Review Article

Role of Yoga as an Adjunct in the Management of Migraine Headache-Current Status and Future Indications

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Abstract

Migraine headache is a painful, disabling condition afflicting 7% of the population. The long-term effort of coping with a chronic headache disorder predisposes the individual to other psychiatric illnesses, ischemic cerebrovascular disease as well as medicine overuse headache. The use of nonpharmacological methods to reduce the stress and pain associated with headache can improve the overall quality of life and reduce the burden of the disease. To examine the utility of yoga as an adjunct to pharmacological treatment of migraine headache. The review article is based on the secondary literature collected through the Google Scholar database between the years 2010 and 2020. Several themes were identified regarding the burden of migraine/headache and the need for the integration of yoga into the existing healthcare system. Despite the limitations and the need for greater scientific rigor, there have been consistent reports of the beneficial effects of yoga in the reduction of stress, anxiety, depression, and an enhanced quality of life, as well as better pain management in chronic diseases. Studies on the role of yoga in the treatment of migraine have been few in number. They have consistently shown that yoga can be a valuable adjunct to the existing pharmacological interventions in the management of migraine headache. In recent years, the Indian government has made enormous strides in establishing yoga outreach programs throughout the country. The need of the hour is to integrate evidence-based yoga with the wellness centers and noncommunicable diseases treatment plan. It can help to reduce the burden on the existing health care resources.

Keywords: *Migraine headache, pain perception, stress management, yoga*

Introduction

Migraine headache is a painful disabling condition afflicting 14% of the population.[1]

In the Global Burden of Disease Study, updated in 2013, migraine was found to be the sixth highest cause of years lost due to disability[2,3] As headache disorders can be most troublesome in the productive years (late teens to 50s), estimates of their financial cost to society– principally from lost working hours and reduced productivity are massive.[2]

Migraine is accompanied by stress and anticipatory anxiety, which further aggravate the existing headache. Poor pain management, catastrophic cognitions about pain, and a sense of helplessness and depression lead to maladaptive behaviors.[4-7]

It is about 3 times more common in women than in men, a pattern seen everywhere.[8] This difference is hormonally driven.[9] Often starting at puberty, migraine affects those aged between 35 and 45 years but can affect much younger people, including children[10].

Migraine headache attacks can be moderate to severe in intensity, one-sided, pulsating in quality, and aggravated by routine physical activity. It can last for hours or even up to 2–3 days. Nausea is commonly associated with migraine. Migraine is often life-long and characterized by recurring attacks, the frequency of which could be anywhere between once a week to once a year. In children, attacks tend to be of shorter duration and abdominal symptoms are more prominent.[11]

Managing stress and pain associated with headache improves the overall quality of life and can reduce the disability associated with the headache. Yoga has been subjected to extensive scientific research

How to cite this article: Nayar D, Mahapatro M, Nayar P. Role of yoga as an adjunct in the management of migraine headache-current status and future indications. Int J Yoga 2022;15:12-8.

Submitted: 08-Nov-2021 **Revised:** 10-Jan-2022
Accepted: 12-Jan-2022 **Published:** 21-Mar-2022

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Access this article online

Website: www.ijoy.org.in

DOI: 10.4103/ijoy.ijoy_173_21

Quick Response Code:

and there have been scientific reports of its utility in the reduction of stress,[12,13] anxiety,[14,15] and depression,[15,16] resulting an enhanced quality of life[17] as well as better pain management in chronic disease.[18] Studies show that yoga-based methods help in managing chronic pain restoring autonomic balance and reducing the disability associated with chronic disease conditions.[19,20,21]

Thus, it may mitigate the burden on the existing healthcare resources, which are overstretched. The utilization of an existing cost-effective resource like yoga can make an important contribution towards the goal of universal health care.[22,23] Hence there is a need to review the available evidence to assess the possibility of integrating yoga with the existing biomedical treatment of migraine. This manuscript attempts at it.

Methods

Databases were searched through Google Scholar from 2010 to 2020 using the following key words or exact phrases, "therapeutic effects of yoga in migraine," "stress," "anxiety, "depression," "pain," and "chronic disease." Due to the large number of studies, the systematic reviews with meta-analysis were taken up, along with individual studies for inclusion in the article.

Burden Due to Headache Disorders

Not only is the headache painful, but it is also disabling. Prodromal, headache episode, and postdrome phases of migraine are known to impact productivity at work and quality of life, apart from causing cognitive impairment.[10]

The long-term effect of coping with chronic migraine headaches also carries the risk of concomitant comorbidities. General population studies indicate an increased risk of affective disorders and anxiety disorders in patients with migraine, compared to subjects without migraine;[24] anxiety and depression are significantly more common in people with migraine than in healthy individuals.[3,8,25] Migraine is also a risk factor for ischemic cerebral and ischemic cardiovascular diseases.[9,26] Despite this, many health-care professionals, as well as the patients themselves, perceive headache as a minor or a trivial complaint. It has remained underdiagnosed and undertreated.

Current treatment for migraine is based primarily on the biomedical model of disease which focuses exclusively on biological principles. The remission rates for chronic migraine have been reported from 26% to 70%[25,27] Migraine medications include abortive therapies[28] to reduce the symptoms of acute attacks as well as drugs to prevent or reduce the frequency of the attacks. As headaches are unpredictable, patients often do not take medications in a regular manner and choose to wait until the pain increases, leading to medication overuse. This results in medication overuse headache and increased risk of suicidal attempts.[29] No medication overuse is consistently associated with remission[30,31] highlighting the need for preemptive control measures.

Stress and Migraine Headache

Stress as a trigger for migraine attacks is present in nearly 70% of individuals.[32] Stress from daily hassles was predictive of the future occurrence of a migraine attack in a group of migraine sufferers over an extended period.[33] Migraine attacks themselves can act as a stressor, thereby potentially leading to a vicious circle of increasing migraine frequency. Hence, stress can not only initiate migraine in those predisposed to the disorder but also contribute to migraine chronification.

When the frequency or severity of these stressors escalate, the protective adaptive responses (allostatic responses) that maintain a stable state for the brain become dysregulated. As a result, both behavior and systemic physiology are altered in ways that can lead to further allostatic load.[34] The cascade of these effects can lead to further deterioration of adaptation and migraine can progress to a chronic condition.[34]

An important factor in the stress-migraine interaction is the individual's responses to stressors,[33] rather than the stressors themselves. Hence, effective stress management skills have the potential to mitigate the adverse effects of migraine.[35,36]

Pain Perception in Headache

The neuronal networks for pain and emotion overlap and have an influence on each other.[37,38] Fear or anxiety about pain, as well as the anticipation of pain in future, contributes to somatic symptoms and disability.[3,4] The belief that current pain will persist or regarding pain as mysterious and inexplicable is associated with poor outcome, psychological distress, and somatization.[34] Headache patients with a lack of self-efficacy awareness and inadequate response strategies were more prone to poor outcomes in overall disability.[5]

Enhanced pain perception or sensitivity can be a significant risk factor in the chronicity of pain.[39]

Illness expression is diverse, i.e., severity, duration, and consequences to the individual are based on the interrelationships among biological and psychological characteristics that determine the individual's perceptions and response to disease. This view is in contrast to the traditional biomedical perspective that conceptualizes migraine headache in terms of more narrowly defined neurophysiological dimensions. Psychological factors such as locus of control, self-efficacy, and negative affect or/emotional states can alter the likelihood of a headache attack being triggered, the perceived severity of headache pain, the impact a headache has on functioning, and treatment prognosis.[32,7] Unfortunately, psychological

factors are typically considered relevant only in cases where the patient presents with a psychiatric illness.[40]

Unlike the biomedical model of disease which focuses exclusively on biological processes, the biopsychosocial model considers biological, psychological, and social factors on equal grounds, in a circular system of causes and effects. It involves the active participation of the patient and recognizes the importance of educational aspects. Although it is the best available medical model today, it is still underrated and underused.[40]

Need to Integrate Yoga

The yoga-based techniques, like other mind-body techniques such as biofeedback and meditation, are "learning strategies," which facilitate the control systems in the mind-body complex for proper functioning. There are biochemical and neurological expressions of these practices in the body.[41] The data, summarized below have given substantive weight to subjective reports of enhanced physical and mental functions after regular practice of Yoga.[42-45]

The first group of studies cited below is on the effectiveness of yoga on anxiety, depression, stress, pain, and pain-associated disability. These variables have an impact on the disability and the quality of life of the patient with migraine.

A systematic review of data available up to 2016[13] on the effectiveness and safety of yoga for anxiety included randomized controlled trials (RCTs) of yoga for individuals with anxiety disorders or elevated levels of anxiety. The primary outcomes were anxiety and remission rates. Out of a total of 2234 studies, 17 studies (501 participants) met the study inclusion criteria. The within-group analysis gave an overall effect size on the anxiety of Hedges' g = 0.44. This effect size was robust with a low likelihood for a publication bias. The between-groups analysis of the studies comparing yoga to a waitlist control had a similar effect size (Hedges' g = 0.61). The moderator analyses suggested that more yoga practices were associated with greater benefits. Furthermore, the higher the level of anxiety at the beginning, the more beneficial the practices were. In fact, people with clinically elevated anxiety symptoms benefitted the most. Effect sizes were not moderated by study year, gender, presence of a medical disorder, and age. However, the limited number of well-controlled studies did not allow for meaningful sub-analyses to examine the differential effects of yoga on specific anxiety disorder diagnoses or even specific symptoms. Furthermore, the relatively greater benefit among people with elevated or clinical symptoms of anxiety could be the result of the regression to the mean. Waitlist-controlled trials provide weak evidence for the efficacy of the active treatment. The results of this meta-analysis provide preliminary support for yoga for anxiety reduction.

Another review[15] examined database up to 2013 for RCTs of yoga for patients with depressive disorders and individuals with elevated levels of depression. The main outcomes were the severity of depression and remission rates, secondary outcomes were anxiety and quality of life. Twelve RCTs with 619 participants were included. Regarding the severity of depression, there was moderate evidence for short-term effects of yoga compared to usual care (standardized mean differences [SMD] = −0.69) and limited evidence compared to relaxation (SMD = −0.62) and aerobic exercise (SMD = −0.59;) Subgroup analyses revealed evidence for effects in patients with depressive disorders and in individuals with elevated levels of depression. Due to the paucity and heterogeneity of the RCTs, no meta-analyses on long-term effects were possible. No RCT reported safety data. Despite methodological drawbacks of the included studies, yoga could be considered an ancillary treatment option for patients with depressive disorders and individuals with elevated levels of depression.

Büssing *et al*. reported[18,47] a systematic analysis of yoga interventions on pain and pain-associated disability. It included patients with back pain, rheumatoid arthritis, headache/migraine, and for other indications. The meta-analysis included 5 randomized studies with single-blinding and a higher methodological quality; 7 studies were randomized but not blinded and had moderate quality; and 4 nonrandomized studies had low quality. In 6 studies, yoga was used to treat patients with back pain; in 2 studies to treat rheumatoid arthritis; in 2 studies to treat patients with headache/migraine; and 6 studies enrolled individuals for other indications. All studies reported positive effects in favor of the yoga interventions. With respect to pain, a random effect meta-analysis estimated the overall treatment effect at SMD = −0.74, and an overall treatment effect at SMD = −0.79 for pain-related disability. These effects were strong particularly in healthy individuals but much weaker in patients with chronic pain conditions. The beneficial effects might be explained by increased physical flexibility, by calming and focusing the mind to develop greater awareness and diminish anxiety, reduction of distress, and improvement of mood. Because patients may recognize that they can be physically active, even despite persisting pain symptoms, they may therefore experience higher self-competence and self-awareness, which contributes to the higher quality of life.

Riley and Park[11] conducted a systematic review for evidence of an empirical quantitative study of a yoga intervention and stress outcomes. Out of 926 abstracts, 5 articles were found suitable for inclusion (n = 164). Five studies examined three psychological mechanisms (positive affect, mindfulness, and self-compassion) and four biological mechanisms: Posterior hypothalamus, interleukin-6 (IL-6), C-reactive protein (CRP), and cortisol.

Kiecolt-Glaser *et al*.[48] administered a stressor (Stroop, cold pressor task) before a yoga class then measured participants' physiological response to stress before, during, and after one of three different interventions: a yoga session, a movement control condition and a video control condition. The researchers did not find any change in IL-6 or CRP in the yoga group as compared to the other groups following the stressful event. Michalsen *et al*.[49] reported salivary cortisol decreased significantly after participation in a yoga class, and changes in cortisol significantly predicted decreased perceived stress over the course of the intervention. Bagga and Gandhi[50] demonstrated that the Shavasana pose in a yoga session led to inhibition of activity in the posterior area of the hypothalamus, decreasing blood pressure, a stress biomarker, after a single session. In the study of novice and expert yoga practitioners,[48] positive affect increased from pre-to postyoga in a single-yoga session and in a study of healthy college students, a Hatha yoga intervention created significant pre to post changes in positive affect; further, change in positive affect was negatively correlated with change in cortisol, suggesting a meditational relationship.[51] The studies[52] suggest yoga participation may increase self-compassion, increase mindfulness, and reduced perceived stress.

Practicing yoga as a means to manage and relieve both acute and chronic stress helps individuals overcome other comorbidities associated with diseases and leads to an improved quality of life. Hence, including stress management and reduction of negative emotional states can reduce the burden of chronic disease conditions.[35]

Despite four of five studies describing their yoga intervention as "Hatha yoga," there is wide variation in what might comprise a Hatha yoga intervention. Diversity in yoga practice makes the comparison of findings across studies difficult and limits our ability to understand the mechanisms by which yoga affects stress and other aspects of well-being.[53]

The second group of studies have been on the effect of yoga in migraine headache. A review study[54] based on six electronic databases to identify RCTs published before January 2015 reported only one potential trial.[55] It investigated the effectiveness of yoga therapy for migraine treatment compared to self-care using the RCT study design. Patients with migraine without aura were randomly assigned to yoga therapy or self-care groups for 3 months. Primary outcomes were headache frequency (headache diary), the severity of migraine (0–10 numerical scale), and pain component (McGill pain questionnaire). Secondary outcomes were anxiety and depression (Hospital Anxiety Depression Scale), medication score. Results showed that there was a significant reduction in migraine headache frequency and associated clinical features, in patients treated with yoga. There was a significant reduction in the yoga group compared to the self-care group in headache intensity, frequency, pain rating index, affective pain rating index, total pain rating index, anxiety and depression scores, symptomatic medication use. Some limitations of the study were: The trial had no placebo group; the trial did not mention blinding, lack of which may have threatened the internal validity of the trial. Also, the trial had no long-term follow-up data concerning the durability of the treatment effect.

Kisan *et al*.[56] evaluated the efficacy of Yoga as adjuvant therapy in migraine patients by assessing clinical outcomes as well as the autonomic functions tests. Sixty patients were randomly assigned to either conventional care CC or Yoga Y with conventional care over 6 weeks' period. Yoga group received yoga practice session for 5 days a week for 6 weeks along with conventional care. Clinical assessment and autonomic function tests were done at baseline and at the end of the intervention. Significant reductions in monthly headache frequency, average pain intensity, and headache-related disability were seen in both the Yoga and CC care groups. However, Group Y showed improvements in all clinical outcome measures to a greater extent. Considering all Heart rate variability parameters, Yoga with conventional care showed reduction in sympathetic tone as well as increased vagal tone. However, in the case of conventional care only, reduction in sympathetic tone was noted, without much alteration in the vagal tone. Therefore, increasing vagal tone by Yoga intervention may improve cardiovascular health and autonomic balance. However, the study was not blinded and there was no sham group for Yoga therapy. Latha *et.al*. reported outcome of yoga in 20 patients with migraine and tension headaches.[57] Subjects were randomly assigned to 4 months of yoga therapy and no treatment control conditions. Assessment was done for headache frequency, duration, and intensity, sources of stress, coping patterns, and somatic symptoms before and after the therapeutic intervention. There was significant reduction in the headache activity, medication intake, symptoms, and stress perception for the therapy group. They also showed significant improvement in coping behaviour.

Kumar *et al*. 2020[58] evaluated the effectiveness of yoga as an adjuvant to conventional medical management on clinical outcomes in patients with episodic migraine. A prospective, randomized, open-label trial with blinded endpoint assessment was carried out. Patients were aged 18–50 years. They were randomized into medical and yoga groups (1:1). Yoga intervention was given for 3 months. The primary endpoint was a decrease in headache frequency, headache intensity, and Headache Impact Test (HIT)–6 score. Secondary outcomes included change in Migraine Disability Assessment (MIDAS) score, pill count, and proportion of headache-free patients. A total of 114 patients out of 160 completed the trial. Baseline measures were comparable except for a higher mean headache frequency

in the yoga group. Compared to medical therapy, the yoga group showed a significant reduction in headache frequency headache intensity, HIT score, MIDAS score, and pill count. Hence, Yoga as add-on therapy in migraine seems more effective than medical therapy alone. This evidence needs validation with double-blind trials and matched control groups.

For migraine treatment, regular exercise is frequently recommended.[59-61] Many of the studies have reported beneficial effects of exercise on both frequency and intensity of migraine as well as on the duration of the attacks and on patient's well-being.[29,32] However, around 22% of migraine patients complain as exercise was a trigger factor and hence some patients avoid exercise and were physically less active.[4,37] In Yoga, slower movements or static stretching is done with mindfulness.[5] Hence Yoga, a slow nonexertional aerobic exercise can be beneficial for migraine.

Discussion and Conclusions

The results of various studies indicated that short-term interventions based on yoga can help to reduce not only the clinical symptoms of migraine headache but also alleviate comorbid anxiety, depression, the stress associated with migraine which can aggravate the disability and pain.

Some lacunae exist which provide indications for future research. Nearly every published study testing yoga interventions implemented a combination of movement, mental exercise, both rigorous and gentle postures, breath work, and meditative exercise. This heterogeneity, even within a certain type of yoga (e.g., Hatha, Iyengar, Integral) presents a problem: It is difficult to determine which component or combination of components is responsible for any outcome obtained, or whether it is the totality of the practice. Further, different yoga interventions, with varying emphases on the components of yoga such as asana, pranayama, or meditation, may have differential effects on physiological stress responses. To date, these issues remain unexamined. A tool that should be helpful in classifying yoga techniques in research, the Essential Properties of Yoga Questionnaire, is being designed to address current limitations in the yoga literature.[62] The development of a reliable, valid tool to assess the essential dimensions of yoga should lead to the improvement and tailoring of yoga interventions that will result in their improved effectiveness.

Despite the lacunae in existing research, it is a promising area and needs to be explored further. It is in line with the WHO vision, urging all governments to facilitate the development of traditional knowledge as it can and does contribute to scientific and universal medicine. It needs to be evaluated to improve its efficacy, safety, availability, and wider application at a low cost…."[21,22]

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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