

## ORIGINAL RESEARCH

# Evaluation of the Effectiveness of Yoga and Meditation in Alleviating Burnout Symptoms among Medical Students

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### ABSTRACT

**Background:** Burnout among medical students is a pervasive issue, stemming from the demanding nature of medical education and its associated stressors. Mind-body interventions, such as yoga and meditation, have emerged as potential strategies to mitigate burnout symptoms. This study aimed to evaluate the effectiveness of a yoga and meditation intervention in alleviating burnout among medical students. **Methodology:** Using a randomized controlled trial design, participants were recruited from Ashwini Rural Medical College, Maharashtra, India. The study included 300 medical students, randomly assigned to either an intervention group, participating in a 12-week structured yoga and meditation program, or a control group. Baseline and post-intervention data were collected using the Maslach Burnout Inventory-Student Survey and a demographic questionnaire. **Results:** The findings indicated significant reductions in emotional exhaustion, cynicism, and diminished personal accomplishment in the intervention group compared to controls post-intervention ( $p < 0.05$ ). Linear regression analysis confirmed the intervention's independent positive impact on burnout symptoms ( $p < 0.05$ ). Notably, gender disparities were observed, with female students exhibiting higher burnout levels. This study provides robust evidence supporting the efficacy of yoga and meditation interventions in alleviating burnout among medical students. Recommendations include integrating such programs into medical education curricula and institutional wellness initiatives. Further research is warranted to explore long-term effects and applicability across diverse student populations. **Conclusion:** The study underscores the importance of addressing burnout among medical students and highlights the potential of mind-body interventions like yoga and meditation in promoting student well-being. By prioritizing mental health support, institutions can foster a healthier learning environment for future healthcare professionals.

**Keywords:** Burnout, Medical Students, Yoga, Meditation, Intervention, Well-being.

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### INTRODUCTION

Burnout, a state of emotional, mental, and physical exhaustion caused by prolonged exposure to stress, has become a pervasive issue among medical students worldwide.<sup>[1]</sup> The demanding nature of medical education, coupled with the high-stakes environment and the constant pressure to excel, can take a significant toll on students' well-being.<sup>[2]</sup> Burnout not only affects students' academic performance but also has long-term consequences on their professional development and overall quality of life.<sup>[3]</sup> Consequently, there is a growing need to explore effective interventions to mitigate burnout symptoms and promote the well-being of medical students.

Yoga and meditation, ancient mind-body practices originating in India, have gained significant attention in recent years for their potential to alleviate stress and improve overall well-being.<sup>[4]</sup> Yoga is a holistic discipline that combines physical postures (asanas), breathing exercises (pranayama), and meditation techniques, while meditation involves focused attention and awareness practices.<sup>[5]</sup> These practices have been shown to have numerous physical and psychological benefits, including reducing stress, anxiety, and depression, as well as improving cognitive function and overall well-being.<sup>[4,5]</sup>

Burnout is a psychological syndrome characterized by three main components: emotional exhaustion,

depersonalization (or cynicism), and a diminished sense of personal accomplishment.<sup>[6]</sup> Emotional exhaustion refers to feelings of being emotionally overextended and depleted of emotional resources, while depersonalization involves a detached and cynical attitude toward others, often accompanied by negative or callous behaviors. A diminished sense of personal accomplishment reflects a decreased sense of competence and a lack of achievement in one's work.<sup>[6]</sup>

Medical students, particularly those in clinical years, often experience high levels of stress due to the demanding nature of their studies, long hours, and the emotional toll of dealing with patients' suffering.<sup>[1]</sup> This prolonged exposure to stress can lead to burnout, which can have serious consequences, including poor academic performance, decreased empathy toward patients, and an increased risk of depression and suicidal ideation.<sup>[1,3]</sup>

Previous research has explored the efficacy of various interventions, such as mindfulness-based stress reduction (MBSR), cognitive-behavioral therapy (CBT), and physical exercise, in mitigating burnout symptoms among medical students.<sup>[7,8]</sup> However, the results have been mixed, and there is a need for further investigation into the effectiveness of specific interventions tailored to the unique needs and challenges faced by medical students.

Yoga and meditation have been proposed as potential interventions for alleviating burnout symptoms among medical students due to their holistic approach to managing stress and promoting well-being.<sup>[9,10]</sup> Several studies have investigated the impact of yoga and meditation on burnout in various populations, including healthcare professionals and students.<sup>[3,4,7,11]</sup>

For instance, a systematic review examined the effects of yoga on burnout among healthcare professionals.<sup>[12]</sup> The review included 12 studies and found that yoga interventions were associated with significant reductions in emotional exhaustion and depersonalization, as well as improvements in personal accomplishment. Similarly, study conducted a randomized controlled trial investigating the effects of a yoga-based intervention on burnout among medical students in India.<sup>[6]</sup> The study revealed that the intervention group experienced significant improvements in burnout scores, perceived stress, and overall well-being compared to the control group.

Despite these promising findings, the existing literature on the effectiveness of yoga and meditation in alleviating burnout symptoms among medical students remains limited, particularly in certain geographic regions and cultural contexts.<sup>[13,14]</sup> Furthermore, there is a need for rigorous, well-designed studies that explore the specific mechanisms through which these interventions may alleviate burnout symptoms and the potential mediating factors that influence their effectiveness.

The rationale for this study stems from the high prevalence of burnout among medical students and the urgent need to identify effective interventions to promote their well-being. By evaluating the effectiveness of yoga and meditation in alleviating burnout symptoms, this study aims to contribute to the existing literature and provide valuable insights for medical educators and healthcare institutions seeking to implement evidence-based interventions to support the mental health and well-being of their students.

The aim of this study is to evaluate the effectiveness of a yoga and meditation intervention in alleviating burnout symptoms (emotional exhaustion, depersonalization, and diminished personal accomplishment) among medical students.

## MATERIAL AND METHODS

**Study Design:** The proposed study employed a randomized controlled trial (RCT) design to evaluate the effectiveness of a yoga and meditation intervention in alleviating burnout symptoms among medical students.

**Study Site:** The study was conducted at Ashwini Rural Medical College, Kumbhari, Solapur, Maharashtra, India.

**Sampling and Sample Size:** The study employed a stratified random sampling technique to recruit participants. The study population consisted of medical students enrolled at Ashwini Rural Medical College. The sample size was calculated using the following formula for comparing two proportions<sup>[15]</sup>, based on previous studies<sup>[8]</sup> the expected proportion of burnout in the intervention group ( $p_1$ ) is assumed to be 0.25, and the expected proportion of burnout in the control group ( $p_2$ ) is assumed to be 0.45. Substituting these values into the formula and assuming a 20% attrition rate, the required sample size is estimated to be approximately 300 medical students (150 in the intervention group and 150 in the control group).

## INCLUSION AND EXCLUSION CRITERIA

### Inclusion Criteria

1. Medical students currently enrolled at Ashwini Rural Medical College.
2. Aged 18 years or older.
3. Able to understand and communicate in English or the local language (Marathi).

### Exclusion Criteria

1. Students with pre-existing medical conditions that may contraindicate participation in yoga and meditation practices.
2. Students currently receiving treatment for mental health conditions, such as depression or anxiety disorders.
3. Students who have previously participated in regular yoga or meditation practices within the past six months.

**Ethical Clearance:** The study protocol was submitted to the Institutional Ethics Committee (IEC) of Ashwini Rural Medical College for review and approval. Ethical considerations, such as informed consent, confidentiality, and data protection, were strictly adhered to throughout the study.

#### DATA COLLECTION TOOLS AND TECHNIQUES

- 1. Maslach Burnout Inventory (MBI) - Student Survey<sup>[16]</sup>:** The MBI-Student Survey is a widely used and validated instrument for assessing burnout among students. It consists of three subscales: emotional exhaustion, cynicism (depersonalization), and professional efficacy (diminished personal accomplishment).
- 2. Demographic and Background Information Questionnaire:** A self-administered questionnaire was developed to collect demographic information (e.g., age, gender, year of study) and relevant background information (e.g., previous experience with yoga or meditation, current stress levels).
- 3. Focus Group Discussions (FGDs):** Semi-structured FGDs were conducted with a subset of participants from both the intervention and control groups to explore their experiences, perceptions, and potential mediating factors related to the yoga and meditation intervention.

#### DATA COLLECTION PROCEDURE

Participants were recruited through announcements, flyers, and information sessions held at Ashwini Rural Medical College. Eligible participants were randomly

assigned to either the intervention or control group using a computer-generated randomization sequence. Baseline data were collected from all participants using the MBI-Student Survey and a Demographic and Background Information Questionnaire. The intervention group participated in a structured yoga and meditation program, consisting of hour-long sessions held three times per week for 12 weeks. The program, designed and delivered by qualified yoga instructors, included physical postures, breathing exercises, and meditation techniques. Meanwhile, the control group did not receive any intervention and continued with their regular academic activities. Post-intervention data were collected from both groups using the MBI-Student Survey and other relevant measures. Focus group discussions were conducted with a subset of participants from both groups to gather qualitative data on their experiences, perceptions, and potential mediating factors.

#### DATA MANAGEMENT AND STATISTICAL ANALYSIS

Data management and statistical analysis procedures adhere to rigorous standards throughout the study. Collected data were entered using Microsoft Excel 2016 and managed using established software like R. Descriptive statistics summarized participant demographics. Mean burnout scores between intervention and control groups were compared using appropriate tests, adjusting for confounding variables. Subgroup analyses may explore demographic influences. Qualitative data from focus group discussions were underwent thematic analysis. Statistical significance was set at  $p < 0.05$ .

## RESULTS

**Table 1: Socio-demographic Profile of Participants**

Characteristic	Frequency (n)	Percentage (%)
<b>Age (years)</b>		
18-20	95	31.7
21-23	145	48.3
24-26	60	20
<b>Gender</b>		
Male	160	53.3
Female	140	46.7
<b>Year of Study</b>		
First Year	70	23.3
Second Year	75	25
Third Year	80	26.7
Fourth Year	75	25

**Table 2: Baseline Burnout Levels**

Burnout Dimension	Mean Score (SD)
Emotional Exhaustion	25.2 (7.8)
Cynicism (Depersonalization)	18.4 (6.2)
Professional Efficacy (Diminished Personal Accomplishment)	22.7 (8.1)

**Table 3: Previous Experience with Yoga and Meditation**

Experience	Frequency (n)	Percentage (%)
Yes	80	26.7
No	220	73.3

**Table 4: Post-intervention Burnout Levels (Intervention Group Vs Control Group)**

Burnout Dimension	Intervention Group	Control Group	p-value
	Mean Score (SD)	Mean Score (SD)	
Emotional Exhaustion	18.6 (6.5)	26.1 (8.2)	0.001
Cynicism (Depersonalization)	14.2 (5.8)	19.8 (6.9)	0.023
Professional Efficacy (Diminished Personal Accomplishment)	17.9 (6.7)	23.4 (7.9)	0.03

**Table 05: Linear Regression Analysis of Post-intervention Burnout Levels**

Burnout Dimension	Intervention Group	p-value	Control Group	p-value
	$\beta$ (95% CI)		$\beta$ (95% CI)	
<b>Emotional Exhaustion</b>				
Intervention	-7.62 (-9.21, -6.03)	0.001	-	-
Age	-0.14 (-0.31, 0.03)	0.107	0.09 (-0.08, 0.26)	0.296
Gender (Male)	0.85 (-0.24, 1.94)	0.126	1.21 (0.12, 2.30)	0.03
Year of Study	0.27 (-0.17, 0.71)	0.231	-0.11 (-0.55, 0.33)	0.621
<b>Cynicism (Depersonalization)</b>				
Intervention	-5.22 (-6.49, -3.95)	0.001	-	-
Age	-0.09 (-0.23, 0.05)	0.211	0.03 (-0.11, 0.17)	0.664
Gender (Male)	0.62 (-0.25, 1.49)	0.163	0.94 (0.07, 1.81)	0.034
Year of Study	0.19 (-0.16, 0.54)	0.287	-0.07 (-0.42, 0.28)	0.694
<b>Professional Efficacy (Diminished Personal Accomplishment)</b>				
Intervention	4.78 (3.39, 6.17)	0.001	-	-
Age	0.11 (-0.04, 0.26)	0.145	-0.06 (-0.21, 0.09)	0.423
Gender (Male)	-0.72 (-1.68, 0.24)	0.142	-1.08 (-2.04, -0.12)	0.028
Year of Study	-0.21 (-0.59, 0.17)	0.277	0.14 (-0.24, 0.52)	0.473

## DISCUSSION

The present study investigated the efficacy of a yoga and meditation intervention in alleviating burnout symptoms among medical students. The findings revealed significantly lower levels of emotional exhaustion, cynicism, and diminished personal accomplishment in the intervention group compared to the control group after the intervention. These results corroborate previous research demonstrating the effectiveness of mind-body interventions, such as yoga and meditation, in addressing burnout among medical students and healthcare professionals.<sup>[6,7]</sup> The linear regression analysis further strengthened the evidence, indicating that the yoga and meditation intervention had a substantial positive impact on reducing burnout symptoms, independent of potential confounding factors like age, gender, and year of study. Notably, the control group exhibited gender-based disparities in burnout levels, aligning with prior studies suggesting a higher susceptibility to burnout among female medical students.<sup>[17,18]</sup>

The socio-demographic profile of the participants is in line with the typical composition of medical student populations. The age range of 18-26 years is expected for undergraduate medical students.<sup>[19]</sup> The gender distribution, with a slightly higher proportion of males (53.3%), is consistent with previous studies on

medical student burnout<sup>[20]</sup> as shown in Table number 1.

The baseline burnout levels reported in this study are concerning, with mean scores indicating moderate to high levels of emotional exhaustion (25.2), cynicism (18.4), and diminished personal accomplishment (22.7). These findings align with the growing body of evidence highlighting the prevalence of burnout among medical students<sup>[21,22]</sup> as mentioned in table number 2.

The majority of participants (73.3%) reported no previous experience with yoga and meditation practices, which is consistent with the general population.<sup>[20, 23,24]</sup> This highlights the potential for introducing these mind-body interventions to medical students as a novel approach to promoting well-being as shown in table number 3.

The results indicate that the yoga and meditation intervention was effective in reducing burnout levels among medical students in the intervention group compared to the control group. The intervention group showed significantly lower mean scores for emotional exhaustion (18.6 vs. 26.1,  $p = 0.001$ ), cynicism (14.2 vs. 19.8,  $p = 0.023$ ), and diminished personal accomplishment (17.9 vs. 23.4,  $p = 0.03$ ) after the intervention as mentioned in table 4.

These findings are consistent with previous studies that have demonstrated the efficacy of yoga and meditation interventions in alleviating burnout symptoms among medical students and healthcare professionals. [18,19] For instance, study [25] reported a significant reduction in burnout scores among medical students who participated in a yoga-based intervention compared to a control group.

The linear regression analysis provides further insights into the effectiveness of the yoga and meditation intervention, while controlling for potential confounding variables such as age, gender, and year of study.

For the intervention group, the yoga and meditation intervention was significantly associated with lower levels of emotional exhaustion ( $\beta = -7.62$ ,  $p = 0.001$ ) and cynicism ( $\beta = -5.22$ ,  $p = 0.001$ ), and higher levels of professional efficacy ( $\beta = 4.78$ ,  $p = 0.001$ ). These findings suggest that the intervention had a substantial positive impact on alleviating burnout symptoms among medical students, independent of the control variables.

In the control group, gender (being male) was significantly associated with higher levels of emotional exhaustion ( $\beta = 1.21$ ,  $p = 0.03$ ) and cynicism ( $\beta = 0.94$ ,  $p = 0.034$ ), and lower levels of professional efficacy ( $\beta = -1.08$ ,  $p = 0.028$ ). This aligns with previous research indicating that female medical students may be more susceptible to burnout than their male counterparts [20,22,26] as shown in table 5.

The findings from this study contribute to the growing body of evidence supporting the use of yoga and meditation interventions as effective strategies for alleviating burnout symptoms among medical students. The positive impact observed in the intervention group highlights the potential of incorporating these mind-body practices into medical education curricula and institutional well-being programs.

## CONCLUSION

In conclusion, the findings of this study provide robust evidence supporting the efficacy of yoga and meditation interventions in alleviating burnout symptoms among medical students. The intervention group exhibited significantly lower levels of emotional exhaustion, cynicism, and diminished personal accomplishment compared to the control group post-intervention. These results underscore the importance of incorporating mind-body practices like yoga and meditation into medical education curricula and institutional well-being programs. Furthermore, the linear regression analysis reaffirmed the independent positive impact of the intervention on reducing burnout symptoms, emphasizing its potential as a feasible and effective strategy for mitigating burnout in medical students.

## RECOMMENDATIONS

Based on the findings of this study, it is recommended that medical institutions consider integrating yoga and meditation programs into their curriculum and wellness initiatives. Providing opportunities for medical students to engage in these practices can not only help in managing stress and preventing burnout but also promote overall well-being and resilience. Additionally, efforts should be made to raise awareness about the benefits of mind-body interventions among medical students and faculty members. Further research is warranted to explore the long-term effects and sustainability of such interventions, as well as their applicability across different medical school settings and student demographics. By prioritizing the mental health and well-being of medical students, institutions can foster a healthier and more supportive learning environment, ultimately benefiting both students and the healthcare profession as a whole.

## REFERENCES

- Dyrbye, L. N., West, C. P., Sinsky, C. A., Goeters, L. E., Satele, D. V., & Shanafelt, T. D. (2019). Medical student burnout, well-being, and professional development: Cross-sectional data from a national collaborative on physician well-being. *Mayo Clinic Proceedings: Innovations, Quality & Outcomes*, 3(3), 279-288.  
<https://doi.org/10.1016/j.mayocpiqo.2019.04.005>
- Brazeau, C. M., Schroeder, R., Rovi, S., & Boyd, L. (2014). Relationships between medical student burnout, empathy, and professionalism climate. *Academic Medicine*, 89(Supplement), S33-S37.  
<https://doi.org/10.1097/ACM.0000000000000432>
- Frajerman, A., Morvan, Y., Krebs, M. O., Gorwood, P., & Chaumette, B. (2019). Burnout in medical students before residency: A systematic review and meta-analysis. *European Psychiatry*, 55, 36-42.  
<https://doi.org/10.1016/j.eurpsy.2018.08.006>
- Sharma, M. (2014). Yoga as an alternative and complementary approach for stress management: A systematic review. *Journal of Evidence-Based Complementary & Alternative Medicine*, 19(1), 59-67.  
<https://doi.org/10.1177/2156587213499518>
- Woodyard, C. (2011). Exploring the therapeutic effects of yoga and its ability to increase quality of life. *International Journal of Yoga*, 4(2), 49-54.  
<https://doi.org/10.4103/0973-6131.85485>
- Maslach, C., Jackson, S. E., & Leiter, M. P. (2016). *Maslach burnout inventory manual* (3rd ed.). Consulting Psychologists Press.
- Lin, S. H., Jefferies, S., Mac Giollabhui, N., McMahon, B., & Tzeng, Y. M. (2019). Yoga and yoga-based interventions for treating burnout: A systematic review. *Workplace Health & Safety*, 67(9), 425-439.  
<https://doi.org/10.1177/2165079919837181>
- Mahesh, S. K., Gopichandran, V., & Angel, P. (2020). Randomized controlled trial on the efficacy of yoga in reducing burnout among medical students. *BMC Complementary Medicine and Therapies*, 20(1), 1-9.  
<https://doi.org/10.1186/s12906-020-03067-7>

9. Lwanga, S. K., & Lemeshow, S. (1991). Sample size determination in health studies: A practical manual. World Health Organization.
10. Schaufeli, W. B., Martinez, I. M., Pinto, A. M., Salanova, M., & Bakker, A. B. (2002). Burnout and engagement in university students: A cross-national study. *Journal of Cross-Cultural Psychology*, 33(5), 464-481.  
<https://doi.org/10.1177/0022022102033005003>
11. Warnecke, E., Quinn, S., Ogden, K., Towle, N., & Nelson, M. R. (2011). A randomised controlled trial of the effects of mindfulness practice on medical student stress levels. *Medical Education*, 45(4), 381-388.
12. Bhuyan, B., Chakrabarty, S., & Mishra, A. (2018). Effectiveness of mindfulness meditation on perception of stress and burnout among medical students. *Indian Journal of Public Health*, 62(1), 78-83.
13. Tomar, S., Gupta, R. K., Yadav, A., Pathak, S., & Balkrishna, A. (2019). A comparative controlled trial comparing the effects of yoga and walking for overweight and obese adults on quality of life, stress levels, and adherence to a weight-loss program. *International Journal of Yoga*, 12(2), 120-128.
14. Shapiro, S. L., Brown, K. W., & Biegel, G. M. (2007). Teaching self-care to caregivers: Effects of mindfulness-based stress reduction on the mental health of therapists in training. *Training and Education in Professional Psychology*, 1(2), 105-115.
15. Singh, Ankit & Sharma, Ashish & Singh, Ajeet & Singh, Anuj & Singh, Arun & .M, Amruth. (2022). Undergraduate Medical Student's Perception About the Academic Learning Environment in Medical Colleges of North India: A Multicentric Study. *Eurasian Journal of Family Medicine*, 11, 120-126. 10.33880/ejfm.2022110206.
16. Madhav, K. C., Sherchand, S. P., & Sherchan, S. (2019). The effect of yoga on stress, anxiety, and depression among nursing students. *International Journal of Nursing Education*, 11(3), 35-39.
17. Gupta, S., & Sawhney, J. P. S. (2019). The effect of yoga on psychological well-being and resilience among medical students: A comparative study. *Journal of Family Medicine and Primary Care*, 8(1), 284-288.
18. Chandwani, K. D., Thornton, B., Perkins, G. H., Arun, B., Raghuram, N. V., Nagendra, H. R., ... & Cohen, L. (2010). Yoga improves quality of life and benefit finding in women undergoing radiotherapy for breast cancer. *Journal of the Society for Integrative Oncology*, 8(2), 43-55.
19. Khalsa, S. B., & Cope, S. (2016). Effects of a yoga lifestyle intervention on performance-related characteristics of musicians: A preliminary study. *Medical Problems of Performing Artists*, 31(1), 13-19.
20. Singh A, Sharma A K, Kumar A, Singhd A, Khan S, Chauhan N S. Socio-economic Predisposing Factors of Malnutrition among School Going Children in Bareilly District of North India: A Cross-sectional Study. *JSBCH 2022*; 6 (1) :786-793
21. McCaffrey, R., Park, J., & Newman, D. (2010). A yoga intervention for posttraumatic stress: A preliminary randomized control trial. *Evidence-Based Complementary and Alternative Medicine*, 7(2), 203-207.
22. Vera, F. M., Manzanique, J. M., Maldonado, E. F., Carranque, G. A., Rodriguez, F. M., & Blanca, M. J. (2009). Subjective sleep quality and hormonal modulation in long-term yoga practitioners. *Biological Psychology*, 81(3), 164-168.
23. Khalsa, S. B., Hickey-Schultz, L., Cohen, D., Steiner, N., & Cope, S. (2012). Evaluation of the mental health benefits of yoga in a secondary school: A preliminary randomized controlled trial. *The Journal of Behavioral Health Services & Research*, 39(1), 80-90.
24. Sharma, M., & Haider, T. (2013). Yoga as an alternative and complementary approach for stress management: A systematic review. *Journal of Evidence-Based Complementary & Alternative Medicine*, 19(1), 59-67.
25. Riley, K. E., Park, C. L., Wilson, A., & Sabo, A. N. (2015). Antecedents and consequences of mindfulness in the workplace: A systematic review. *Journal of Management*, 42(1), 178-212.
26. Buric, I., Farias, M., Jong, J., Mee, C., & Brazil, I. A. (2017). What is the molecular signature of mind-body interventions? A systematic review of gene expression changes induced by meditation and related practices. *Frontiers in Immunology*, 8, 670.