EFFECT OF MIND–BODY EXERCISES VERSUS DIAPHRAGMATIC BREATHING EXERCISES ON BLOOD PRESSURE AND PERCEIVED STRESS IN YOUNG FEMALES

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Abstract

Introduction:

Stress is a common psychosocial factor that adversely affects physical and mental health, particularly among young females who experience academic and interpersonal stressors. Chronic perceived stress can influence autonomic function and blood pressure (BP), increasing the risk of future lifestyle disorders. Mind–body exercises and diaphragmatic breathing exercises are known to reduce stress, but comparative evidence between these interventions is limited. This study aimed to compare their effects on BP and perceived stress in young females.

Methodology:

A comparative study was conducted on 30 young females aged 18–24 years with high perceived stress (PSS-10 score 27–40) and normal BP. Participants were selected using convenience sampling and randomly allocated into two groups: Group A (mind–body exercises) and Group B (diaphragmatic breathing exercises), with 15 participants each. Both groups received supervised intervention sessions of 15 minutes, three times per week for eight weeks. Blood pressure was measured at baseline, 4th week, and 8th week, while perceived stress was assessed using the PSS-10 at baseline and post-intervention. Statistical analysis was performed using appropriate parametric and non-parametric tests.

Results:

Both groups showed a statistically significant reduction in perceived stress levels after the intervention ($p < 0.05$). The effect size was moderate in Group A and moderate-to-large in Group B. No statistically significant changes were observed in systolic or diastolic BP within or between the groups. Comparison between the two interventions revealed no significant difference in post-intervention BP or perceived stress scores.

Discussion:

The findings suggest that both interventions are effective in reducing perceived stress among young females. The absence of significant BP changes may be attributed to normal baseline BP values and the relatively short intervention duration.

Conclusion:

Mind–body exercises and diaphragmatic breathing exercises are equally effective, simple, and safe methods for reducing perceived stress in young females and can be recommended as preventive stress management strategies.

Keywords: *Perceived stress, Mind–body exercises, Diaphragmatic breathing, Blood pressure, Young females*

Introduction

Stress is a multifaceted psychosocial phenomenon that arises when individuals perceive that the demands placed upon them exceed their coping resources [1]. In contemporary society, stress has become increasingly prevalent, particularly among young adults navigating academic, social, and personal responsibilities. Female students are especially vulnerable to elevated stress levels due to biological, psychological, and sociocultural factors [2–4]. Academic competition, performance pressure, interpersonal relationships, financial concerns, and uncertainty regarding future career prospects contribute significantly to heightened stress among young females pursuing higher education. Chronic exposure to stress triggers a cascade of neuroendocrine responses involving activation of the sympathetic–adrenal–medullary axis and the hypothalamic–pituitary–adrenal (HPA) axis [5]. These responses result in increased secretion of catecholamines and cortisol, leading to alterations in cardiovascular, metabolic, and immune function. Blood pressure is one of the most sensitive physiological parameters affected by stress-induced autonomic imbalance [6]. Although young adults often exhibit normal resting blood pressure, repeated exposure to stress may predispose them to future hypertension and cardiovascular disease. Pharmacological management of stress-related conditions is often associated with side effects and is not always suitable for young or otherwise healthy individuals. As a result, there has been growing interest in non-pharmacological interventions aimed at stress reduction and health promotion [7]. Mind–body interventions, including yoga-based exercises, meditation, and relaxation techniques, have demonstrated beneficial effects on mental well-being, autonomic regulation, and cardiovascular health [8–10]. These practices emphasize the integration of physical movement, breath awareness, and mental focus, promoting harmony between the body and mind. Diaphragmatic breathing exercises represent another simple yet powerful intervention for stress management. By encouraging slow, deep breathing patterns that engage the diaphragm, these exercises stimulate parasympathetic activity and reduce sympathetic arousal [11,12]. Evidence suggests that diaphragmatic breathing can lower cortisol levels, improve emotional regulation, and enhance overall psychological resilience. Although both mind–body exercises and diaphragmatic breathing have independently shown promise in stress reduction, comparative studies examining their relative effectiveness, particularly in young female populations, remain limited. Understanding the comparative impact of these interventions is essential for developing evidence-based stress management programs tailored to this vulnerable group. Therefore, the present study aimed to compare the effects of mind–body exercises and diaphragmatic breathing exercises on blood pressure and perceived stress levels in young females aged 18–24 years.

Methodology

This comparative experimental study was conducted at Padmashree Group of Institutions, Kengeri, Bengaluru, over a period of six months. Ethical clearance was obtained from the institutional ethics committee prior to the commencement of the study, and written informed consent was obtained from all participants. The study adhered to the ethical principles outlined in the Declaration of Helsinki.

A total of 37 female students were initially screened for eligibility. Convenience sampling was employed due to accessibility of participants. Thirty participants who met the inclusion criteria were recruited for the study. Inclusion criteria comprised unmarried females aged 18–24 years, high perceived stress levels as indicated by a Perceived Stress Scale-10 (PSS-10) score ranging from 27 to 40, and normal resting blood pressure values (<120/80 mmHg). Participants with a history of cardiovascular, respiratory, neurological, or musculoskeletal disorders, as well as those practicing yoga or breathing exercises regularly, were excluded.

Participants were randomly allocated into two equal groups using a simple randomization method. Group A (n=15) was assigned to the mind–body exercise intervention, while Group B (n=15) received diaphragmatic breathing exercises. Baseline demographic data, including age, height, weight, and body mass index, were recorded.

Blood pressure was measured using a calibrated aneroid sphygmomanometer and stethoscope following standardized guidelines [13]. Measurements were taken in a seated position after five minutes of rest. Two readings were recorded and averaged to minimize measurement error. Blood pressure assessments were conducted at baseline, at the end of the fourth week, and at the end of the eighth week.

Perceived stress was assessed using the PSS-10, a widely validated and reliable questionnaire designed to measure the degree to which individuals perceive situations in their lives as stressful [14]. The scale consists of ten items rated on a five-point Likert scale, with higher scores indicating greater perceived stress.

The intervention protocol lasted for eight weeks, with sessions conducted three times per week, each lasting 15 minutes. All sessions were supervised by a trained physiotherapist to ensure correct performance and adherence.Group A participants performed a structured mind–body exercise program consisting of beginner-level yoga postures, including Tadasana(fig 1), Padahastasana(fig 2), Vrikshasana(fig 3), and Garudasana(fig 4). These postures were selected to promote balance, flexibility, and postural awareness. Each session concluded with an Instant Relaxation Technique (fig 5) aimed at reducing muscular tension and inducing mental calmness.Group B participants practiced diaphragmatic breathing exercises(fig 6) in a crook-lying position. Participants were instructed to inhale slowly through the nose, allowing the abdomen to rise, followed by a slow controlled exhalation. Two sets of 6–12 repetitions were performed in each session, with emphasis on rhythm and relaxation.

Data analysis was performed using SPSS version 20.0. Normality of data was assessed prior to statistical testing. Paired t-tests and Wilcoxon signed-rank tests were used for within-group comparisons, while independent t-tests and Mann–Whitney U tests were used for between-group comparisons. Statistical significance was set at $p < 0.05$.

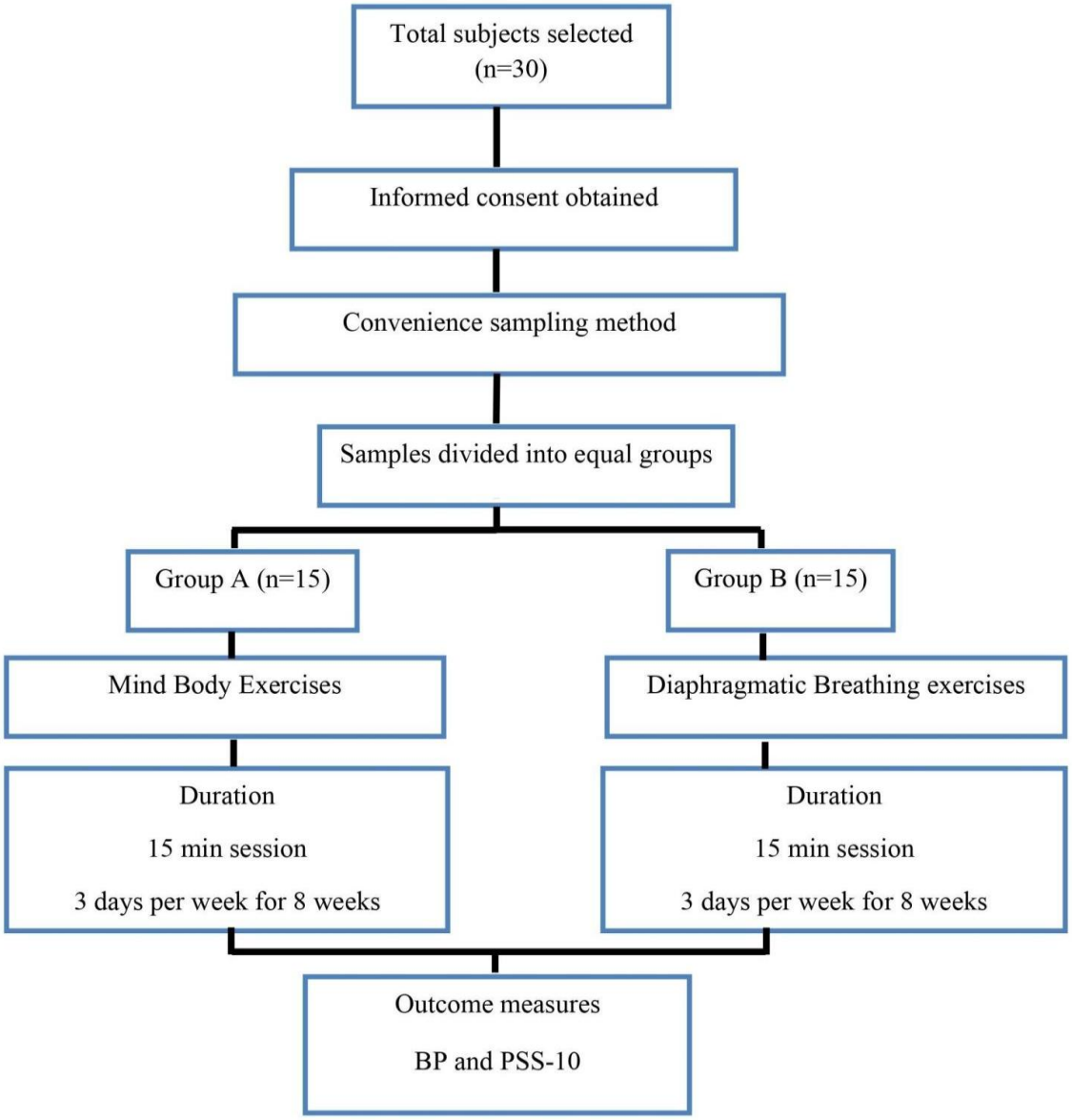

Fig : Flow Chart of Methodology

Fig 1: Tadasana

Fig 2: Padahastasana

Fig 3: Vrikshasana

Fig 4: Garudasana

Fig 5: Instant Relaxation Technique

Fig 6: Diaphrgamatic Breathing Exercise

Results

The mean age of participants in Group A was 22.53 ± 1.06 years, while the mean age in Group B was 20.66 ± 1.49 years. There were no statistically significant differences between the groups with respect to baseline demographic characteristics, blood pressure values, or perceived stress scores, indicating homogeneity between the groups. Within-group analysis revealed no statistically significant changes in systolic or diastolic blood pressure in either group following the eight-week intervention period. Although Group A demonstrated a transient reduction in systolic blood pressure at the fourth week, this change was not sustained at post-intervention assessment.

Perceived stress levels showed a statistically significant reduction in both groups following the intervention. Group A exhibited a significant decrease in PSS-10 scores after participation in the mind–body exercise program ($p < 0.05$), with

a moderate effect size. Group B demonstrated a highly significant reduction in perceived stress following diaphragmatic breathing exercises ($p < 0.01$), with a moderate-to-large effect size.

Between-group comparison of post-intervention scores revealed no statistically significant difference in perceived stress or blood pressure outcomes, suggesting that both interventions were equally effective in reducing perceived stress among young females.

Discussion

The present study aimed to compare the effects of mind–body exercises and diaphragmatic breathing exercises on blood pressure and perceived stress in young female adults. The primary finding of this study is that both interventions resulted in a significant reduction in perceived stress levels, while neither produced significant changes in blood pressure.

The reduction in perceived stress observed in the mind–body exercise group is consistent with previous research demonstrating the stress-modulating effects of yoga-based interventions [8–10]. Mind–body exercises facilitate autonomic regulation by enhancing parasympathetic activity and reducing sympathetic dominance. Additionally, these practices encourage mindfulness and body awareness, which may improve coping strategies and emotional resilience.

Similarly, diaphragmatic breathing exercises were found to be highly effective in reducing perceived stress. Slow, deep breathing has been shown to directly influence the vagus nerve, resulting in improved heart rate variability and reduced cortisol secretion [11,12]. The slightly higher effect size observed in the diaphragmatic breathing group may be attributed to the simplicity and direct physiological impact of this intervention.

The absence of significant changes in blood pressure in both groups may be explained by the normal baseline blood pressure values of participants. Young adults typically exhibit efficient cardiovascular compensatory mechanisms, and stress-related BP fluctuations may be transient and not captured during resting measurements [6]. Previous studies have reported more pronounced BP reductions in populations with prehypertension or hypertension [12].

The lack of a statistically significant difference between the two interventions suggests that both techniques are comparably effective for stress reduction. From a clinical and public health perspective, this finding is important, as it provides flexibility in selecting stress management strategies based on individual preferences, feasibility, and available resources.

The study has certain limitations. The small sample size and short intervention duration may limit the generalizability of the findings. Additionally, stress was assessed using a self-reported questionnaire, which may be subject to response bias. Future studies with larger sample sizes, longer follow-up periods, and inclusion of physiological stress markers such as cortisol levels are recommended.

Despite these limitations, the study highlights the potential role of simple, non-pharmacological interventions in managing stress among young females. Integration of such interventions into educational institutions may contribute to improved mental well-being and long-term health outcomes.

Conclusion

This study concludes that both mind–body exercises and diaphragmatic breathing exercises are effective in significantly reducing perceived stress among young females aged 18–24 years. However, neither intervention produced statistically significant changes in blood pressure, likely due to normal baseline values and the young age of participants. No significant difference was observed between the two interventions, indicating comparable effectiveness. These findings support the incorporation of simple, safe, and cost-effective stress management techniques into student wellness programs. Regular practice of mind–body exercises or diaphragmatic breathing may enhance psychological well-being and serve as a preventive strategy against future stress-related health disorders.

Keywords: Perceived stress; Mind–body exercises; Diaphragmatic breathing; Blood pressure; Young females

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