https://africanjournalofbiomedicalresearch.com/index.php/AJBR
Afr. J. Biomed. Res. Vol. 27(3s) (November 2024); 6138-6144
Research Article

Exploring The Effects Of Yoga On Stress Reduction In Women: A Systematic Review

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ABSTRACT: Stress is a pervasive issue affecting women across various life stages, leading to numerous physical and psychological health concerns. Yoga, a mind-body practice, has gained popularity as a potential intervention for stress reduction. The primary aim of this review paper is to assess the effectiveness of yoga in reducing stress among women. The patient, intervention, comparison, and outcome search strategies were used to identify the keywords. Using the keywords "yoga and women and stress" 391 studies were identified from the PubMed database. For discussion, 10 studies were included in the review. The review found consistent evidence supporting the positive impact of yoga on stress reduction in women. Various studies reported significant decreases in stress levels, as measured by physiological and psychological indicators, after regular yoga practice, which is most beneficial. Yoga appears to be an effective intervention for reducing stress in women, with benefits observed across different age groups and stress conditions. The practice's holistic approach, which combines physical postures, breathing techniques, and meditation, likely plays a crucial role in its effectiveness.

KEYWORDS: Yoga, Stress, Women, Psychological Health, Mental Health

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Received 17/10/2024, Acceptance 23/10/2024

DOI: https://doi.org/10.53555/AJBR.v27i3S.2978

INTRODUCTION:

Stress among women, especially in countries like India, is a significant concern impacting both physical and psychological health. Women face stressors from various sources, including the workplace and home environment, leading to negative health outcomes.[1] The sex-specific stress response in females contributes to a higher susceptibility to chronic stress-related diseases, such as coronary artery disease, compared to men.[2] In India, challenges such as violence, inequality, and sexual harassment impede women's empowerment, causing emotional and psychological distress.[3] To address these challenges, it is crucial to educate families and societies about the effects of stress on mental health, promote good family relations, and increase access to mental healthcare services, ultimately aiming to reduce the impact of stress on women's overall well-being and societal contribution.

The prevalence of stress varies across different populations as highlighted in the research papers.

Among individuals with pre-hypertension, a significant portion 63% are experiencing moderate levels of stress.[4] During the COVID-19 pandemic, adults globally reported moderate stress levels, with females, individuals with a four-year degree, and those over 75 years old showing higher stress scores. At the same time, personal care practices were associated with lower stress levels.[5] Among school-going adolescents in India, stress levels were higher in males, individuals from lower socioeconomic backgrounds, and those with parents engaging in substance use.[6] Healthcare professionals exhibited a high prevalence of moderate to high stress levels, with factors such as age, gender, work hours, and chronic diseases influencing stress levels.[7]

Yoga has emerged as a significant tool for managing stress, with various studies highlighting its effectiveness in reducing stress levels and promoting overall well-being. Research indicates that yoga is widely adopted as a remedy for stress, with its combination of physical postures, breath control, and meditation proving beneficial in alleviating stress-related symptoms.[8] Studies have shown that regular yoga practice can lead to a significant reduction in stress levels, especially in work-related stress scenarios, making it a valuable approach for individuals seeking stress relief and improved mental health.[9,10] Furthermore, yoga's impact on stress extends to specific populations, such as infertile women, where it has been found to reduce stress levels and potentially improve clinical outcomes, emphasizing its role as a complementary intervention in managing stress.[11,12]

MATERIAL AND METHODS

SEARCH STRATEGIES:

The present review paper used an electronic database search with PubMed from January 2006 to July 2024 and published scientific studies (Randomized control trials, case studies, and pilot studies) in English were reviewed. The search strategy utilized the keywords "Yoga AND Women AND Stress." This review mainly depended on electronic searches through online databases.

SCREENING AND SELECTION:

Article selection was determined through successive screening of the study design, titles, abstracts, and free full-text articles based on the level of assessment required to ascertain eligibility.

INCLUSION CRITERIA:

The current systematic review includes studies published in English under the titles “Yoga” “Stress” AND “Women” with free full-text articles, with female participants aged between 18 to 75 years and suffering from any stress. Yoga intervention should be more than 1 week.

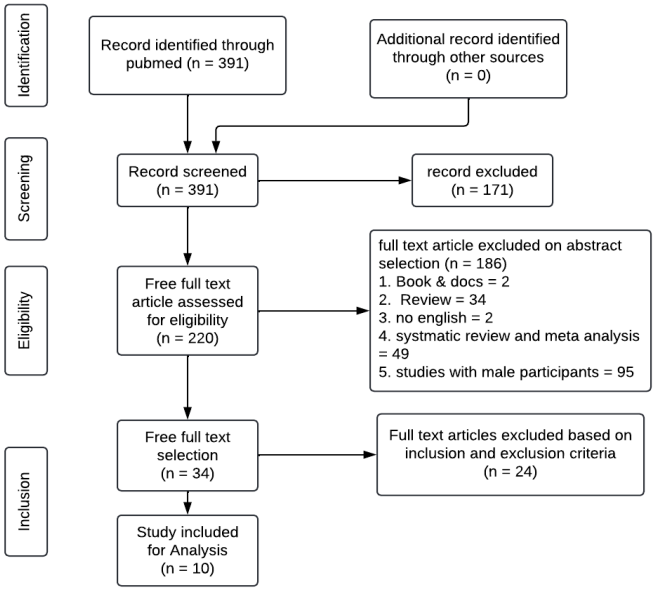
EXCLUSION CRITERIA:

The current systematic review did not incorporate conference abstracts, books, review articles, theses, or dissertations. Non-English language articles were omitted from the analysis. Additionally, research involving male participants was excluded from the study.

DATA EXTRACTION:

The studies that met the criteria for inclusion and exclusion were carefully evaluated. Details extracted from the records included the author's name, study year, sample size, study type, and the age range of participants. Any uncertainties or questions were resolved through brainstorming and mutual discussion.

RESULTS:



Figer 1: Identification and Inclusion of Studies

Table 1: The systematic review table for the included studies

S. No.	Author & year	Study design	Sample size	Intervention	Outcome measure	Age group	Key findings
1.	D'Silva et al. (2022)	RCT	N= 79 Female	Hatha Yoga (8 weeks) 1 session/week for 60 minutes	• IBS-SSS • IBS-QOL • Generalized anxiety disorder • PHQ-9 • Perceived Stress Scale • COVID-19-related stress • MFIS-21 • PHQ-15 • Self-compassion scale-short form-31	18-70 years	Yoga Significant improvements in quality of life, fatigue, and perceived stress.
2.	Price et al. (2017)	Non-randomized single-group	N = 9	20 weeks	• CAPS • PTSD (DTS)	25-55 years	Trauma-sensitive yoga treatment showed effectiveness for chronic PTSD in women
3.	Hopkins et al. (2017)	RCT	N = 52	Vikram Yoga 8 weeks Two 90 minutes sessions/ week	• BMI • DRES • AUC • PSQ • EEI • EDDS	25-46 years	Yoga reduced cortisol reactivity and binge eating in high-reactors Yoga participants reported fewer binge eating episodes and coping motives.
4.	Kinser et al. (2013)	RCT Pilot study	N = 27	Hatha Yoga 8 weeks, 75 minutes	• PHQ9 • PSS • STAI • RSS		Both groups showed decreased depression over time. Yoga group uniquely decreased ruminations, enhancing coping strategies
5.	Yoko Miyoshi (2018)	Randomized crossover trial	N=20	Retroactive yoga 4 weeks/ 1 hour	• Job stress questionnaire (BJSQ)	20-30 years	There are no significant differences in stress reactions between sequences A and B. There are no significant differences in stress reactions between periods I and II.
6.	KN Harkess et al. (2016)	RCT	N = 28	8 weeks of yoga intervention, twice weekly for one hour	• Kessler Psychological Distress Scale [K10]	Average age 41.12 years"	Reduced TNF methylation in the yoga group compared to the control group Elevated IL-6 trends in the yoga group shown by the Mann-Whitney U test
7.	Unick JL et al. (2022)	RCT	N = 60	12 weeks of group-based Iyengar yoga twice per week for 60 minutes	• DTS • Five fact mindfulness questionnaires • PANAS • Perceived stress • Self-comparison	18-60 years	Yoga lost significantly more weight (-9.0kg vs. -6.7kg) at 6 months and resulted in greater distress tolerance, mindfulness, self-compassion, and lower negative affect, compared to CON.
8.	Nadholta et al. (2023)	Open-label RCT	N=77	Yogesta (gestational yoga) 5 days a week until delivery 2nd trimester – 60 mints 3rd trimester – 40 minutes	• PSS • DASS • WHO-QOF BREF	18-35 years	The Yoga group exhibited a noteworthy decrease in perceived stress, depression, anxiety, and psychological stress, as well as an improvement in the psychological and environmental domains of QOL-BREF

9.	Hewett et al. (2017)	Parallel arm – RCT	N = 63	Vikram yoga 3-5 classes/ week for 90 mins For 16 weeks	• RAVO • Hemoglobin outcome • Hematological outcome • DASS-21	19-64 years	Bikram yoga as a method to reduce the risk of stress-related cardiovascular disease
10.	Kinser et al. (2014)	RCT (Mixed method)	N=27	Hatha Yoga Weekly 75 minutes/ class 8 weeks	• PHQ9 • PSS • STAI • RRS • SF-12	18+	Long-term yoga practice showed sustained benefits on depression and rumination. Positive effects on stress, anxiety, and health-related quality of life.

Result: This review included a total of 10 studies [Figure 1]. After searching the database, 391 articles were identified through PubMed. One hundred seventy-one articles were excluded because they did not have "yoga" AND "stress" and "women" in their titles. Two studies were excluded because they were not in English language. Ninety-five studies were excluded because they had male particles too with female participants. Two studies were excluded because they were books and documents. Thirty-four and forty-nine studies were excluded because they were reviews, systematic reviews, and meta-analyses. Four studies were not relevant to the objective of the study. The most common scale used to asses stress was the perceived stress scale (PSS) followed by the Job stress questionnaire (BJSQ), Generalized anxiety disorder, and COVID-19-related stress, posttraumatic stress disorder scale, Perceived stress questionnaire (PSQ) Depression anxiety stress scale (DASS21). The sample size of the study varied from 9 to 79, from the age group of 10 to 70 years.

The MY-IBS study is the first to show that an 8-week virtual yoga program, combined with home practice, is both feasible and safe for patients with IBS, compared to a control group receiving only advice. The primary outcome was measuring IBS symptoms, while secondary outcomes included quality of life, anxiety and depression, fatigue, somatic symptoms, perceived stress, COVID-19 stress, and self-compassion. Although the study did not find significant differences in IBS symptoms between the groups after the intervention, it did reveal positive effects of yoga on quality of life, fatigue, somatic symptoms, perceived stress (P=0.040), COVID-19-related stress, and self-compassion in IBS patients.[13]

Research indicates that practicing yoga more frequently is linked to improved mental and physical health. In a study assessing the feasibility of a 20-week trauma-sensitive yoga program for women with chronic, treatment-resistant PTSD, nine participants aged 25 to 55 were involved. The study used the CAPS and Davidson Trauma Scale (DTS) to evaluate PTSD. The results suggest that engaging in yoga for a longer period is connected to a range of beneficial physical and mental health effects.[14] Yoga practice is associated with reductions in stress and cortisol levels. In a study, 52 women participated in 8 weeks of Bikram Yoga, which included 26 hatha yoga postures, two breathing exercises, and two savasana. Participants were instructed to attend a minimum of two 90-minute yoga classes each week. The study found that those in the yoga group showed a significant reduction in cortisol reactivity from pre- to post-treatment ($p = .042$, $d = .85$), demonstrating the effectiveness of Bikram yoga in reducing cortisol reactivity to stress and emotional eating.[15]

A community-based, prospective, randomized clinical pilot study was carried out in a metropolitan city on the East Coast of the United States to evaluate the effectiveness of yoga for women with depression. The study involved an 8-week program of 75-minute gentle Hatha yoga classes led by experienced instructors. The findings indicated that different yoga interventions might help reduce both psychological and physical symptoms of depression and stress. The duration of the interventions appears to be a crucial factor in their effectiveness.[16] Restorative yoga has proven to be effective in reducing occupational stress among female nurses who work night shifts. This form of yoga is gentle, with the body supported by pillows or towels to help relax muscles and the spine. In a randomized crossover trial involving 20 nurses, the effectiveness of restorative yoga was assessed. Participants practiced restorative yoga at least three times a week for about 5 to 15 minutes over 4 weeks under the guidance of an experienced yoga instructor. The mean score for psychological and physical stress reactions, measured using the BJSQ, was 65.7 ± 10.8 (range: 48-92) before the sessions and dropped to 62.6 ± 10.6 (range: 47-87) afterward, showing a significant decrease ($P = 0$). After 4 weeks of practicing restorative yoga, there was a notable reduction in BJSQ scores for psychological and physical stress reactions among night shift nurses compared to baseline levels or standard stress relief methods.[17] This study is a subsample ($n = 28$) from a larger clinical trial ($N = 116$) that investigates the psychophysiological effects of a yoga intervention in women experiencing psychological distress. Participants attended a 1-hour yoga class weekly for 8 weeks. The study consists of two parts: the first uses a randomized trial design to compare inflammation-related protein markers (IL-6, TNF, and CRP) between participants who completed the yoga intervention and those in the control group. The second part employs a cross-sectional trial design to compare DNA methylation patterns between the yoga group and the control group at the post-treatment assessment. The study examines yoga's effects on immune markers and

DNA methylation, revealing reduced TNF methylation in the yoga group compared to the control group.[18] Another randomized trial examined the feasibility, acceptability, and preliminary effectiveness of a 12-week yoga intervention in 60 women following a 3-month behavioral weight loss (WL) program. The study focused on changes in body weight and key psychological factors among women with overweight or obesity. Yoga could be a promising approach for sustaining long-term weight loss in those who have achieved initial success and for enhancing psychological constructs over time.[19]

Another study recruited 77 pregnant women to explore the effects of Gestational Yoga (YOGESTA) on neuropsychology, quality of life, and personality. Pregnant women in their second and third trimesters participated in a 16-week online Prenatal Yoga intervention. Within-group analysis after follow-up revealed a significant increase in perceived stress in the usual care group (UCG), rising from 16.79±0.763 to 20.84±0.927 (p=0.000), with an average change of −4.047. In contrast, the yoga group (YG) showed a significant decrease in perceived stress, dropping from 17.38±0.943 to 13.41±0.943 (p=0.000), with an average change of 3.971. Additionally, the yoga group experienced a substantial reduction in depression, from 8.71±1.441 to 4.41±0.998 (p=0.000); anxiety, from 9.09±0.946 to 6.35±0.774 (p=0.011); and stress, from 12.38±1.346 to 7.35±1.010 (p=0.000) after the intervention. The yoga group also showed a significant improvement in perceived stress, depression, anxiety, and psychological stress, along with enhancements in the psychological and environmental domains of QOL-BREF.[20]

In the study, 63 participants (average age 37.2 ± 10.8 years, 79% women) were assigned to a 16-week Bikram yoga program. The classes lasted 90 minutes and were conducted in a temperature-controlled room. No significant difference in the Ln HF power component of HRV was observed between groups over time ($p = 0.912$, partial $\eta 2 = 0.000$). There was also no significant change in HRV or cardiovascular risk factors after the intervention. Increased attendance, however, was linked to decreases in both diastolic blood pressure and body fat. The findings suggest that while there is no chronic increase in vagal tone in response to the intervention, Bikram yoga does help reduce psychological stress and lowers cortisol reactivity to stress.[21]

Long-term yoga practice demonstrated lasting advantages for those experiencing depression and excessive thinking. It also had beneficial effects on stress, anxiety, and overall quality of life related to health. The intervention study involved twenty-seven women, nine of whom participated in a follow-up study one year later (over 52 weeks). Participants reported that the long-term benefits of yoga included ongoing improvements in their mental well-being, as well as the acquisition of new techniques to cope with symptoms of depression and stress.[22]

Discussion: The results from these studies suggest that yoga-based practices can significantly reduce stress. Among the ten studies reviewed, nine involved interventions lasting at least 8 weeks, while one study lasted 4 weeks. All the studies were conducted by a certified yoga instructor, with each session lasting at least 60 minutes. This review also covers several controlled trials, both randomized and non-randomized, that examined yoga as an intervention for anxiety and anxiety disorders. Out of ten randomized controlled trials (RCTs), nine were included because RCTs are considered the highest standard for establishing causal relationships in clinical research. One major issue with single-arm clinical trials is the difficulty in accurately assessing the effects of the intervention.[21] Yoga was found to be effective in improving psychological factors in the included RCTs, demonstrating reductions in anxiety and depression, as well as enhancements in quality of life, fatigue levels, and perceived stress.[22,13,20] Furthermore, the RCTs also provided evidence that yoga would be quite beneficial for individuals with PTSD and reduce the risk of stress-related cardiovascular disease.[14,20] Despite the increasing popularity of yoga, its neurobiological effects remain largely unclear. However, the literature reviewed in this systematic review indicates that yoga practice seems to enhance positive emotions and reduce symptoms of depression and anxiety in various populations. The effects of yoga on different physiological systems have been well-documented, with several mechanisms suggested for its beneficial role in reducing stress. Yoga positively influences the autonomic nervous system (ANS) by reducing sympathetic nervous system (SNS) activity and enhancing parasympathetic nervous system (PNS) activity.[23]

Although there are methodological limitations, most studies offer evidence that yoga is linked to reduced TNF methylation and lower cortisol levels. This suggests that yoga might influence mood through the regulation of the sympathetic nervous system (SNS) and the hypothalamic-pituitary-adrenal (HPA) axis.[15,18] Yoga has been demonstrated to lower stress levels and markers of oxidative stress, like malondialdehyde, while also boosting the levels of antioxidant enzymes, such as superoxide dismutase.[24,25] In our study, we discovered that the duration of the intervention appears to be a crucial factor in the effectiveness of yoga. Studies with longer intervention periods yielded more convincing results. Chong et al. also suggested further research to determine the long-term effects of yoga.[26] The three yoga interventions that reported positive outcomes support the benefits of hatha yoga-based styles. However, these interventions incorporated breathing and meditation components in addition to physical postures within the protocol. The specific proportions of these components, however, were not detailed.[13,16,22] When yoga is combined with breathing exercises, meditation, and physical activity, it strengthens muscles and reduces stress. It aids both the mind and body in coping with stress, anxiety, and depression, leading to a calm and relaxed state of being.[27]

There is a shortage of information on safety or contraindications for yoga for stress and no adverse effects related to the practice of yoga can be gained from the studies included in this review. Practicing

pranayama improves the balance between the sympathetic and parasympathetic nervous systems and enhances respiratory function, both of which are vital psycho-physiological factors related to stress.[28]

Conclusion: In summary, recent research indicates that yoga may enhance outcomes for stressed women by alleviating stress, symptoms of depression, and some negative effects. These improvements might be linked to physiological changes, such as variations in salivary cortisol levels. No negative effects were reported in the trials, implying that yoga, when guided properly and adjusted for physical needs, is safe for women. The practice of yoga, including asanas, pranayama, and chanting, seems to offer lasting benefits. The meditative aspect of yoga helps activate the self-regulatory system, leading to increased positive emotions, reduced rumination, stress, depression, and anxiety, and an improved quality of life. However, the effectiveness of yoga interventions has been questioned due to factors like study design, small sample sizes, variations in yoga styles, session duration, and frequency, components of the yoga practice, home practice, and follow-up. To better understand yoga's impact on patient outcomes and reach conclusive results, future research should focus on consistent types of yoga, treatment duration, and frequency. Further well-designed studies, particularly targeting specific anxiety disorders, are needed for more productive insights.

Acknowledgment: Nil
Financial support and sponsorship: Nil.
Conflict of interest: There are no conflicts of interest**.**

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