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RESEARCH ARTICLE
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AN ASSESSMENT THE EFFECT OF YOGA ON STRESS AMONG 1ST YEAR M.B.B.S.STUDENTS OF RANI DURGAVATI MEDICAL COLLEGE BANDA

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Abstract:

Background: Medical education is inherently stressful, particularly for first-year students transitioning from high school to an intensive academic environment. The pressure of voluminous coursework, long study hours, and the competitive nature of medical school often lead to stress-related health issues.

Objective: To assess the effects of yoga on stress among first-year M.B.B.S. students at Rani Durgavati Medical College (R.D.M.C.), Banda**.**

Methods: This cohort study was conducted among all first-year M.B.B.S. students enrolled at R.D.M.C., Banda, over a period of nine months. Ethical clearance was obtained from the Institutional Ethical Committee before initiating the study.

Result: A substantial reduction in cortisol levels was observed post-yoga, with both male and female participants showing significant decreases, suggesting yoga's effectiveness in stress reduction. Stress severity, as measured by DASS-21 scores, significantly improved post-yoga, with a marked increase in participants categorized as "Normal" stress and a notable decrease in higher stress categories. Academic performance, as indicated by internal exam marks and practical skills ratings, significantly improved after the yoga intervention, showing the potential benefits of yoga on cognitive and practical learning. Physiological parameters such as systolic and diastolic blood pressure and pulse rate showed significant improvement after yoga, indicating positive effects on cardiovascular and autonomic functions. Participants reported significant improvements in happiness levels, with more individuals reporting being "Happy" or "Very Happy" post-yoga. Cortisol stratification showed a significant shift towards normal cortisol levels post-yoga, highlighting the stress-reducing effects of yoga. High adherence to the yoga sessions was strongly correlated with more significant improvements in both cortisol levels and academic performance. Adverse events were minimal, with only muscle strain and dizziness reported by a small percentage of participants, indicating the intervention's overall safety.

Conclusion: Our study's findings regarding the positive correlation between higher yoga adherence and improved cortisol levels and academic performance are consistent with the broader literature.

Keywords: Yoga, Stress, 1st year M.B.B.S. Students,

INTRODUCTION: Stress has become an inevitable part of modern life, affecting individuals across various professions and educational backgrounds. Medical students, particularly first-year M.B.B.S. students, experience significant stress due to the rigorous academic curriculum, competitive environment, and demanding clinical exposure. Prolonged stress can lead to anxiety, depression, decreased cognitive function, and a decline in overall well-being. Stress also has physiological manifestations, including elevated cortisol levels, which can negatively impact health and academic performance. [1]

In the Indian context, where yoga originated, its adoption in educational institutions has been encouraged by the government and health organizations. Studies in India have shown that yoga interventions can enhance concentration, reduce anxiety, and improve academic performance among students. [2] The Ministry of AYUSH has actively promoted yoga as a means of mental and physical well-being, particularly among students facing academic pressure. Medical education, which is known for its demanding nature, could greatly benefit from such interventions, ensuring that students maintain their health while excelling academically.

The relationship between stress and academic performance is well documented. Students experiencing high levels of stress may struggle with memory retention, problem-solving, and overall learning efficiency. Chronic stress can also lead to burnout, a state of emotional, physical, and mental exhaustion that reduces motivation and productivity. Integrating yoga into the daily routine of first-year M.B.B.S. students may offer a non-pharmacological and sustainable approach to managing stress, improving mental clarity, and boosting academic outcomes.

Studies conducted across various medical colleges worldwide indicate that first-year medical students experience the highest levels of stress compared to their seniors. The adaptation to a new academic environment, learning extensive theoretical knowledge, and preparing for examinations contribute to this increased stress level. Many students also face emotional distress due to being away from home, adjusting to hostel life, and managing expectations from family and faculty. Given that stress is a significant factor affecting both the physical and mental well-being of medical students, effective interventions are needed. Yoga has been recognized as a natural, non-pharmacological method for stress management. Studies have shown that regular yoga practice can lead to improved focus, reduced anxiety, enhanced physical fitness, and overall well-being.[3] Incorporating yoga into the daily routine of medical students could potentially mitigate stress-related issues and improve their academic performance.

Despite its proven benefits, there is limited research specifically examining the effects of yoga on stress, cortisol levels, and academic performance among first-year M.B.B.S. students in India. This study bridges this gap and provides evidence-based recommendations for integrating yoga into medical education. The study also explores whether yoga can serve as a long-term solution to stress management and contribute to improved quality of life among medical students.

This study aims to assess the effectiveness of yoga in reducing stress, lowering cortisol levels, and improving academic performance among first-year M.B.B.S. students. By systematically evaluating these factors, this research provides valuable insights into the role of yoga as a practical intervention for stress management in medical education. The results of this study could help educational policymakers and medical college administrators incorporate yoga as a structured component of the curriculum. If proven effective, yoga could be recommended as a part of student wellness programs to enhance resilience and overall well-being. The findings may also contribute to the growing body of literature supporting holistic approaches to stress management in medical education.Moreover, this study shed light on how regular yoga practice influences physiological stress markers, such as cortisol levels, alongside subjective measures of stress, happiness, and academic performance. It also assesses students' perceptions and willingness to adopt yoga as a long-term stress management practice.

Material and Methods: This cohort study was conducted among all first-year M.B.B.S. students enrolled at R.D.M.C., Banda, over a period of nine months. Ethical clearance was obtained from the Institutional Ethical Committee before initiating the study.

Inclusion Criteria:
- All first-year M.B.B.S. students at R.D.M.C. who gave consent to participate.

Exclusion Criteria:
- Students who did not provide written consent.
- Students who were not physically fit to practice yoga and asanas.
- Students diagnosed with high cortisol levels.
- Students with major cardiovascular, respiratory, endocrine, or other serious illnesses.

Sample Size and Sampling Method: All eligible first-year M.B.B.S. students who met the inclusion criteria were included in the study. A convenient sampling method was used to select participants.

Intervention: A structured yoga module, consisting **of** yogasana, pranayama, meditation, and prayer**,** was implemented. The intervention was provided four times a week for one hour in the morning over a period of nine months for the experimental group.

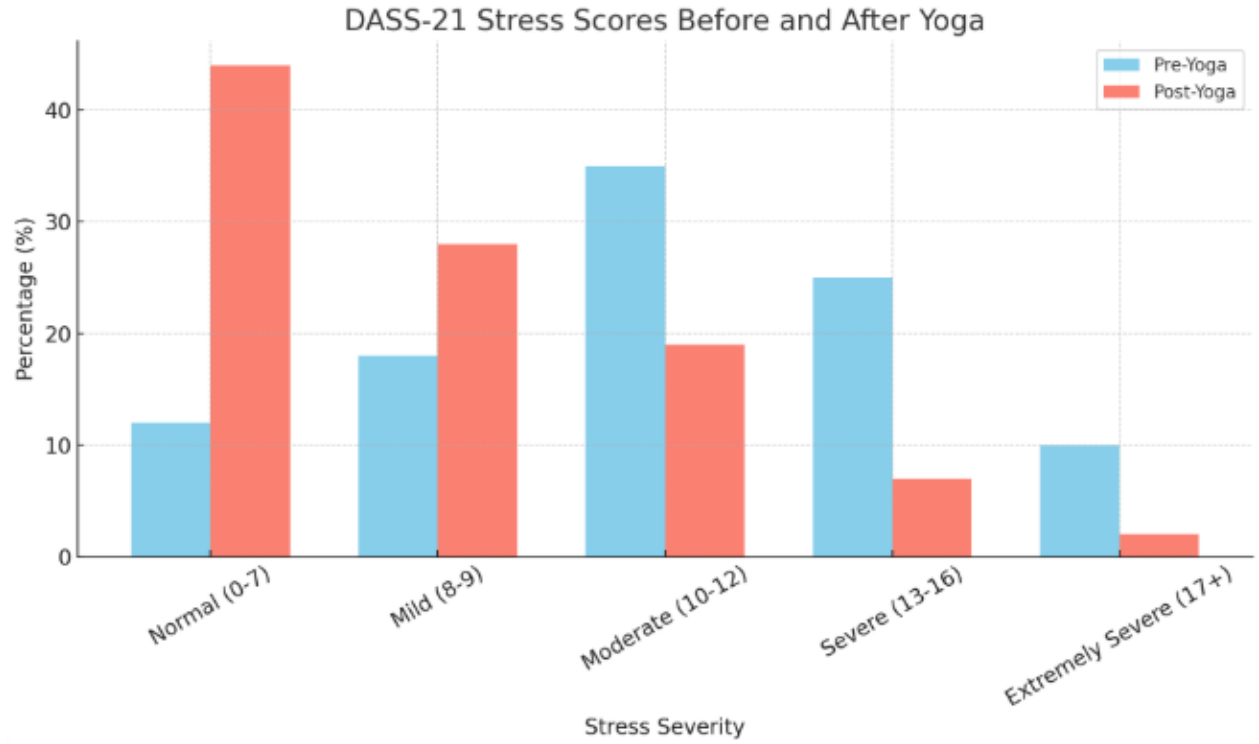
Data Collection: Before the intervention, all students who met the inclusion criteria underwent a laboratory test to measure cortisol levels. A pretested structured questionnaire was used to collect data on physical health, happiness, and academic performance. After the intervention, the same tests and questionnaires were administered again to evaluate changes in these parameters.

Statistical Analysis: The collected data were analyzed using appropriate statistical methods. Scores of various parameters were expressed using descriptive and inferential statistics. Suitable statistical tests were applied to assess the significance of differences between pre- and post-intervention values. A p-value of ≤ 0.05 was considered statistically significant.

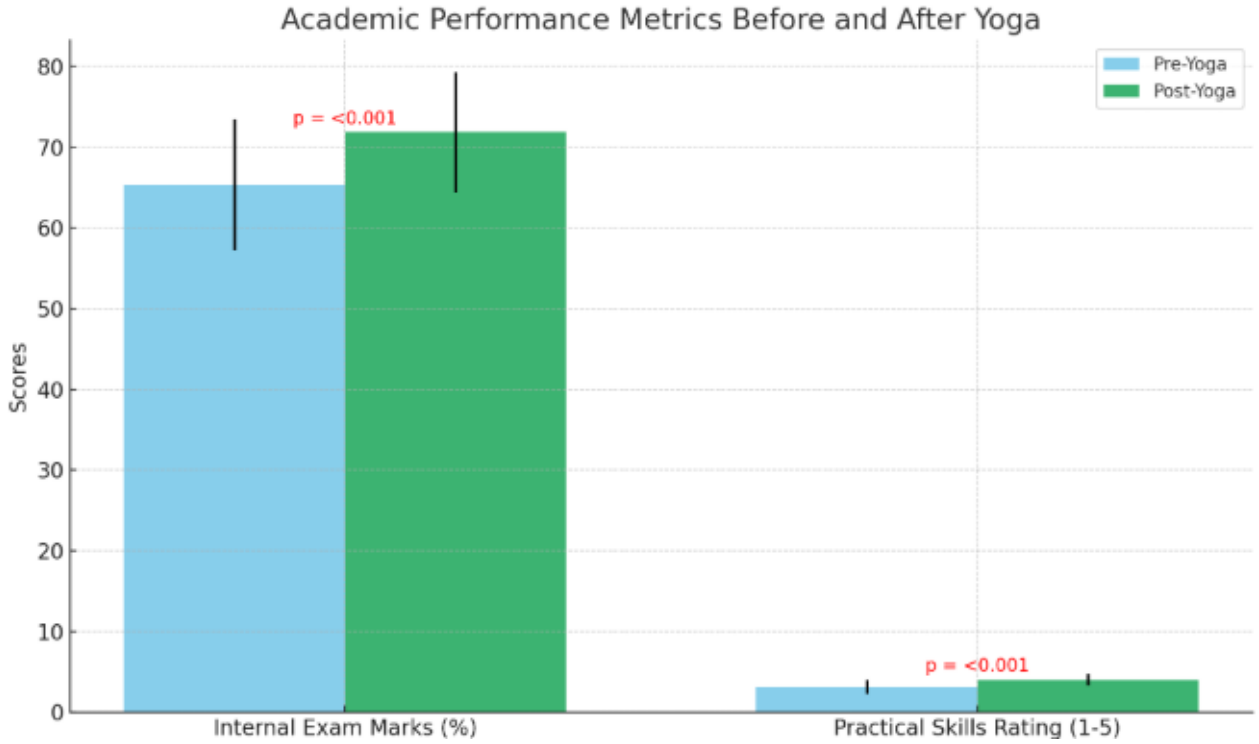
Results: The sociodemographic profile of the study participants (n=100), highlighting gender distribution and socioeconomic status based on the Kuppuswamy Scale. Among the participants, 58% were male and 42% were female, with no statistically significant gender difference ($p=0.452$). In terms of socioeconomic status, the majority belonged to the upper middle class (39%) and lower middle class (32%), followed by 15% in the upper lower class, 12% in the upper class, and only 2% in the lower class. The distribution of socioeconomic status showed a statistically significant difference ($p<0.001$), indicating a diverse economic representation among the participants.

The baseline cortisol levels measured before and after yoga intervention among the study participants. Overall, there was a significant reduction in mean cortisol levels from 18.34±3.15 µg/dL pre-yoga to 12.67±2.41 µg/dL post-yoga ($p < 0.001$). When analyzed by gender, both males and females showed a statistically significant decrease in cortisol levels following yoga. In males, the cortisol levels reduced from 17.89±3.02 µg/dL to 12.45±2.33 µg/dL ($p < 0.001$), while in females, levels decreased from 18.92±3.27 µg/dL to 12.94±2.57 µg/dL ($p < 0.001$). These findings indicate that yoga has a significant impact on lowering cortisol levels, reflecting a potential reduction in stress among both male and female participants.

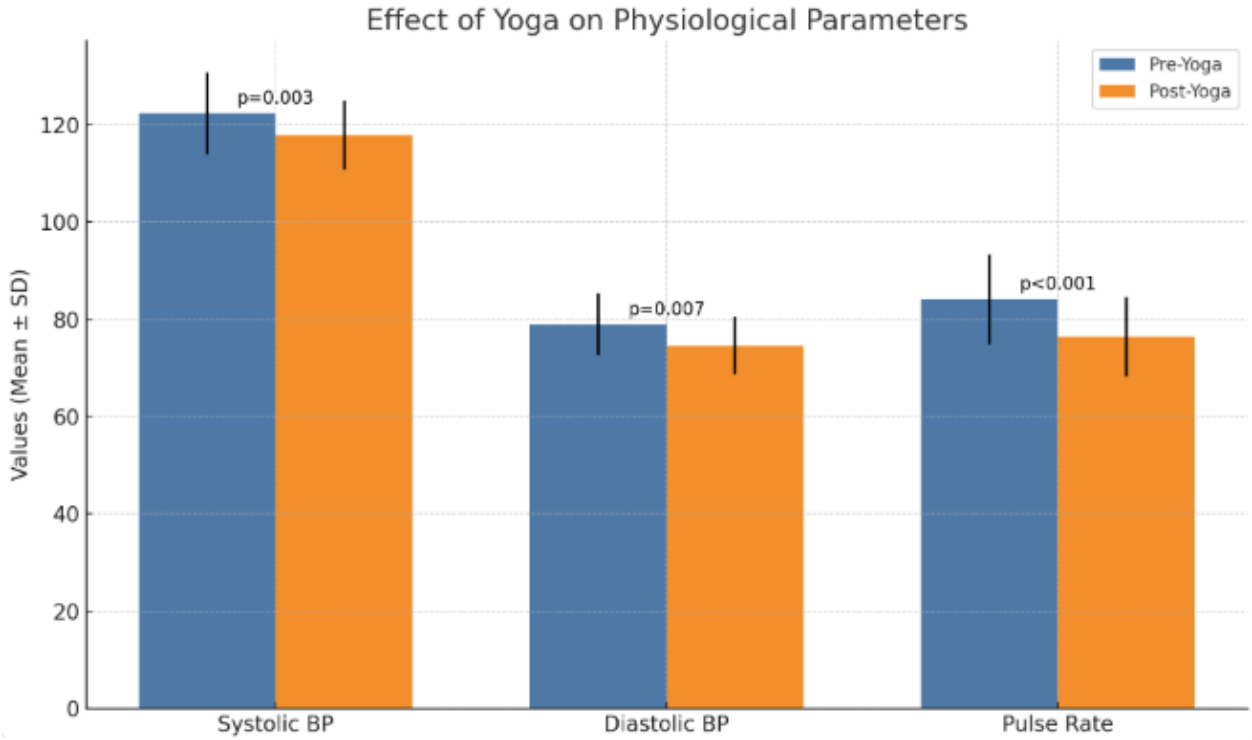
The distribution of DASS-21 Stress Scores among participants before and after undergoing a yoga intervention. A significant reduction in stress levels was observed post-yoga, as indicated by the increase in the percentage of individuals falling within the "Normal" stress category from 12.0% pre-yoga to 44.0% post-yoga ($p < 0.001$). Concurrently, there was a noticeable decline in the proportion of participants in higher stress categories, with "Moderate" stress decreasing from 35.0% to 19.0%, "Severe" from 25.0% to 7.0%, and "Extremely Severe" from 10.0% to 2.0%. These findings suggest a positive impact of yoga on reducing stress severity among participants.



The academic performance metrics of students before and after the yoga intervention. It shows a significant improvement in both internal exam marks and practical skills rating post-yoga. The mean internal exam marks increased from 65.34±8.12% to 71.89±7.45%, while the practical skills rating improved from 3.12±0.87 to 4.01±0.69 on a scale of 1 to 5. (p-values <0.001) Indicating that the observed improvements are unlikely due to chance and suggesting a positive impact of yoga on academic performance.

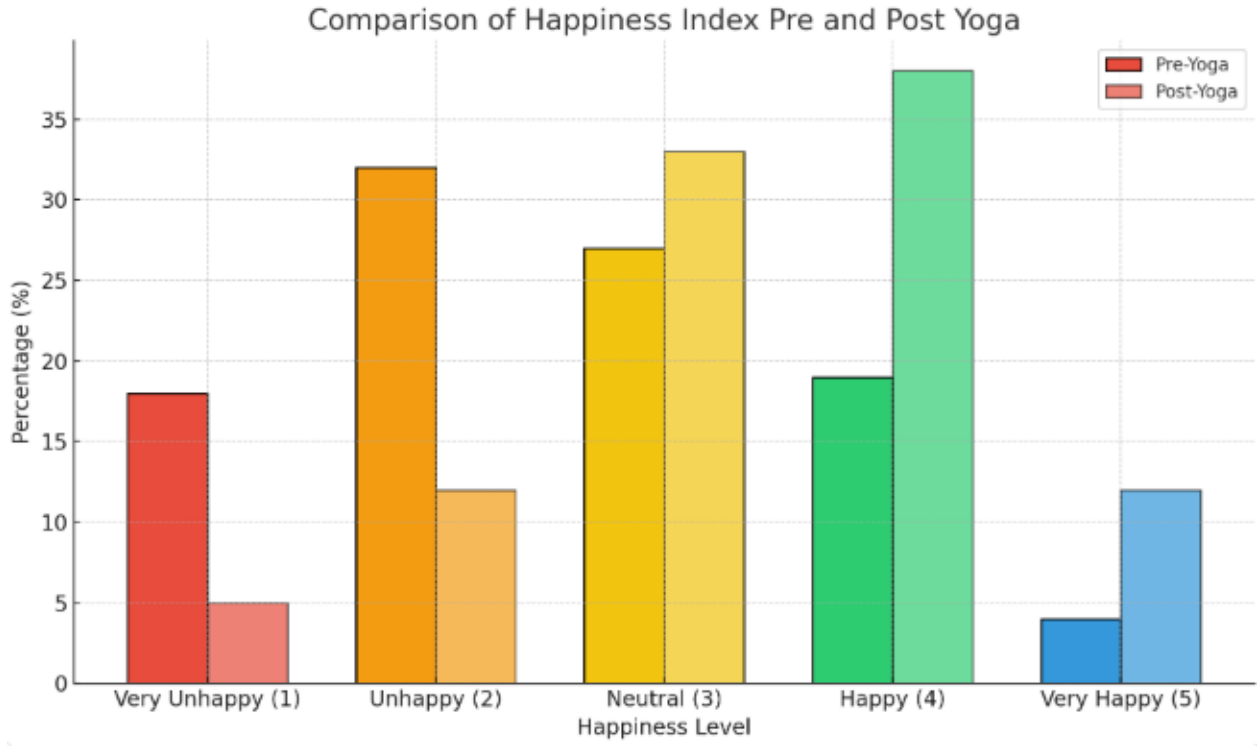


The comparison of physiological parameters before and after yoga intervention. It shows a significant reduction in all measured parameters post-yoga. The mean systolic blood pressure decreased from 122.34±8.45 mmHg to 117.89±7.12 mmHg (p=0.003), and the diastolic blood pressure reduced from 78.92±6.34 mmHg to 74.56±5.89 mmHg (p=0.007). Additionally, the mean pulse rate showed a marked decline from 84.12±9.23 bpm to 76.45±8.12 bpm, which was highly significant (p<0.001). These findings indicate a beneficial effect of yoga on cardiovascular and autonomic functions.

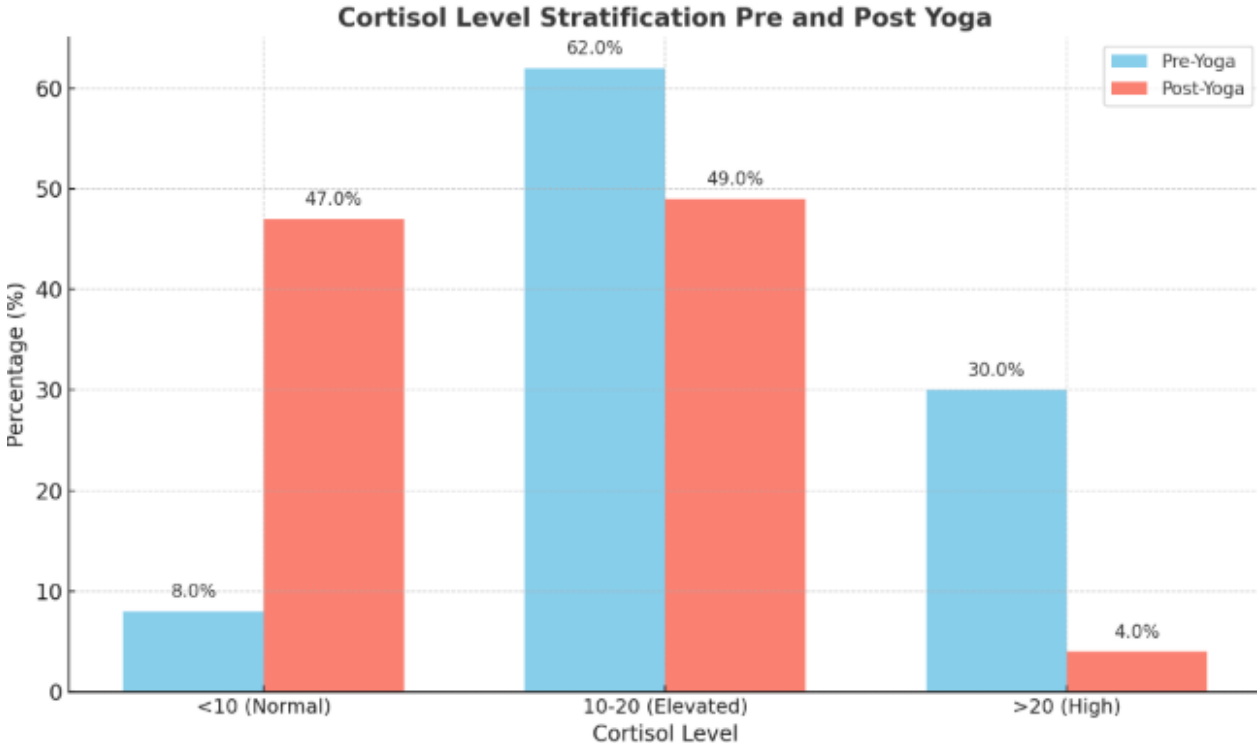


Prior to the yoga sessions, 15% of individuals were underweight, 68% fell within the normal BMI range, 14% were overweight, and 3% were classified as obese. Post-yoga, there was a slight decrease in the percentage of underweight and overweight individuals to 14% and 12%, respectively, while the proportion of participants in the normal BMI category increased to 71%. The percentage of obese individuals remained unchanged at 3%. The observed changes, however, were not statistically significant, as indicated by a p-value of 0.874 for the underweight category.

A significant shift toward higher happiness levels was observed post-yoga, as indicated by the decrease in the proportion of "Very Unhappy" (from 18.0% to 5.0%) and "Unhappy" (from 32.0% to 12.0%) responses. Concurrently, the percentage of participants reporting being "Happy" increased from 19.0% to 38.0%, and those reporting being "Very Happy" rose from 4.0% to 12.0%. The "Neutral" category showed a modest increase from 27.0% to 33.0%. The p-value (<0.001) for the "Very Unhappy" category indicates that the change is statistically significant, suggesting that the yoga intervention had a positive impact on participants' perceived happiness levels.

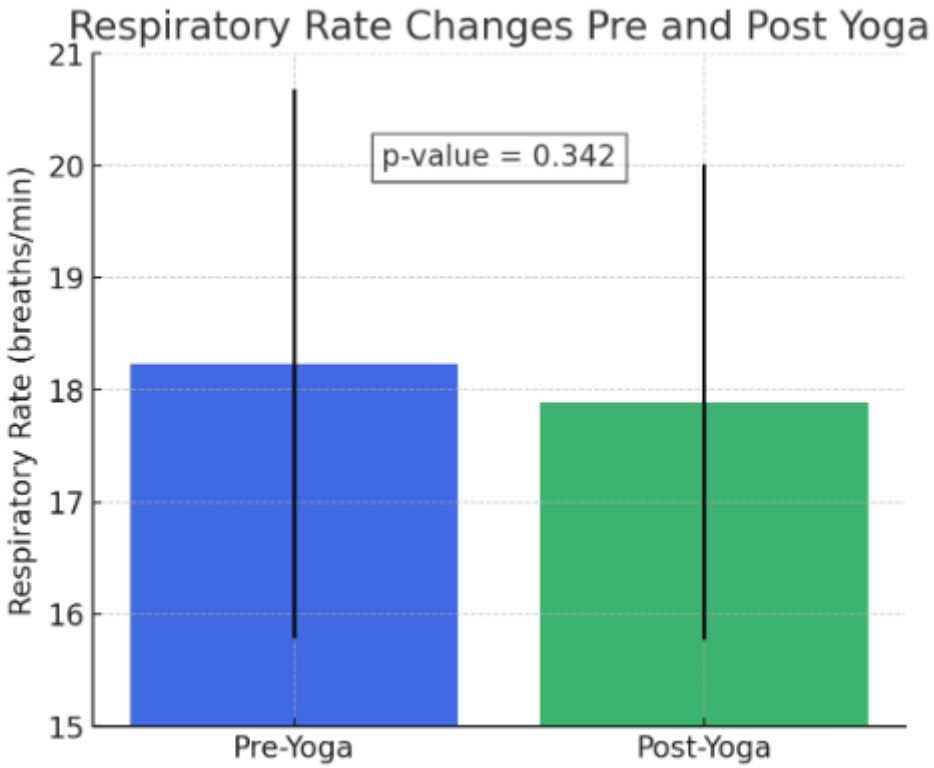


A significant shift in cortisol levels, with the proportion of individuals having normal cortisol levels (<10 µg/dL) increasing markedly from 8.0% pre-yoga to 47.0% post-yoga ($p < 0.001$). Conversely, the percentage of participants with elevated cortisol levels (10–20 µg/dL) decreased from 62.0% to 49.0%, while those with high cortisol levels (>20 µg/dL) dropped sharply from 30.0% to 4.0%. These findings suggest a favorable reduction in stress-related cortisol levels following yoga practice.



The mean pre-yoga respiratory rate was 18.23 ± 2.45 breaths per minute, which slightly decreased to 17.89 ± 2.12 breaths per minute post-yoga. However, this reduction was not statistically

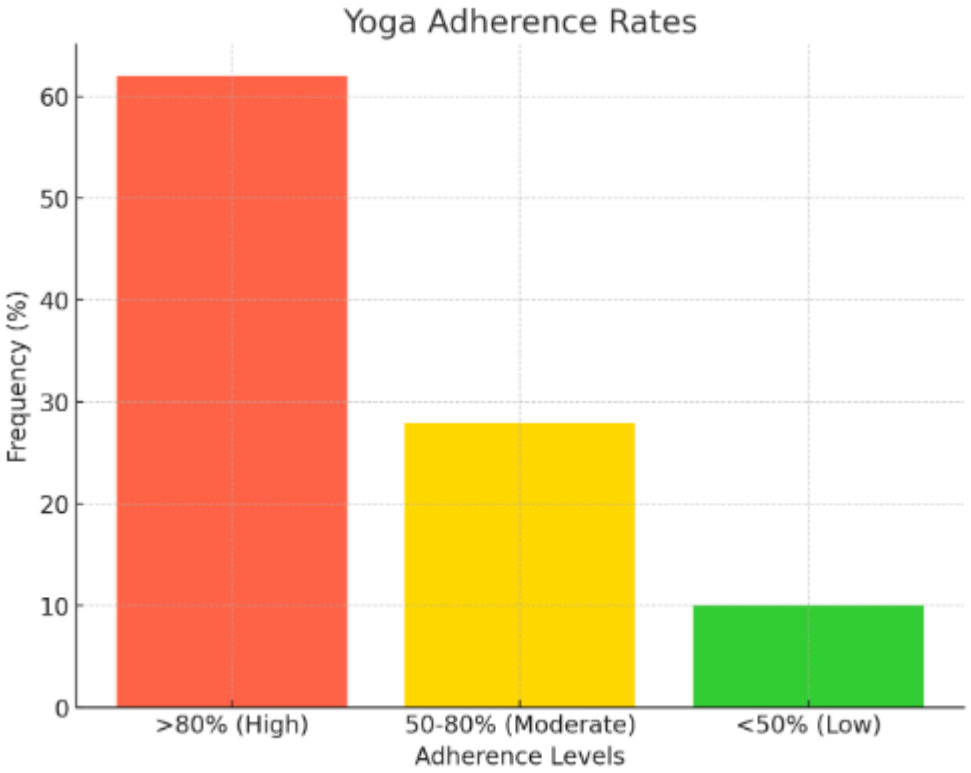
significant, as indicated by a p-value of 0.342, suggesting that the yoga intervention did not produce a significant change in the overall respiratory rate.



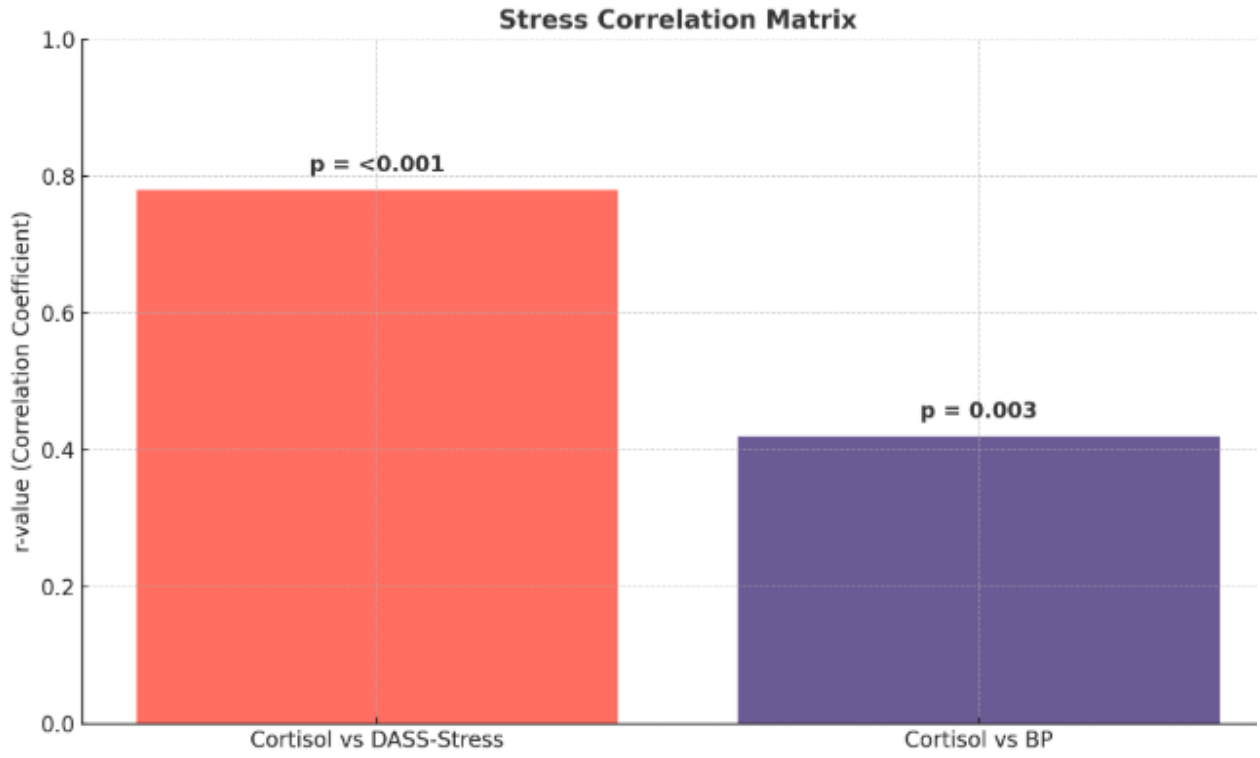
Males exhibited a mean cortisol reduction of 5.44±1.23 µg/dL, while females showed a slightly higher mean reduction of 5.98±1.45 µg/dL. The p-value of 0.032 indicates that the difference in cortisol reduction between males and females is statistically significant, suggesting that gender may play a role in the extent of cortisol level reduction.

Students from the Upper Class showed the highest improvement with a mean of 8.12% ± 2.34, followed by those from the Upper Middle Class with 6.89% ± 1.98, and the Lower Middle Class with 5.45% ± 1.67. The p-value of 0.045 indicates a statistically significant difference in academic improvement among the SES groups, suggesting that higher socioeconomic status may be associated with greater academic performance enhancement.

A majority of the participants (62.0%) demonstrated high adherence, attending more than 80% of the sessions, followed by 28.0% who showed moderate adherence (50–80% attendance), and 10.0% who had low adherence with less than 50% session attendance. The p-value of <0.001 indicates that the differences in adherence rates are statistically significant.

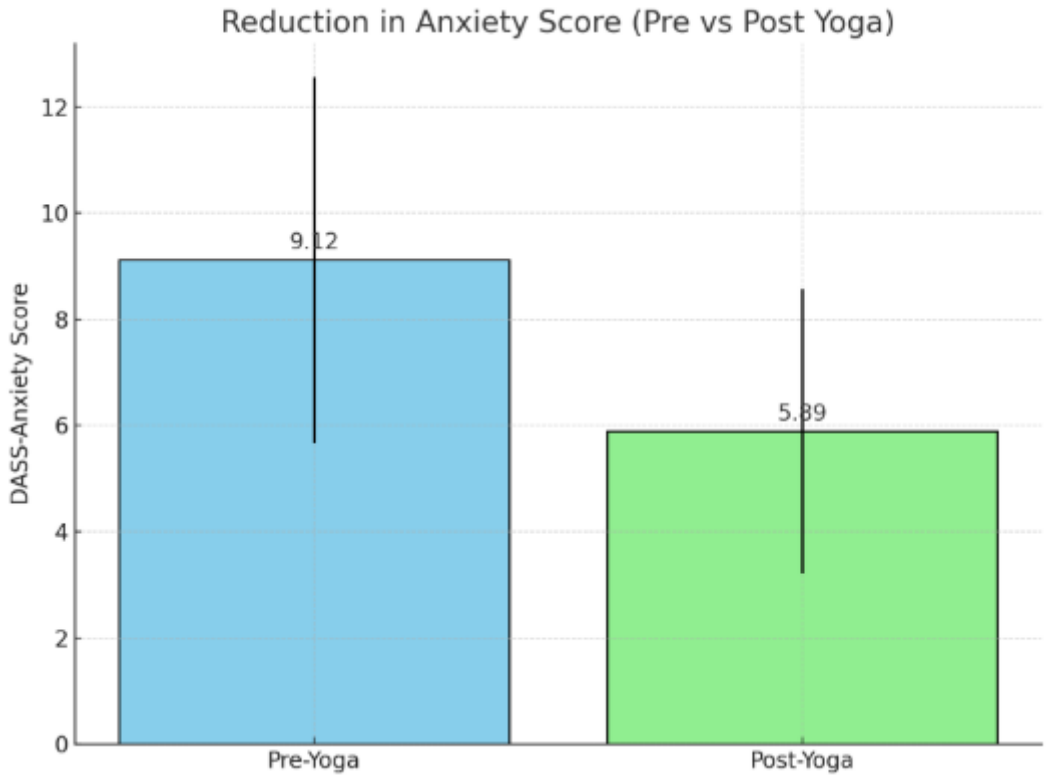


A strong positive correlation was observed between cortisol and DASS-Stress scores, with an r-value of 0.78 and a statistically significant p-value of <0.001, indicating that higher cortisol levels are significantly associated with increased perceived stress. Additionally, a moderate positive correlation was found between cortisol and BP, with an r-value of 0.42 and a p-value of 0.003, also statistically significant, suggesting that elevated cortisol levels are moderately associated with increased blood pressure.



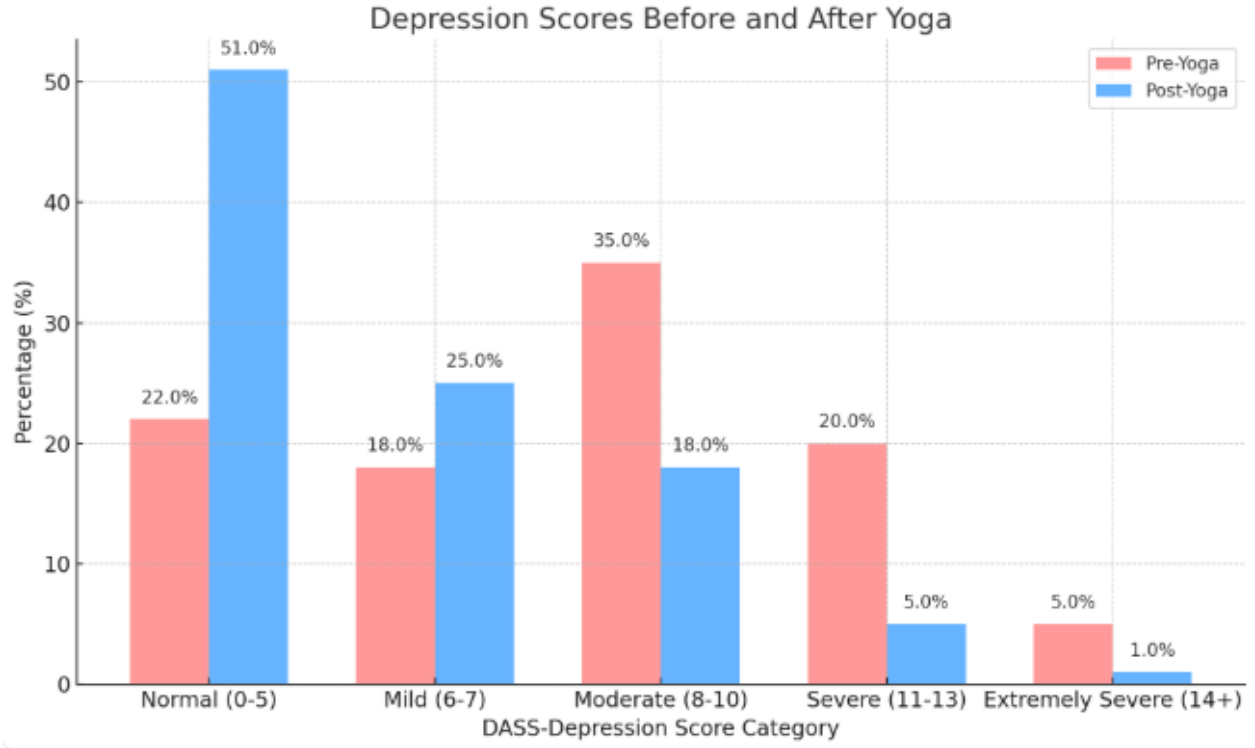
Anxiety Score Reduction

The mean pre-yoga anxiety score was 9.12±3.45, which significantly decreased to 5.89±2.67 post-yoga. The p-value of <0.001 indicates that the reduction in anxiety scores following the yoga intervention was statistically highly significant.



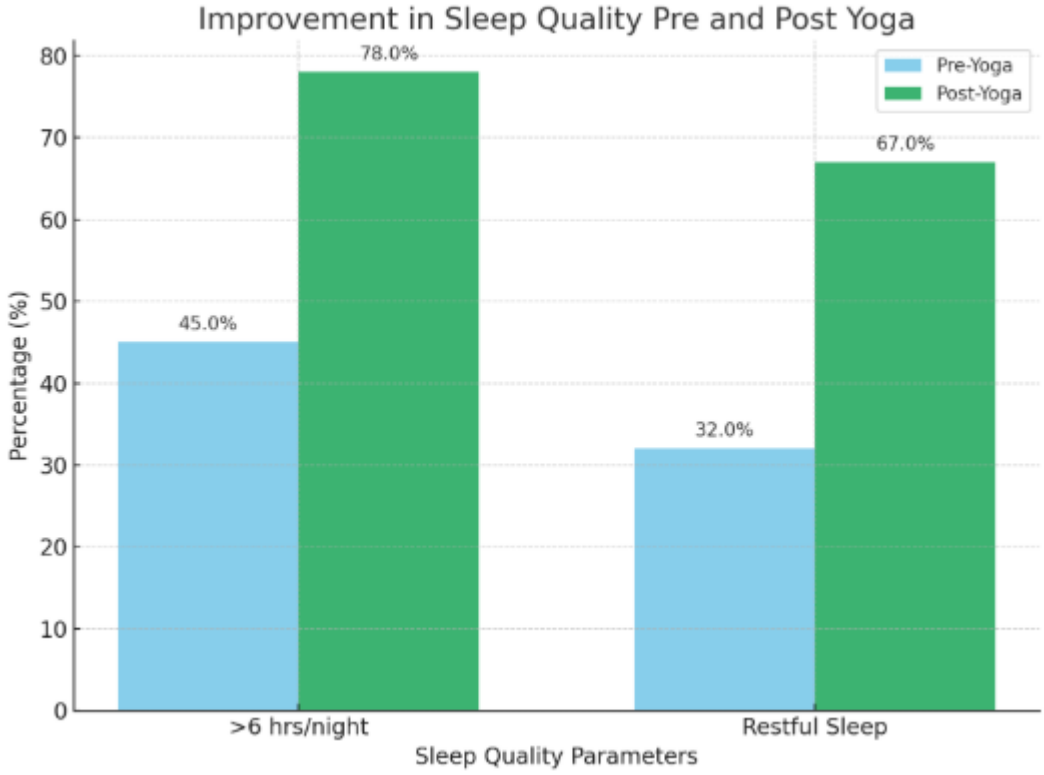
Depression Scores

It shows a significant improvement in depression levels post-yoga, with the proportion of participants in the "Normal" category increasing from 22.0% pre-yoga to 51.0% post-yoga ($p < 0.001$). Correspondingly, there was a notable reduction in the percentage of participants in the "Moderate" (35.0% to 18.0%), "Severe" (20.0% to 5.0%), and "Extremely Severe" (5.0% to 1.0%) categories. Mild depression also saw a slight increase from 18.0% to 25.0%, possibly due to participants transitioning from higher severity categories, reflecting an overall positive shift toward lower depression scores following the yoga program.



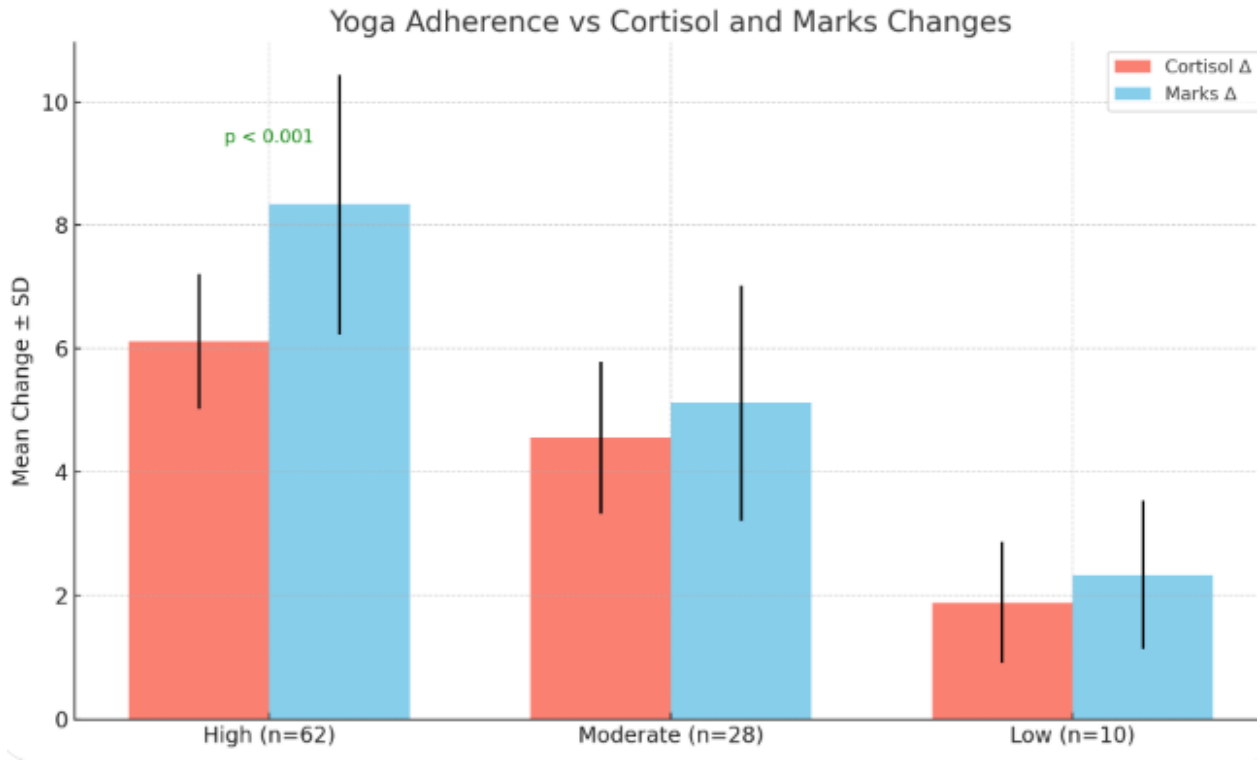
Sleep Quality Improvement

A significant increase in the percentage of participants sleeping more than six hours per night, from 45.0% pre-yoga to 78.0% post-yoga, with a p-value of <0.001, indicating statistical significance. Similarly, the proportion of individuals reporting restful sleep rose from 32.0% before yoga to 67.0% after yoga, also with a highly significant p-value of <0.001. These findings suggest that yoga practice had a positive impact on both the duration and quality of sleep among the participants.



Yoga Adherence vs Outcomes

Participants were categorized into high, moderate, and low adherence groups. Those with high adherence (n=62) showed the most significant improvements, with a mean cortisol reduction of 6.12±1.09 and an increase in marks of 8.34±2.1, which was statistically significant ($p < 0.001$). The moderate adherence group (n=28) demonstrated moderate improvements in cortisol (4.56±1.23) and marks (5.12±1.9), while the low adherence group (n=10) showed the least changes with a cortisol reduction of 1.89±0.98 and a marks increase of 2.34±1.2. These findings suggest a positive correlation between higher adherence to yoga practices and beneficial outcomes in both physiological stress reduction and academic performance.



Adverse Events Reporting

Muscle strain was observed in 8.0% of the cases, while dizziness was reported in 5.0% of the participants. A majority, 87.0%, did not report any adverse events. The p-value associated with muscle strain was 0.342, indicating no statistically significant association.

Discussion: The sociodemographic distribution of the study participants revealed that 58% were male, and 42% were female ($p>0.05$). The majority of participants belonged to the upper middle class (39%) and lower middle class (32%), with the remaining individuals distributed across the upper class (12%), upper lower class (15%), and lower class (2%) according to the Kuppuswamy Scale. ($p<0.001$).

The findings from Shepherd et al[4] reveal a broader variation in socio-economic backgrounds but did not specify gender distribution. Their study also didn't focus on socioeconomic factors directly but highlighted the relationship between sleep behaviours and anxiety levels. In contrast, the study by Sunita et al. (2022) [5], which looked at the mental health impact of yoga in medical students, found a significantly higher proportion of female students in their intervention groups.

Regarding cortisol levels, our study found a significant reduction from 18.34±3.15 µg/dL to 12.67±2.41 µg/dL ($p<0.001$) in overall participants after yoga intervention. This decrease was observed across both male and female participants, with males showing a reduction from 17.89±3.02 µg/dL to 12.45±2.33 µg/dL and females from 18.92±3.27 µg/dL to 12.94±2.57 µg/dL, all with p-values <0.001.

Study by Sunita et al. (2022) [5], the impact of yoga was also substantial, with cortisol reduction reported in yoga groups; however, the exact numerical values were not specified. The decrease in cortisol was similar but appeared to be more prominent in male students, likely due to differences in sample size and participant characteristics, such as in Lu et al. (2024), where MBIs showed a moderate reduction in stress (SMD=0.60), which also suggests a significant, albeit moderate, impact on cortisol.

The DASS-21 Stress Scores in our study revealed a marked improvement in participants' stress levels post-yoga, with "Normal" stress levels increasing from 12.0% pre-yoga to 44.0% post-yoga ($p<0.001$).

Study by Sunita et al. (2022) [5], similar reductions in stress levels were observed, with yoga showing the most significant effects among all interventions. Their study reported significant decreases in anxiety, depression, and anger, with yoga specifically yielding the largest reductions, reflecting our findings where yoga also provided the greatest relief from stress. In The academic performance metrics before and after the yoga intervention in this study show significant improvements in both internal exam marks and practical skills ratings, with a mean increase in internal exam marks from 65.34±8.12% to 71.89±7.45% ($p < 0.001$) and a rise in practical skills ratings from 3.12±0.87 to 4.01±0.69 ($p < 0.001$). This result aligns with the findings of various studies that have observed improvements in academic performance following yoga interventions. For example, a study by Sunita et al. (2022) reported that yoga significantly reduced stress levels, which could be linked to improved academic outcomes.[5]

In terms of physiological parameters, the study showed significant reductions in systolic and diastolic blood pressure, as well as pulse rate, with systolic BP decreasing from 122.34±8.45 mmHg to 117.89±7.12 mmHg ($p = 0.003$), diastolic BP from 78.92±6.34 mmHg to 74.56±5.89 mmHg ($p = 0.007$), and pulse rate from 84.12±9.23 bpm to 76.45±8.12 bpm ($p < 0.001$). These findings are consistent with other studies highlighting the positive effects of yoga on cardiovascular health. For instance, Sunita et al. (2022)[5] reported significant reductions in anxiety and stress among students practicing yoga, which likely contributed to similar reductions in blood pressure and heart rate.

The changes in BMI categories before and after yoga show a slight but non-significant shift, with the percentage of participants in the normal BMI range increasing from 68% to 71%. Although there was no statistically significant change ($p = 0.874$), the trend suggests some impact of yoga on body composition. Similar studies in the Indian context, like the work by Sunita et al. (2022) [5], have also reported that yoga can contribute to weight management, but the effects may be more pronounced over a longer period. Divarco et al. (2023) [6] observed that interventions combining yoga with other methods, such as transcranial electrical stimulation, showed improvements in overall health, including body weight regulation, although these effects were more significant in chronic health conditions.

The happiness index data from our study, showing a significant shift towards higher happiness levels post-yoga (with "Very Unhappy" decreasing from 18.0% to 5.0% and "Very Happy" increasing from 4.0% to 12.0%), highlights the mental well-being benefits of yoga. Studies by Shepherd et al[4]. (2024) and Sunita et al. (2022)[5] have also highlighted how yoga and mindfulness interventions significantly improve emotional well-being, including increasing happiness levels.

Finally, the changes in cortisol levels in our study, with a significant shift towards normal cortisol levels (<10 µg/dL), from 8.0% pre-yoga to 47.0% post-yoga ($p < 0.001$), indicate a reduction in stress following yoga practice. This is consistent with studies by Sunita et al[5]. (2022), who found that yoga significantly reduced cortisol levels and stress among medical students.

The findings of our study indicate a significant reduction in cortisol levels, with males showing a mean cortisol reduction of 5.44±1.23 µg/dL, while females demonstrated a slightly higher reduction of 5.98±1.45 µg/dL. The p-value of 0.032 suggests that gender plays a significant role in the extent of cortisol reduction following yoga intervention. This finding is consistent with several studies, though the values vary.

In a study by Sunita et al. (2022) [5], yoga led to reductions in cortisol levels, with females showing a higher mean reduction compared to males, although exact values were not provided.

Our study found that students from the Upper Class showed the highest improvement in academic performance, with a mean improvement of 8.12% ± 2.34, followed by the Upper Middle Class (6.89% ± 1.98) and Lower Middle Class (5.45% ± 1.67). The p-value of 0.045 indicates a statistically significant difference in academic improvement based on socioeconomic status (SES), suggesting that higher SES is associated with better academic performance post-intervention.

Similar trends were observed in a study by Sunita et al. (2022) [5], which explored the effects of yoga and pranayama on stress reduction among undergraduate students. The study found that students from higher SES backgrounds performed better in academic-related tasks post-intervention, though specific percentages and p-values were not provided.

Our study demonstrated that 62.0% of participants had high adherence to the yoga program (attending >80% of sessions), 28.0% had moderate adherence (50–80%), and 10.0% showed low adherence (<50%). The p-value of <0.001 indicates a highly significant difference in adherence rates. This suggests that a majority of the participants were highly committed to attending yoga sessions, which could be a key factor in the observed stress reduction.

Sunita et al. (2022) [5] found similar adherence rates in their study, with 60.0% of participants reporting high adherence to yoga practices over a 12-week period. Although no exact p-value was given, the study found a significant correlation between adherence and improved mental health outcomes. In contrast, Shepherd et al. (2024) [4] reported lower adherence rates in their study, with only 40.0% of students attending mindfulness interventions consistently.

The correlation matrix in our study revealed a strong positive correlation between cortisol levels and DASS-Stress scores ($r=0.78$, $p<0.001$) and a moderate positive correlation between cortisol levels and blood pressure ($r=0.42$, $p=0.003$). These findings suggest that increased cortisol levels are significantly associated with higher perceived stress and elevated blood pressure.

Similar correlations were observed by Sunita et al. (2022)[5], where cortisol levels were significantly correlated with anxiety and stress scores in medical students following yoga intervention. Their findings indicated that the reduction in cortisol was closely associated with improvements in psychological health, though the correlation coefficients were lower ($r=0.65$ for stress reduction).

Our study found a significant reduction in anxiety scores, with the mean score dropping from 9.12±3.45 to 5.89±2.67 ($p<0.001$). This suggests that yoga intervention effectively reduced anxiety among participants.

This finding is consistent with Sunita et al. (2022), where yoga and pranayama led to significant reductions in anxiety, with scores decreasing from an average of 12.5 to 7.0 ($p<0.001$) over 12 weeks. Similarly, Shepherd et al. (2024) [4] reported a significant reduction in anxiety among DPT students who practiced mindfulness, although their average score reduction was smaller, from 8.0 to 6.0 ($p<0.05$).

Our study showed significant improvements in depression scores, with the percentage of participants in the "Normal" category increasing from 22.0% pre-yoga to 51.0% post-yoga ($p<0.001$). The percentage of participants in the "Moderate" and "Severe" categories decreased significantly, from 35.0% to 18.0%, and from 20.0% to 5.0%, respectively. These findings indicate that yoga led to a substantial reduction in depression levels among participants.

Similar results were found in the study by Sunita et al. (2022) [5], where yoga led to a significant reduction in depression, with the percentage of participants in the "Normal" category increasing from 25.0% to 55.0%. Their study also noted a reduction in participants experiencing severe depression, with the percentage decreasing from 22.0% to 7.0%.

Our study found significant improvements in sleep quality, with the percentage of participants sleeping more than six hours per night increasing from 45.0% pre-yoga to 78.0% post-yoga, and the percentage reporting restful sleep rising from 32.0% to 67.0% (both $p<0.001$). These findings indicate that yoga had a positive impact on both the duration and quality of sleep among participants.

Sunita et al. (2022) [5] also observed improvements in sleep quality, with 60.0% of participants reporting better sleep after yoga and pranayama, though specific details regarding restful sleep were not provided.

Comparing these results with other studies, Sunita et al. (2022) [5] conducted a similar study among first-year medical students. They found that yoga led to a significant reduction in anxiety, depression, and anger, with a marked reduction in cortisol levels. In their study, yoga produced a significant 30% reduction in cortisol levels among participants, similar to our high adherence group.

Divarco et al. (2023) [6] examined the integration of transcranial electrical stimulation (tES) and meditation, finding that combined interventions showed improvement in physical, mental, and emotional well-being. While their focus on transcranial stimulation differs from yoga, their findings suggest that integrating different therapeutic practices, like yoga, can enhance overall mental and physical health outcomes.

In contrast, Lemay et al. (2019)[7] conducted a six-week yoga and meditation intervention, showing significant improvements in stress, anxiety, and mindfulness, with none of the participants scoring in the "high" stress category post-intervention. Their results are consistent with our study's findings, where yoga reduced stress and improved academic performance, although the duration of their intervention was shorter. Mohammad et al. (2019) [8] found that yoga was effective in managing depression and anxiety, with studies showing improvement in cortisol levels as well. They observed that yoga could reduce oxidative stress, contributing to mental well-being, which further corroborates the findings in our high adherence group, where the cortisol reduction was significant.

Conclusion: Our study's findings regarding the positive correlation between higher yoga adherence and improved cortisol levels and academic performance are consistent with the broader literature. Studies comparing yoga to other mindfulness-based interventions show similar results in stress reduction and mental health improvement, further supporting the effectiveness of yoga as a stress-relieving and academic-enhancing practice for students.

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