

Academic Stress as a Trigger Factor for Migraine in College Students: A Literature Review

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ABSTRACT

Introduction: Migraine is a common primary headache disorder among college students and is closely associated with impaired academic performance and reduced quality of life. Students are particularly vulnerable because they are exposed to academic stress, irregular lifestyles, and poor sleep. Academic stress is among the most frequently reported triggers of migraine attacks; however, its role is shaped by multiple interacting factors. This review examines academic stress as a trigger factor for migraine in college students.

Result: A narrative synthesis shows that migraine in college students is multifactorial, involving neurovascular mechanisms, genetic predisposition, hormonal influences, lifestyle habits, and psychological factors. Academic stress arises from academic demands such as examinations, assignments, time pressure, and performance expectations. Higher stress levels are consistently associated with greater frequency and severity of migraine attacks. Prolonged stress may activate the sympathetic nervous system and hypothalamic–pituitary–adrenal axis, producing hormonal changes and heightened pain sensitization. Lifestyle factors frequently seen among students, including poor sleep quality, irregular meals, dehydration, and limited physical activity, further increase migraine vulnerability. Nevertheless, some studies report inconsistent associations, indicating that academic stress is not an isolated determinant.

Conclusion: Academic stress significantly contributes to migraine in college students, especially when combined with poor sleep and unhealthy lifestyle patterns. However, migraine does not result from academic stress alone but from complex interactions among biological, psychological, and environmental factors. Preventive strategies should therefore be holistic, incorporating stress management, lifestyle modification, and psychosocial support within academic settings.

Academic Stress, Migraine, College Students, Primary Headache, Psychological Stress

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INTRODUCTION

Migraine is a primary neurological disorder characterized by recurrent headaches that reduce the quality of life and productivity of the affected individuals [1]. Several studies have found that migraine is more common among students than in the general population [2]. Approximately 15% of the global population experiences migraine, with a 10–20% lifetime probability of developing it, which is influenced by demographic factors such as sex and age [3]. Migraine is often associated with various factors, including female sex, estrogen, metabolic syndrome, sleep quality, and psychological factors [4,5]. Many psychological factors can influence migraine, such as stress, panic disorder, anxiety, phobias, obsessive–compulsive disorder, post-traumatic stress disorder, personality disorders, bipolar disorder, depression, and attention-deficit/hyperactivity disorder [6].

Stress is one of the main risk factors and most frequent trigger for migraine because of its direct effect on the autonomic nervous system and neuroendocrine system, which can activate pain receptors [7]. Stress in

students may be caused by academic, social, family, personal, and financial factors that provoke physical and mental responses [8]. Academic stress is one of the main triggers of migraine in students because of its relationship with academic activities [9]. It is driven by the demands of assignments, evaluations, and academic expectations [10]. Considering the multifactorial nature of migraine and its impact on students, this literature review is important for understanding the relationship between academic stress and migraine.

DISCUSSION

Migraine is a primary headache characterized by recurrent, throbbing, unilateral, moderate-to-severe pain accompanied by symptoms such as nausea, photophobia, and phonophobia [11]. It arises from complex processes, including activation of the trigeminovascular system and the release of inflammatory mediators that produce pain [12]. Migraine is considered one of the leading causes of disability in the productive age group, including students, affecting daily activities, lectures, and quality of life [2]. Its pathophysiology involves activation of the trigeminovascular system, which causes vasodilation of intracranial vessels and the release of inflammatory factors, thereby activating nociceptors.

The multiple pathways of migraine pathophysiology can be triggered by lifestyle patterns—irregular meal schedules, caffeine consumption, inadequate water intake, and low physical activity—commonly seen in the busy schedules of students, potentially worsening migraine symptoms [13]. Genetic predisposition and hormonal factors also contribute to migraines, particularly in women of productive age [11]. Therefore, migraine is rarely caused by a single factor but rather by a combination of interacting factors [4]. In students, the combination of stress, insufficient sleep, and irregular lifestyles increases migraine vulnerability, peaking during intense academic activities [5]. These mechanisms may be triggered by demographic factors (age and female sex), metabolic syndrome, hormonal factors (estrogen), sleep disorders, and psychological factors [14-16]. The psychological factors involved span a broad spectrum, ranging from stress to various mental disorders [6]. Stress is a life crisis that can hinder daily activity [17]. It is defined as the relationship between an individual and the environment that may exceed or burden the individual's available resources [18]. Stress is perceived differently by each person, producing negative emotions, discomfort, physiological changes due to sympathetic activation, and behavioral changes [19]. In students, this may be triggered by academic stress [9]. Stress in students can arise from academic, social, family, personal, and financial factors that provoke physical and mental responses [8]. Stress is recognized as one of the main risk and trigger factors for migraine because of its direct effect on nociceptor activation [7]. Prolonged psychological stress can increase the levels of stress hormones and affect neural pain pathways [20,21].

Academic stress arises when academic demands are perceived as exceeding an individual's capacity [22]. These demands include assignments, evaluations, grades, time pressure, and academic competition. Chronic stress can cause sleep disturbance and fatigue [13]. and may produce somatic symptoms such as primary headaches, including migraine. Increased stress is associated with a higher frequency of migraine attacks and reduced quality of life [21]. Stress is thought to influence migraine through activation of the sympathetic nervous system, changes in stress-inducing hormones, and heightened pain sensitization [20]. Other mechanisms, such as genetic variation in vascular tone, ion balance, and neuronal excitability, may also influence migraine [23]. Stress responses involving activation of the hypothalamic–pituitary–adrenal (HPA) axis, which raises stress hormones, together with dysfunction of pain-inhibitory pathways, increase the likelihood of migraine [24]. However, some studies have shown no significant association, indicating that stress is an important but not the sole determinant of migraine [21]. The daily life of students is filled with academic activities involving tight schedules and heavy demands. Academic stress occurs in students who face particular academic demands and standards and perceive these as a burden that produces negative emotions and discomfort [25]. Several studies examining academic stress and migraine in students report that stress levels are associated with primary headache (migraine), with moderate stress levels being more common than other levels [20]. Nevertheless, exposure to academic stress is influenced by the year of study and field of study, as the academic demands encountered vary [26,27]. The combination of academic stress, poor sleep quality, and irregular lifestyles can increase students' vulnerability to migraine [9].

Overall, the reviewed evidence indicates that migraine is a health problem frequently found among students that affects both their daily and academic activities [1]. Migraine can reduce concentration, affect attendance, and disrupt the learning process [2]. Conceptually, migraine is a multifactorial disorder involving interactions among neurovascular mechanisms, pain nerve sensitivity, and psychological and environmental factors [12]. This is consistent with previous research identifying stress as an important factor in migraines [5]. Among the various types of stress to which students are exposed, academic stress is closely related to their daily activities [25]. In college students, academic stress arises from assignments, examinations, and performance expectations, and several studies have reported that increased stress is associated with a greater frequency and severity of migraine attacks, although these findings are often influenced by confounders such as lifestyle and sleep quality [10]. Taken together, academic stress plays a role as one of the factors related to migraine in college students, but it is not the sole cause; therefore, preventive approaches should address biological, psychological, and environmental aspects [21].

CONCLUSION

Migraine is a primary headache common among college students that affects academic activities and quality of life. This multifactorial condition is shaped by biological and psychological factors, sleep quality, and the learning environment. Stress significantly contributes to migraine. In college students, academic stress is associated with migraine occurrence and, in several studies, with increased attack frequency and severity. Thus, academic stress is a factor associated with migraine in students, but it interacts with other factors. Preventive measures include stress-management education, lifestyle modification, and psychosocial support in academia.

DECLARATIONS

None

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AUTHORS' CONTRIBUTIONS

ANS conceived the review, conducted the literature search, screened and appraised the sources, and drafted the manuscript. YI supervised the review, contributed to its conception and design, and critically revised the manuscript for its important intellectual content. Both authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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