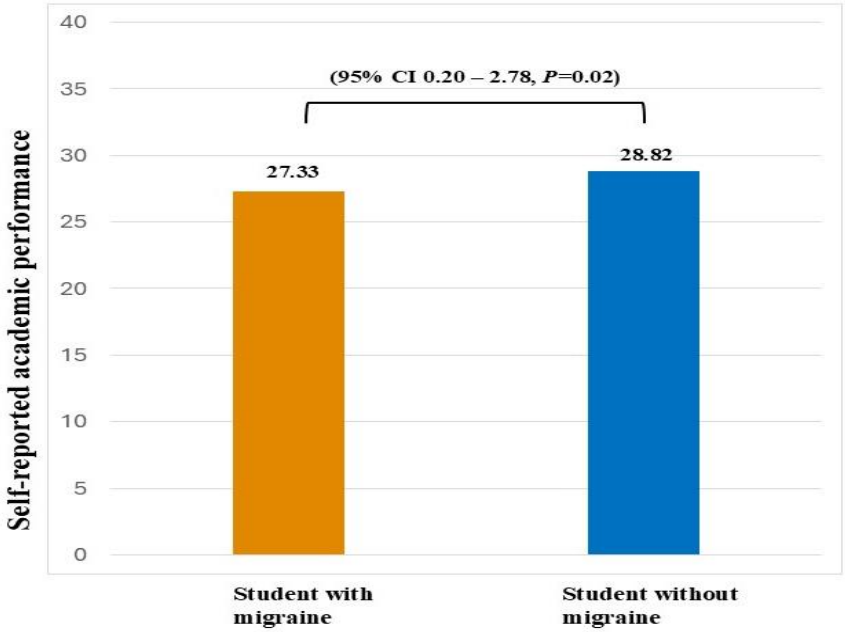


Figure 4: Self-Reported academic performance among medical undergraduates with and without migraine

Discussion

In our study, the prevalence of migraine was 31%. The prevalence of migraine was significantly higher among females compared with males. Recurrent headache was significantly associated with migraine. Academic performance is significantly lower among individuals with migraine compared to those without migraine.

In our study, the prevalence of migraine was 31%. Similarly, a study conducted among medical undergraduates in India reported the prevalence of migraine was 28% [11]. However, our prevalence is higher than that reported in several studies conducted among medical students in other countries, including Saudi Arabia (26%) [12], Russia (28%) [13], and China 7.9%) [14]. These differences may be explained by variations in the demographic characteristics of the study populations, diagnostic criteria used for migraine identification, study design, sample size, and cultural and environmental factors. In addition, differences in academic workload, psychological stress, sleep quality, lifestyle behaviours, and healthcare-seeking practices among medical students across countries may have contributed to the observed variation in migraine prevalence. Notably, Medical undergraduates are particularly vulnerable to migraine because they are frequently exposed to multiple migraine-provoking factors, including chronic academic stress, sleep deprivation, irregular sleep patterns, prolonged screen exposure, missed meals [11], dehydration, excessive caffeine consumption, and reduced physical activity [12].

In our study, the prevalence of migraine was significantly higher among females compared with males. Similarly, a study conducted among medical undergraduates in India reported a female preponderance of migraine, with females being more frequently affected than males [12]. Another study conducted among medical undergraduates in Saudi Arabia reported that the prevalence of migraine was significantly higher among females than males [13]. In contrast, a study conducted among medical undergraduates in China found that there is no significant difference between the prevalence of migraine and gender [15]. Hormonal and neurobiological factors may explain the higher prevalence of migraine among females. Fluctuations in estrogen levels, particularly the decline in estrogen that occurs during the menstrual cycle, can increase susceptibility to migraine by modulating excitability within the trigeminovascular system [16]. Estrogen influences several neurotransmitter systems involved in pain processing, including serotonergic, dopaminergic, and glutamatergic pathways [17]. A reduction in estrogen levels is associated with decreased serotonergic activity and reduced endogenous pain inhibition, which may facilitate activation of trigeminal nociceptive pathways [16]. In addition, estrogen withdrawal can enhance cortical excitability and promote the release of vasoactive neuropeptides

such as calcitonin gene-related peptide (CGRP), contributing to neurogenic inflammation and vasodilation of intracranial vessels [18]. These hormonal fluctuations, combined with genetic and psychosocial factors, make females more vulnerable to migraine compared with males.

In our study, recurrent headache was significantly associated with migraine. Similarly, a study conducted among medical undergraduates in India reported that recurrent headache was highly prevalent among individuals with migraine [12]. Moreover, a study conducted among medical undergraduates in Croatia reported that migraine was one of the most common recurrent primary headache disorders among medical undergraduates [19]. This association is expected because recurrent headache is a hallmark feature of migraine and forms part of its diagnostic criteria [20]. Migraine is a chronic episodic neurological disorder characterised by repeated attacks of headache resulting from recurrent activation of the trigeminovascular system [2]. During a migraine attack, activation of trigeminal nerve fibres leads to the release of vasoactive neuropeptides, particularly calcitonin gene-related peptide (CGRP), substance P, and neurokinin A [21]. These mediators induce neurogenic inflammation, vasodilation, and sensitisation of peripheral and central pain pathways [22]. Repeated activation of these mechanisms lowers the threshold for subsequent attacks through central sensitisation, making affected individuals more susceptible to recurrent headache episodes [23]. Therefore, individuals with migraine typically experience recurrent headaches over time.

Our study reported that self-reported academic performance was significantly lower among individuals with migraine compared to those without migraine. Similarly, a study conducted among medical undergraduates in Malaysia reported that migraine was significantly associated with higher functional disability scores, and individuals with migraine experienced greater impairment in daily and academic functioning compared with individuals without migraine [5]. The observed association between migraine and impaired work ability, as well as reduced academic performance, can be explained by the underlying neurobiological mechanisms of migraine. Migraine is associated with transient impairment of higher cortical functions, including attention, processing speed, working memory, and executive function [7]. Functional neuroimaging studies have demonstrated altered activity in the prefrontal cortex and thalamocortical networks during migraine attacks, which are critical for maintaining concentration and task performance [8]. These neurophysiological disturbances, combined with pain and sensory hypersensitivity, significantly reduce an individual's ability to sustain academic and occupational activities during attacks. Repeated episodes further contribute to cumulative disability, explaining the significantly higher functional impairment observed in individuals with migraine compared to those without migraine.

In the present study, use of validated instruments enhances the reliability and validity of the findings. The present study has several limitations. Migraine was identified using a validated screening tool rather than a clinical diagnosis based on the International Classification of Headache Disorders (ICHD) criteria, which may have resulted in misclassification. Further, academic performance was assessed using students' self-perceptions rather than objective academic records, potentially introducing subjective bias. A further limitation is that the Academic Performance Scale (APS) has not been specifically validated in the Sri Lankan medical undergraduate population. Therefore, the possibility of cultural or contextual differences in the interpretation of the scale cannot be excluded. Finally, as the study was conducted in a single medical faculty, the findings may not be generalizable to all medical undergraduates in Sri Lanka.

Conclusion

Migraine is significantly prevalent among medical undergraduates with female preponderance. Academic performance is significantly lower among individuals with migraine compared to those without migraine. These findings highlight the need for early identification and appropriate management of migraine among medical undergraduates.

Acknowledgement: We wish to thank all the medical undergraduates who enthusiastically participated in this study.

Competing interests: The authors declare that there is no conflict of interest.

Funding: This study was self-funded and did not use grants from any public, commercial or non-profit sectors.

Author Contribution: MVK conceptualised the study, contributed to designing the study, project administration, data analysis, interpretation, writing the manuscript and critically analysed the final manuscript for important intellectual content. JNAJ,

NTI, MMAI, WAHI, and WHAL contributed to designing the study, data collection and data entry. TI contributed to data analysis, data interpretation and writing the manuscript. All authors approved the final manuscript.

Patient and public involvement: Patients and/or the public were not involved in the design, conduct, reporting, or dissemination plans of this research.

Patient consent for publication: Not applicable.

Ethics approval: This study involves human participants, and all procedures involving research, consent of study participants, data analysis and publication were approved by the Ethics Review Committee of the Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka; Reference number: (ERC/2024/36).

Data availability statement: Data are available on reasonable request. Please get in touch with Dr Manori Vijaya Kumari (manoadikari@med.rjt.ac.lk).

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