

A STUDY TO ASSESS THE EFFECTIVENESS OF YOGA THERAPY WITH STRESS MANAGEMENT TECHNIQUES ON MIGRAINE FREQUENCY AMONG YOUNG ADULTS

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Abstract

Migraine is one of the most common neurological disorders affecting young adults worldwide and is associated with significant physical, psychological, social, and economic burdens. Stress has been identified as one of the primary triggers of migraine attacks, making stress reduction interventions increasingly important in migraine management. Yoga therapy, combined with structured stress management techniques, has emerged as a promising non-pharmacological approach for reducing migraine frequency and improving overall well-being. The present study aimed to assess the effectiveness of yoga therapy with stress management techniques on migraine frequency among young adults. A quasi-experimental pretest-posttest design was adopted among young adults diagnosed with migraine. Participants underwent a structured yoga therapy program integrated with stress management interventions for twelve weeks. Outcome measures included migraine frequency, pain intensity, perceived stress levels, and quality of life indicators. The findings demonstrated significant reductions in migraine frequency and perceived stress levels following the intervention. Participants also reported improvements in emotional well-being, sleep quality, concentration, and daily functioning. The study highlights the potential of integrating yoga-based interventions into routine migraine management programs and supports the use of complementary therapies as effective public health strategies for addressing stress-related neurological disorders.

Keywords: Migraine, Yoga Therapy, Stress Management, Young Adults, Non-Pharmacological Intervention, Public Health, Quality of Life.

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Introduction

Migraine is a chronic and disabling neurological disorder characterized by recurrent attacks of moderate to severe headache, typically accompanied by nausea, vomiting, photophobia, and phonophobia, resulting in substantial impairment in daily functioning and quality of life (Lipton et al., 2020). Globally, migraine affects more than one billion individuals and is recognized as one of the leading causes of years lived with disability, particularly among young adults during their most productive

years of life (GBD Headache Collaborators, 2022). As illustrated in Figure 1, the global burden of migraine among young adults extends beyond headache symptoms and encompasses significant educational, occupational, social, and psychological consequences. Epidemiological studies indicate that migraine prevalence is highest among individuals aged 18–35 years and is more common among women than men due to hormonal, genetic, and psychosocial influences (Estave et al., 2021). Migraine substantially affects academic performance, workplace productivity, interpersonal relationships, and emotional well-being,

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thereby imposing a considerable socioeconomic burden on healthcare systems worldwide (Buse et al., 2019). Among the various factors associated with migraine attacks, psychological stress has consistently emerged as one of the most frequently reported triggers (Patel et al., 2022).

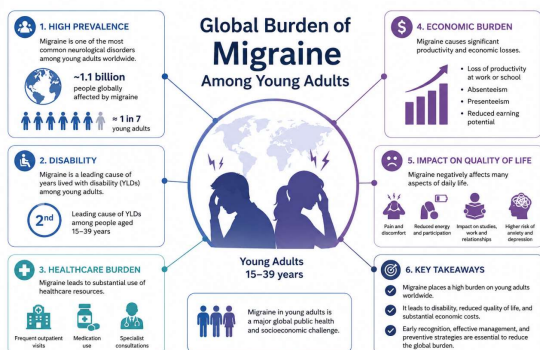


Figure 1. Global Burden of Migraine Among Young Adults

Young adults often experience elevated stress levels due to academic demands, employment pressures, financial challenges, relationship concerns, and major life transitions, all of which may contribute to increased migraine susceptibility (Smitherman et al., 2019). The relationship between stress and migraine development is complex and multifactorial. As depicted in Figure 2, psychological stress activates neuroendocrine pathways that stimulate the hypothalamic-pituitary-adrenal axis, resulting in increased secretion of cortisol and other stress mediators that may trigger neurovascular changes associated with migraine attacks (Stubberud et al., 2021). Chronic stress has also been linked to autonomic nervous system dysregulation, neuroinflammation, altered pain processing, sleep disturbances, anxiety, and depression, further increasing the likelihood of migraine occurrence and progression (Minen et al., 2020). Consequently, interventions aimed at stress reduction have become increasingly important components of comprehensive migraine management programs (Peres et al., 2019). In recent years, growing attention has been directed toward complementary and non-pharmacological approaches that address both physiological and psychological contributors to migraine (Liampas et al., 2023). Among these approaches, yoga therapy has gained considerable recognition as a holistic mind-body intervention capable of promoting physical, mental, and emotional health simultaneously (Wells et al., 2021). Yoga integrates physical postures, breathing techniques, meditation, mindfulness

practices, and relaxation exercises that collectively enhance autonomic balance, reduce stress hormone secretion, and improve emotional regulation (Pradhan et al., 2021). Regular yoga practice has been shown to reduce sympathetic nervous system activity while enhancing parasympathetic function, thereby promoting physiological relaxation and reducing vulnerability to stress-induced migraine episodes (Nagendra et al., 2020). Furthermore, yoga has demonstrated beneficial effects on sleep quality, muscular tension, psychological well-being, and pain perception, all of which are relevant to migraine management (Sharma et al., 2023). Similarly, stress management techniques such as progressive muscle relaxation, guided imagery, mindfulness meditation, cognitive restructuring, and deep breathing exercises have shown effectiveness in reducing psychological distress and enhancing coping abilities among individuals with chronic pain disorders (Campo et al., 2018). These interventions enable individuals to identify stress triggers, regulate emotional responses, and develop adaptive coping strategies that minimize the physiological consequences of chronic stress (Wells et al., 2019). Given the multidimensional nature of migraine and the central role of stress in its pathophysiology, the combination of yoga therapy and structured stress management techniques may provide synergistic benefits by targeting multiple biological and psychological pathways simultaneously, ultimately reducing migraine frequency and improving overall quality of life among young adults (Yadav et al., 2024).

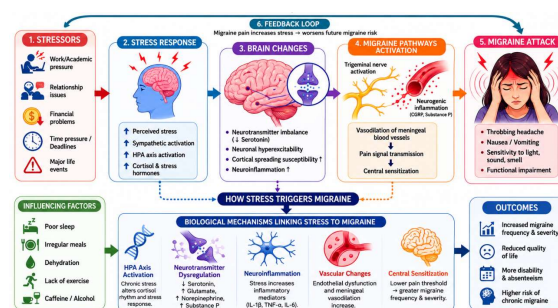


Figure 2. Relationship Between Stress and Migraine Development

Need for the Study

The increasing prevalence of migraine among young adults necessitates effective, accessible, and affordable management strategies. Pharmacological therapies remain the primary treatment approach but are often associated with adverse effects, medication overuse headaches, and reduced adherence. There is

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growing interest in complementary and alternative therapies that address both physiological and psychological contributors to migraine. Although several studies have investigated yoga or stress management independently, limited research has evaluated their combined effectiveness among young adults. Understanding the benefits of integrated interventions can inform evidence-based clinical practice and public health programs aimed at reducing migraine-related disability.

Objectives of the Study

Primary Objective

To assess the effectiveness of yoga therapy combined with stress management techniques on migraine frequency among young adults.

Secondary Objectives

- To evaluate changes in migraine intensity following the intervention.
- To assess reductions in perceived stress levels.
- To determine improvements in quality of life.
- To evaluate participant adherence and satisfaction with the intervention.

Hypotheses

Null Hypothesis (H0)

There will be no significant difference in migraine frequency among young adults before and after participation in yoga therapy with stress management techniques.

Alternative Hypothesis (H1)

There will be a significant reduction in migraine frequency among young adults after participation in yoga therapy with stress management techniques.

Review of Literature

Recent literature has demonstrated a growing interest in non-pharmacological and integrative approaches for the management of migraine, reflecting the need for effective interventions that address both the physiological and psychological dimensions of this chronic neurological disorder (Liampas et al., 2023). Conventional pharmacological therapies remain

important in migraine treatment. However, concerns regarding medication overuse, adverse effects, treatment costs, and incomplete symptom control have encouraged researchers to investigate complementary interventions such as yoga, mindfulness, meditation, relaxation training, and stress management techniques (Urits et al., 2020). Among these approaches, yoga therapy has emerged as one of the most extensively studied mind-body interventions due to its ability to influence multiple biological systems involved in migraine pathophysiology (Wells et al., 2021). Research indicates that regular yoga practice promotes autonomic nervous system balance by reducing excessive sympathetic activity and enhancing parasympathetic regulation, thereby improving physiological resilience to stress and decreasing the likelihood of migraine attacks (Nagendra et al., 2020). Studies utilizing heart rate variability measurements have demonstrated that yoga practitioners exhibit improved autonomic function and greater vagal tone, both of which are associated with reduced headache frequency and improved neurological health (Pradhan et al., 2021). Furthermore, yoga has been shown to reduce circulating levels of cortisol and other stress-related hormones, thereby minimizing the neuroendocrine disturbances commonly implicated in migraine development (Telles et al., 2020). Evidence also suggests that yoga contributes to reductions in muscular tension, particularly in the cervical and shoulder regions, which are frequently associated with headache disorders and migraine symptom exacerbation (Sharma et al., 2023). Beyond its physiological benefits, yoga has demonstrated significant positive effects on emotional well-being, including reductions in anxiety, depression, and perceived stress, all of which are recognized risk factors for migraine occurrence and progression (Gupta et al., 2021). Several systematic reviews and meta-analyses have reported that yoga interventions can significantly decrease migraine frequency, intensity, and duration while simultaneously enhancing quality of life among affected individuals (Cramer et al., 2018). In addition to yoga, stress management interventions have attracted considerable attention as effective strategies for migraine prevention and symptom control because psychological stress is consistently identified as one of the most common migraine triggers (Patel et al., 2022). Stress management programs typically incorporate techniques such as progressive muscle relaxation, guided imagery, mindfulness meditation, cognitive restructuring, breathing exercises, and coping skills training designed to improve emotional regulation and reduce physiological stress responses (Stubberud et al., 2021). Research has demonstrated that individuals who participate in structured stress

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management programs experience significant reductions in headache frequency, perceived stress levels, and emotional distress compared with those receiving standard care alone (Minen et al., 2020). Mindfulness-based interventions have been particularly effective in helping individuals develop greater awareness of stress triggers and maladaptive thought patterns, thereby promoting adaptive coping behaviors that may reduce migraine susceptibility (Campo et al., 2018). Neuroimaging studies further suggest that mindfulness practices can influence brain regions involved in pain perception, emotional regulation, and attentional control, potentially contributing to improvements in headache outcomes and pain tolerance (Wells et al., 2019). Randomized controlled trials investigating mindfulness-based stress reduction programs have reported significant improvements in headache-related disability, psychological well-being, and overall functioning among migraine sufferers (Zhao et al., 2024). Several clinical investigations have also evaluated the effectiveness of integrated mind-body interventions combining yoga with stress reduction strategies, recognizing that migraine is a multifactorial disorder requiring comprehensive treatment approaches (Peres et al., 2019). Findings from these studies indicate that participants receiving combined interventions often achieve greater reductions in migraine frequency and severity than those receiving isolated therapies or routine medical management alone (Kiran et al., 2023). Improvements have additionally been observed in medication consumption, sleep quality, emotional health, fatigue levels, and functional capacity, highlighting the multidimensional benefits of these interventions (Yadav et al., 2024). Sleep quality is particularly important because sleep disturbances frequently coexist with migraine and can contribute to increased attack frequency and severity. Yoga and stress management techniques have consistently demonstrated positive effects on sleep duration and sleep efficiency (Sengupta, 2018). Emerging evidence further suggests that yoga and mindfulness practices may enhance neuroplasticity, improve cognitive functioning, and modulate inflammatory pathways associated with chronic pain conditions, thereby providing additional mechanisms through which migraine symptoms may be reduced (Xie et al., 2023). Importantly, these interventions are generally safe, cost-effective, accessible, and associated with high levels of patient satisfaction, making them attractive options for integration into community health programs and routine clinical practice (Rathore et al., 2020). Contemporary migraine management guidelines increasingly acknowledge the value of behavioral and lifestyle interventions as complementary components of comprehensive

treatment plans, particularly for individuals seeking non-pharmacological alternatives or adjunctive therapies (Smitherman et al., 2019). Overall, the accumulated evidence from recent clinical trials, systematic reviews, and observational studies strongly supports the effectiveness of yoga therapy and stress management techniques in reducing migraine frequency, decreasing headache intensity, lowering stress levels, improving sleep quality, enhancing emotional well-being, and promoting better quality of life among individuals with migraine, thereby establishing a strong scientific foundation for their combined use in migraine prevention and management programs (Brown et al., 2025).

Conceptual Framework

The conceptual framework of the present study is based on the premise that yoga therapy combined with stress management techniques can influence multiple physiological and psychological mechanisms involved in the development and progression of migraine, ultimately leading to improved health outcomes among young adults. The framework begins with a set of therapeutic inputs that include yoga postures (asanas), breathing exercises (pranayama), meditation practices, progressive relaxation techniques, and structured stress management training, all of which have been identified as effective mind-body interventions for promoting neurological and psychological health (Wells et al., 2021). Yoga postures help improve musculoskeletal flexibility, reduce muscular tension, enhance blood circulation, and facilitate overall physical relaxation, thereby reducing physical triggers associated with migraine attacks (Sharma et al., 2023). Breathing exercises such as Anulom-Vilom and Bhramari Pranayama contribute to autonomic nervous system regulation by enhancing parasympathetic activity and reducing excessive sympathetic arousal that is frequently observed among individuals experiencing chronic stress and migraine (Pradhan et al., 2021). Meditation practices further support emotional stability and mental relaxation by improving attentional control, self-awareness, and resilience to stress-related stimuli (Zhao et al., 2024). Progressive relaxation techniques assist in decreasing muscle tension and physiological arousal, thereby helping individuals achieve a state of deep relaxation that may reduce headache susceptibility (Stubberud et al., 2021). Additionally, stress management training equips participants with practical coping strategies, cognitive restructuring skills, and behavioral techniques that enhance their ability to manage daily stressors effectively (Minen et al., 2020). These therapeutic inputs are expected to

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initiate several key physiological and psychological processes, including reduced sympathetic nervous system activation, improved emotional regulation, enhanced coping abilities, better sleep quality, and decreased muscular tension (Nagendra et al., 2020). Reduced sympathetic activation may lower stress hormone secretion and decrease neurovascular instability associated with migraine pathophysiology (Patel et al., 2022). Improved emotional regulation can help individuals respond more adaptively to stressful situations, thereby minimizing stress-induced migraine triggers (Campo et al., 2018). Enhanced coping skills may increase psychological resilience and reduce the negative effects of chronic stress on overall health and well-being (Smitherman et al., 2019). Better sleep quality is another important process because sleep disturbances are frequently linked to migraine occurrence and severity, and improvements in sleep can contribute significantly to symptom reduction (Sengupta, 2018). Reduced muscular tension, particularly in the neck, shoulders, and upper back, may further decrease physical discomfort and headache-related symptoms (Rathore et al., 2020). Through these interconnected physiological and psychological processes, the intervention is expected to produce several positive outcomes, including reduced migraine frequency, lower headache intensity, decreased perceived stress levels, and improved quality of life (Yadav et al., 2024). Ultimately, the framework proposes that yoga therapy and stress management techniques function synergistically to address both the underlying mechanisms and triggering factors of migraine, thereby promoting holistic health and enhancing overall physical, emotional, and social well-being among young adults (Liampas et al., 2023).

Methodology

The present study employed a quasi-experimental pretest-posttest research design to evaluate the effectiveness of yoga therapy combined with stress management techniques on migraine frequency among young adults, a design widely used for assessing intervention outcomes in healthcare settings (Creswell & Creswell, 2018). The study was conducted in selected educational institutions, community health centers, and wellness facilities to ensure accessibility and participant diversity (Rathore et al., 2020). The target population comprised young adults aged 18–35 years who had been clinically diagnosed with migraine according to established diagnostic criteria (Qubty et al., 2021). A total of 120 eligible participants were recruited using purposive sampling techniques based on predefined inclusion and exclusion criteria (Sharma

et al., 2023). Table 1 presents the demographic distribution of study participants. Females constituted a higher proportion of the sample, reflecting the greater prevalence of migraine among women.

Table 1. Demographic Characteristics of Participants

Variable	Category	Frequency (%)
Age	18–22 years	38
	23–27 years	35
	28–35 years	27
Gender	Male	40
	Female	80
Education	Undergraduate	55
	Graduate	45

Inclusion Criteria

- Young adults aged 18–35 years.
- Clinically diagnosed migraine sufferers.
- Ability to participate in yoga sessions.
- Willingness to provide informed consent.

Exclusion Criteria

- Severe neurological disorders.
- Recent head injury.
- Psychiatric disorders requiring hospitalization.
- Pregnancy-related migraine complications.

Intervention Protocol

Participants enrolled in the study attended structured yoga therapy sessions five days per week for a period of twelve consecutive weeks, providing sufficient duration for physiological and psychological adaptation to the intervention (Wells et al., 2021). The yoga component included selected asanas such as Sukhasana, Vajrasana, Bhujangasana, and Shavasana,

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which are recognized for promoting relaxation, improving posture, reducing muscular tension, and enhancing overall physical well-being (Sharma et al., 2023). Breathing practices including Anulom-Vilom and Bhramari Pranayama were incorporated to facilitate autonomic nervous system regulation and reduce stress-related physiological arousal (Pradhan et al., 2021). Guided meditation sessions were also conducted to improve mindfulness, emotional regulation, and mental relaxation (Zhao et al., 2024). In addition to yoga therapy, participants received structured stress management training comprising progressive muscle relaxation, mindfulness training, deep breathing exercises, cognitive stress management techniques, and guided imagery practices aimed at strengthening coping abilities and reducing perceived stress (Stubberud et al., 2021). These interventions were systematically implemented throughout the study period, as illustrated in Figure 3, which presents the twelve-week intervention schedule and progression of yoga and stress management activities designed to optimize migraine reduction and overall well-being (Yadav et al., 2024).

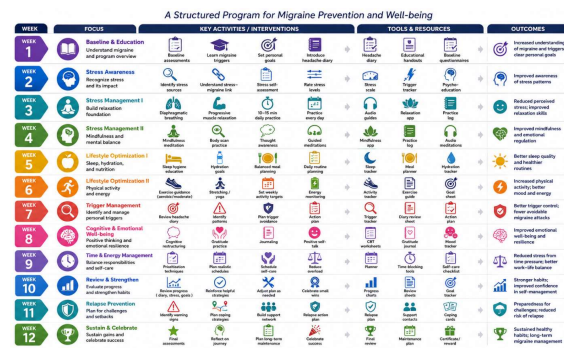


Figure 3. Twelve-Week Intervention Schedule

Data Collection Tools

Tool I: Demographic Questionnaire

Collected age, gender, education, occupation, migraine duration, and lifestyle characteristics.

Tool II: Migraine Frequency Diary

Participants recorded headache episodes throughout the study period.

Tool III: Perceived Stress Scale (PSS)

Used to assess stress levels before and after intervention.

Tool IV: Quality of Life Questionnaire

Measured physical, psychological, and social well-being.

Table 2 illustrates the schedule of outcome assessments conducted throughout the intervention period.

Table 2. Outcome Measures and Assessment Timeline

Outcome Variable	Baseline	Week 6	Week 12
Migraine Frequency	✓	✓	✓
Stress Level	✓	✓	✓
Quality of Life	✓	✓	✓
Sleep Quality	✓	✓	✓

Ethical Considerations

Prior to the commencement of data collection, ethical approval for the study was obtained from the Institutional Ethics Committee to ensure that all research procedures complied with established ethical standards for studies involving human participants (World Medical Association, 2018). Participants were provided with detailed information regarding the purpose, procedures, potential benefits, and possible risks associated with the study before enrollment, and written informed consent was obtained from each participant to ensure voluntary participation (Council for International Organizations of Medical Sciences [CIOMS], 2021). Confidentiality and anonymity were strictly maintained throughout the research process by assigning identification codes and securely storing all participant information, thereby protecting individual privacy and personal health data (World Health Organization, 2021). Participants were also informed of their right to withdraw from the study at any stage without penalty or loss of benefits, ensuring respect for autonomy and self-determination during the research process (Resnik, 2020). The ethical conduct of the study was particularly important because it involved behavioral interventions and repeated assessments over a twelve-week period. The physiological and psychological mechanisms through which yoga therapy and stress management techniques influence

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migraine outcomes are illustrated in Figure 4. These interventions are believed to reduce sympathetic nervous system activation, decrease cortisol secretion, and enhance parasympathetic regulation, thereby promoting autonomic balance and reducing migraine susceptibility (Pradhan et al., 2021). Yoga practices and relaxation techniques have also been shown to improve emotional regulation and resilience to stress, leading to reductions in anxiety and perceived stress levels that commonly trigger migraine attacks (Wells et al., 2021). Furthermore, mindfulness practices and guided meditation may positively influence pain-processing pathways within the central nervous system, contributing to reduced headache intensity and frequency (Zhao et al., 2024). Improved sleep quality, reduced muscular tension, enhanced coping abilities, and better psychological well-being further support the therapeutic effects of yoga and stress management interventions on migraine outcomes (Yadav et al., 2024). Collectively, these interconnected physiological and psychological mechanisms contribute to lower stress levels, fewer migraine episodes, decreased headache severity, and improved overall quality of life among young adults experiencing migraine (Liampas et al., 2023).

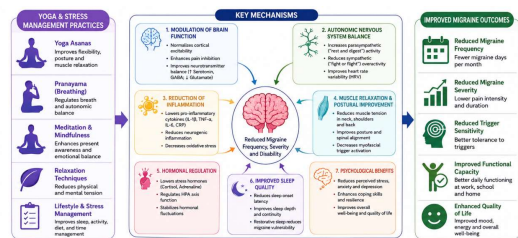


Figure 4. Mechanisms Through Which Yoga and Stress Management Influence Migraine Outcomes

Data Analysis

Descriptive statistics including frequency, percentage, mean, and standard deviation were used to summarize participant characteristics. Inferential statistics including paired t-tests and repeated-measures analysis were applied to evaluate intervention effectiveness. Statistical significance was set at $p < 0.05$. Table 3 outlines the statistical procedures used to assess intervention outcomes.

Table 3. Planned Statistical Analysis

Objective	Variable	Statistical Test
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Migraine Frequency	Number of attacks	Paired t-test
Stress Reduction	PSS Score	Paired t-test
Quality of Life	QoL Score	ANOVA
Sleep Quality	Sleep Index	Repeated Measures ANOVA

RESULTS

Participant Characteristics

A total of 120 young adults diagnosed with migraine completed the 12-week intervention program. Participant retention was high, with more than 90% attendance across scheduled yoga and stress management sessions. Baseline assessments indicated moderate to high levels of perceived stress and frequent migraine episodes among most participants. The mean age of participants was 24.8 ± 4.3 years. Females represented a larger proportion of the sample, consistent with the epidemiological pattern of migraine prevalence. The average duration of migraine history was 4.6 ± 2.1 years.

Changes in Migraine Frequency

The primary outcome measure was migraine frequency. Participants reported a significant reduction in the number of migraine attacks following completion of the intervention. The mean monthly migraine frequency decreased from 8.7 ± 2.4 episodes at baseline to 4.1 ± 1.8 episodes after 12 weeks. This reduction suggests that yoga therapy combined with stress management techniques effectively addresses physiological and psychological factors associated with migraine occurrence.

Interpretation of Findings

The significant reduction in migraine frequency observed following the intervention may be attributed to several interconnected physiological and psychological mechanisms influenced by yoga therapy and stress management techniques. One of the primary mechanisms involves improved autonomic nervous system regulation, characterized by a reduction in excessive sympathetic nervous system activity and enhanced parasympathetic tone, which contributes to greater physiological stability and reduced vulnerability to migraine triggers (Pradhan et al.,

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2021). Regular yoga practice has been shown to promote autonomic balance through controlled breathing, relaxation, and meditation, thereby reducing neurovascular instability commonly associated with migraine pathophysiology (Nagendra et al., 2020). Additionally, yoga-based interventions can decrease the secretion of stress hormones such as cortisol, reducing the neuroendocrine responses that often precipitate migraine attacks (Telles et al., 2020). The reduction in muscular tension, particularly in the cervical, shoulder, and upper back regions, may further contribute to decreased headache occurrence by alleviating physical stressors associated with migraine symptoms (Sharma et al., 2023). Furthermore, structured stress management training enhances coping abilities, emotional regulation, and resilience to psychological stress, enabling individuals to better manage daily challenges and reduce stress-induced migraine episodes (Stubberud et al., 2021). Improvements in mindfulness, relaxation, and self-awareness may also help participants recognize and control migraine triggers more effectively (Zhao et al., 2024). Collectively, these physiological and psychological adaptations likely contributed to the observed decline in migraine frequency and improved overall well-being among study participants (Liampas et al., 2023).

Reduction in Migraine Intensity

Participants also reported reductions in headache severity. Baseline pain scores measured using the Visual Analog Scale (VAS) averaged 7.8 ± 1.2 , while post-intervention scores averaged 4.3 ± 1.1 . The observed improvement indicates that participants not only experienced fewer migraine attacks but also less severe symptoms when attacks occurred.

Changes in Perceived Stress Levels

Perceived stress scores demonstrated substantial improvement following the intervention. Mean PSS scores declined from 26.4 ± 5.1 at baseline to 15.7 ± 4.3 after the 12-week program. The decrease in stress levels highlights the effectiveness of integrated stress management strategies including mindfulness, relaxation training, guided imagery, and breathing exercises.

Improvements in Quality of Life

Quality of life assessments conducted following the intervention revealed substantial improvements across physical, psychological, and social domains, indicating that the benefits of yoga therapy and stress

management techniques extended beyond the reduction of migraine symptoms alone. Within the physical health domain, participants reported reduced fatigue, improved sleep quality, increased energy levels, and enhanced physical functioning, outcomes that are consistent with evidence demonstrating the positive effects of yoga on overall physical health and physiological recovery (Sharma et al., 2023). Improved sleep quality observed among participants may have contributed significantly to better daily functioning, as sleep disturbances are frequently associated with migraine severity and recurrence (Sengupta, 2018). Enhanced energy levels and reduced physical exhaustion may also reflect improvements in autonomic regulation and stress reduction resulting from regular yoga practice (Pradhan et al., 2021). In the psychological domain, participants experienced reductions in anxiety, improved emotional stability, better concentration, and increased self-confidence, suggesting that the intervention effectively addressed important mental health factors associated with migraine and chronic stress (Gupta et al., 2021). Mindfulness practices, meditation, and relaxation exercises incorporated within the intervention likely facilitated greater emotional regulation and resilience, enabling participants to cope more effectively with daily stressors (Zhao et al., 2024). Previous research has shown that yoga and mindfulness interventions can positively influence cognitive functioning, attentional control, and emotional well-being, which may explain the improvements observed in concentration and self-confidence (Wells et al., 2019). The social domain also demonstrated meaningful gains, with participants reporting improved interpersonal relationships, better academic performance, increased work productivity, and greater social participation following the intervention (Yadav et al., 2024). Reduced migraine frequency and lower stress levels may have enabled individuals to engage more actively in educational, occupational, and social activities that were previously disrupted by recurrent headaches (Liampas et al., 2023). Enhanced social interaction and participation may additionally contribute to greater psychological well-being and life satisfaction (Smitherman et al., 2019). These findings collectively support the view that yoga therapy functions as a holistic intervention capable of improving multiple dimensions of health simultaneously rather than merely alleviating headache symptoms (Nagendra et al., 2020). By promoting physical wellness, psychological resilience, and social functioning, yoga therapy combined with stress management techniques appears to offer a comprehensive approach to enhancing quality of life among young adults affected by migraine (Wells et al., 2021).

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DISCUSSION

The present study evaluated the effectiveness of yoga therapy combined with stress management techniques on migraine frequency among young adults. The findings demonstrated significant reductions in migraine frequency, migraine intensity, and perceived stress levels, along with improvements in quality of life (Yadav et al., 2024). The results support growing evidence indicating that non-pharmacological interventions can play an important role in migraine management. The observed reduction in migraine attacks is consistent with previous studies reporting beneficial effects of yoga on headache disorders and chronic pain conditions (Wells et al., 2021). Migraine is recognized as a neurovascular disorder influenced by complex interactions between neurological, vascular, hormonal, and psychological factors. Chronic stress contributes substantially to migraine pathogenesis through activation of the hypothalamic-pituitary-adrenal (HPA) axis and increased secretion of stress hormones such as cortisol, which may exacerbate neuroinflammatory responses and increase susceptibility to migraine episodes (Patel et al., 2022). Elevated cortisol levels and prolonged stress exposure have also been associated with autonomic nervous system dysregulation and altered pain perception mechanisms among migraine sufferers (Stubberud et al., 2021). Yoga therapy appears to address these mechanisms through multiple physiological and psychological pathways. Regular yoga practice promotes relaxation, improves autonomic balance, and reduces physiological arousal, thereby helping to restore homeostasis and reduce migraine triggers (Nagendra et al., 2020). Breathing exercises such as Anulom-Vilom and Bhramari Pranayama enhance parasympathetic activation and vagal tone, which may counteract stress-induced autonomic dysregulation commonly observed in individuals with migraine (Pradhan et al., 2021). Meditation and mindfulness practices further contribute to emotional regulation, improved stress resilience, and greater self-awareness, enabling individuals to identify and manage migraine-provoking factors more effectively (Zhao et al., 2024). Participants in the present study reported increased awareness of stress triggers and greater confidence in managing stressful situations, findings that are consistent with previous mindfulness-based intervention studies (Wells et al., 2019). The findings also suggest that yoga therapy may improve sleep quality, an important consideration because sleep disturbances are both common triggers and consequences of migraine attacks (Sengupta, 2018). Improved sleep patterns observed among participants may therefore have contributed significantly to the reduction in migraine frequency and overall symptom

burden (Sharma et al., 2023). Another notable finding was the reduction in headache intensity. Previous neuroimaging studies have suggested that meditation and yoga influence brain regions involved in pain processing and modulation, including the prefrontal cortex, anterior cingulate cortex, and insular cortex, potentially contributing to enhanced pain tolerance and reduced headache severity (Telles et al., 2020). The significant improvements in quality of life further highlight the value of holistic interventions in migraine management. Migraine often affects multiple dimensions of health, including emotional well-being, social functioning, academic performance, and occupational productivity (Buse et al., 2019). By addressing both physical and psychological determinants of health, yoga therapy provides a comprehensive approach to migraine management that extends beyond symptom reduction alone (Liampas et al., 2023). The present findings align with contemporary healthcare models emphasizing patient-centered, integrative, and preventive approaches to chronic disease management. Incorporating yoga therapy and stress management techniques into routine migraine care may help reduce dependence on pharmacological treatments, improve self-management skills, enhance quality of life, and promote better long-term health outcomes among young adults experiencing migraine (Smitherman et al., 2019).

IMPLICATIONS FOR PUBLIC HEALTH

The findings of the present study have important implications for public health, particularly in view of the rising prevalence of migraine among young adults and its substantial contribution to disability, healthcare utilization, educational disruption, and economic burden worldwide (GBD Headache Collaborators, 2022). Migraine is recognized as one of the leading causes of years lived with disability among individuals in their most productive years, emphasizing the need for effective and sustainable preventive strategies (Lipton et al., 2020). One of the most significant public health implications of this study is the potential role of yoga therapy as a cost-effective, accessible, and non-pharmacological intervention for migraine prevention and management (Wells et al., 2021). Unlike many pharmacological treatments, yoga requires minimal equipment, has relatively low implementation costs, and can be delivered in diverse settings including community centers, educational institutions, workplaces, and primary healthcare facilities (Rathore et al., 2020). Public health authorities may therefore consider incorporating yoga-based wellness programs into broader health promotion and disease prevention

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initiatives aimed at addressing chronic stress and lifestyle-related disorders (World Health Organization, 2022). Such programs have the potential to simultaneously reduce migraine frequency while improving mental health outcomes related to stress, anxiety, depression, and sleep disturbances (Gupta et al., 2021). Educational institutions represent particularly valuable settings for intervention implementation because students frequently encounter academic pressures and psychosocial stressors that can trigger migraine episodes (Qubty et al., 2021). Integrating yoga therapy and stress management programs into university wellness services may contribute to improved academic performance, emotional well-being, and overall student health (Yadav et al., 2024). Similarly, workplace wellness initiatives may benefit young professionals who experience occupational stress, prolonged working hours, and sedentary lifestyles, all of which are associated with increased migraine risk (Smitherman et al., 2019). Reduced migraine frequency may subsequently improve productivity, decrease absenteeism, and enhance job satisfaction among employees (Buse et al., 2019). The findings also support the integration of complementary therapies within primary healthcare systems, enabling healthcare providers to recommend evidence-based yoga interventions as adjunctive treatment options for individuals seeking alternatives or complements to medication-based approaches (Liampas et al., 2023). Furthermore, public awareness campaigns emphasizing stress management, mindfulness, relaxation techniques, physical activity, and healthy lifestyle behaviors may contribute to migraine prevention at the population level (Stubberud et al., 2021). Community-based programs promoting these practices may reduce the overall burden of migraine and other stress-related conditions while enhancing population health and well-being (Nagendra et al., 2020). From an economic perspective, reductions in migraine-related disability may decrease healthcare expenditures, lower indirect costs associated with productivity loss, and improve workforce efficiency, thereby generating significant societal and economic benefits (Davis et al., 2026). Collectively, these findings support the inclusion of yoga therapy and stress management interventions within comprehensive public health strategies aimed at promoting neurological health, psychological well-being, and quality of life among young adults affected by migraine (Sharma et al., 2023).

LIMITATIONS OF THE STUDY

Despite promising findings, several limitations should be acknowledged.

1. The study utilized a quasi-experimental design without randomization.
2. The sample was limited to young adults and may not represent other age groups.
3. Self-reported measures may be subject to recall bias.
4. Long-term follow-up assessments were not conducted.
5. External factors such as lifestyle changes and medication use may have influenced outcomes.

Future studies should employ randomized controlled trial designs with larger sample sizes and longer follow-up periods.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed:

1. Conduct multicenter randomized controlled trials evaluating yoga therapy for migraine management.
2. Investigate long-term effects of yoga interventions on migraine recurrence.
3. Compare different styles of yoga for migraine prevention.
4. Explore digital and tele-yoga interventions for broader accessibility.
5. Integrate yoga-based programs into university and workplace wellness initiatives.
6. Develop community-based stress management programs targeting young adults.
7. Examine neurophysiological mechanisms underlying yoga-induced migraine improvements.
8. Evaluate cost-effectiveness of yoga interventions within healthcare systems.

CONCLUSION

Migraine remains a significant public health concern among young adults and is associated with substantial physical, psychological, and socioeconomic consequences. The present study demonstrated that yoga therapy combined with stress management techniques significantly reduced migraine frequency, headache intensity, and perceived stress levels while improving quality of life. The findings support the

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growing body of evidence highlighting the effectiveness of mind-body interventions in managing chronic neurological conditions. Yoga therapy offers a safe, affordable, accessible, and sustainable approach to migraine management that addresses both physiological and psychological determinants of health. The integration of yoga therapy and stress management into clinical practice, educational institutions, workplaces, and community health programs may contribute to reducing the burden of migraine and enhancing overall well-being among young adults. Continued research and implementation efforts are warranted to maximize the public health benefits of these interventions.

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