

A CORRELATION STUDY ON COMPREHENSIVE HEALTH AND WELL-BEING ASSESSMENT OF ANESTHESIOLOGY RESIDENTS IN TAMIL NADU

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ABSTRACT

Background: Anesthesiology residents are frequently exposed to prolonged working hours, night duties, sleep deprivation, and high occupational stress, which may adversely affect their physical, mental, and social well-being. This study aimed to assess the well-being of postgraduate Anesthesiology residents in Tamil Nadu and evaluate the association between lifestyle factors, work patterns, and health outcomes.

Methods: This cross-sectional observational correlational study was conducted among 700 postgraduate Anesthesiology residents from various medical colleges and teaching hospitals in Tamil Nadu. Data were collected using a structured self-administered online questionnaire assessing demographic details, work patterns, lifestyle habits, and well-being parameters. Mental health status was evaluated using the Depression Anxiety Stress Scale-21 (DASS-21), physical health using the Short Form-36 (SF-36) questionnaire, and social well-being using the Social Support Questionnaire (SSQ).

Results: Among the participants, 42.9% worked 60–80 hours weekly and 42.9% performed 5–8 night shifts monthly. More than half (51.4%) slept only 4–6 hours per night, while 17.1% slept for less than 4 hours. Moderate-to-severe stress levels were observed in 51.4% of residents. SF-36 scores demonstrated moderate impairment in physical functioning and general health. Poor social support was reported by 21.4% of participants. Residents sleeping less than 6 hours had significantly higher stress levels ($p < 0.001$). Increased work hours showed a significant positive correlation with stress scores ($r = 0.62$, $p < 0.001$).

Conclusion: Anesthesiology residents experience substantial occupational stress and compromised well-being. Excessive work hours, inadequate sleep, and poor lifestyle habits significantly contribute to adverse health outcomes. Institutional interventions promoting resident well-being are essential.

Keywords: Anesthesiology; Burnout; Mental health; Sleep deprivation; Stress.

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INTRODUCTION

Physician burnout is a comprehensive psychological syndrome mainly categorized into three important aspects: emotional exertion, depersonalization, and a reduced sense of personal achievement.¹ Such symptoms are generally reported due to occupational stress when the workspace stresses on more consistent work expectation, particularly more than individual's coping resources.² Burnout is not only a personal issue, it is a wide-spread symptom reported in healthcare systems, medical professional, and patients as well.³ Burnout has been categorized as a “a syndrome conceptualized as resulting from chronic workplace

stress that has not been successfully managed” by the Internal Classification of Diseases (ICD-11), issued by the World Health Organization (WHO). This has been highlighted distinctly from other mental health conditions (anxiety or depression) but can occur with those conditions as well.⁴

A large number of healthcare professional has been affected by such burnouts and hectic working hours. However, anaesthesiologists are one such group being the most vulnerable that demands superior vigilance, quick decision-making under pressure, and ability to manage unanticipated situations with ease.⁵ The role of anaesthesiologist is less exposed to patient interactions

and also have less direct recognition which can lead to a feeling of emotional detachment.⁶ A recent study reported that anaesthesiologist specifically are more prone to burnout due to the intense cognitive and emotional demands from their daily work.⁷ Multiple studies have highlighted the significant impact of work stress on both individuals and healthcare institutions. At the personal level, clinicians experiencing burnout commonly report chronic fatigue, irritability, sleep disturbances, impaired concentration, and a diminished sense of professional accomplishment. More severe psychological outcomes may include anxiety, depression, substance misuse, and, in extreme situations, suicidal thoughts.⁸ Professionally, these manifestations are associated with lower job satisfaction, increased absenteeism, strained interpersonal relationships, and a greater risk of medical errors.⁹ Burnout among healthcare professionals contributes to reduced productivity and elevated staff turnover rates.¹⁰

Within the Indian healthcare setting, these occupational stressors are further aggravated by systemic and sociocultural factors. Healthcare services in India frequently face challenges such as excessive patient loads, inadequate infrastructure, and unequal distribution of resources.¹¹ Anaesthesiologists, especially those employed in government healthcare institutions, often work under irregular schedules, experience shortages of supporting staff, and have limited availability of mental health and wellness services.¹² Anaesthesiologists in India commonly endure heavier workloads and longer working hours compared to their counterparts in several developed countries, often without equivalent institutional support or professional recognition.¹³

Burnout among resident doctors not only affects their personal well-being and professional growth but also has important implications for patient safety. Unresolved occupational stress can trigger multiple adverse health consequences in medical professionals, compromising the quality and safety of patient care. Elevated burnout levels have been linked to increased diagnostic and procedural errors, ineffective patient communication, and an overall reduction in standards of care.¹⁴

The consequences of burnout during residency may also extend into a physician's long-term career path, influencing specialty selection, career progression, and workforce retention. Physicians exposed to burnout early in their careers are more likely to withdraw from clinical practice or develop persistent mental health concerns. Therefore, addressing burnout during residency is both a preventive measure and a strategic necessity for healthcare systems seeking to preserve a skilled workforce and maintain high-quality patient care.¹⁵

Burnout remains underdiagnosed condition in India despite its clinical and professional relevance the condition remains unexplored. Most of the literature on such assessment reports Western population or

general healthcare professional with a reduced amount of attention given to speciality of healthcare professionals in India. Our study aims to assess the physical, mental, and social well-being of anaesthesiologist residents in Tamil Nadu and to assess their association between lifestyle factors, work related patterns, and overall wellbeing.

Aim

To assess the physical, mental, and social well-being of anesthesiology postgraduate residents in Tamil Nadu and to evaluate the association between lifestyle factors, work patterns, and overall health status.

Primary Objectives

- To assess the mental health status of anesthesiology postgraduate residents using the DASS-21 scale.
- To evaluate the physical health status of anesthesiology residents using the SF-36 questionnaire.
- To assess the social well-being and support systems of residents using the Social Support Questionnaire (SSQ).

Secondary Objectives

- To evaluate the work patterns of anesthesiology residents, including weekly work hours and night duty schedules.
- To assess lifestyle-related factors such as sleep duration, exercise habits, and substance use among residents.
- To determine the association between occupational workload, lifestyle factors, and well-being outcomes among anesthesiology residents.
- To identify factors independently associated with poor well-being among anesthesiology residents.

MATERIALS AND METHODS

Study design

The present study was designed as a cross-sectional observational correlational study. It was conducted among postgraduate anesthesiology residents from various medical colleges and teaching hospitals across Tamil Nadu. The study was carried out over an adequate period to ensure attainment of the required sample size.

Inclusion Criteria

- Postgraduate residents enrolled in anesthesiology residency programs.
- Residents willing to participate and provide informed consent.
- Residents available during the study period.

Exclusion Criteria

- Residents who submitted incomplete questionnaires.
- Residents unwilling to participate in the study.
- Duplicate responses identified during data screening.

Sample size and data collection

A total of 700 participants were included in the study. Data were collected using a structured, self-administered online questionnaire developed to evaluate the demographic characteristics, occupational workload, lifestyle practices, and overall well-being of postgraduate Anesthesiology residents. The questionnaire comprised sections pertaining to demographic details and residency-related characteristics, assessment of work patterns including average weekly working hours and night duty schedules, as well as lifestyle-related factors such as sleep duration, physical activity, and substance use habits.

Mental health status was assessed using the validated Depression Anxiety Stress Scale-21 (DASS-21). Physical health and quality of life were evaluated using the Short Form-36 (SF-36) questionnaire, while social well-being and perceived social support were assessed using the Social Support Questionnaire (SSQ).

The primary outcome measures included evaluation of mental health status, physical health status, social support, and overall well-being among Anesthesiology residents. Secondary outcomes focused on

determining the association of occupational workload and lifestyle-related factors with various physical, psychological, and social health parameters among the participants.

Statistical Analysis

Data were analysed using appropriate statistical software. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to summarize the study variables. Inferential statistical methods were applied to assess associations between variables. Correlation analysis was performed to evaluate the relationship between lifestyle-related factors and health outcomes among the participants. Regression analysis was further conducted to identify significant predictors of physical, mental, and social well-being. A p-value of less than 0.05 was considered statistically significant throughout the analysis.

RESULTS

A total of 700 residents were included in this study, majority of the population belonged to the 26–30 years age group (50.0%), with male residents constituting 60.0% of the study population. The distribution across residency years was relatively uniform (Table 1).

Table 1: Demographic Characteristics of the Participants (N = 700)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	22–25	210	30.0
	26–30	350	50.0
	>30	140	20.0
Gender	Male	420	60.0
	Female	270	38.6
	Other	10	1.4
Year of Residency	1st Year	240	34.3
	2nd Year	230	32.9
	3rd Year	230	32.9

Assessment of work patterns reported that 42.9% of the overall residents worked between 60–80 hours per week, and 42.9% performed 5–8 night shifts per month (Table 2).

Table 2: Work Pattern of Residents (N = 700)

Variable	Category	Frequency (n)	Percentage (%)
Weekly Work Hours	<40 hours	40	5.7
	40–60 hours	180	25.7
	60–80 hours	300	42.9
	>80 hours	180	25.7
Night Shifts per Month	None	20	2.9
	1–4	210	30.0
	5–8	300	42.9
	>8	170	24.2

More than half of the residents (51.4%) reported sleeping only between 4–6 hours per night, whereas 17.1% slept <4 hours. A total of 51.4% of residents had moderate-to-severe stress levels based on the DASS-21 stress subscale (Table 3).

Table 3: Sleep Pattern and Mental Health Status of Participants (N = 700)

Categories		Frequency (n)	Percentage (%)
Sleep Duration	<4 hours	120	17.1
	4–6 hours	360	51.4
	6–8 hours	190	27.1
	>8 hours	30	4.3
Mental Health Status	Normal	180	25.7
	Mild	160	22.9
	Moderate	220	31.4

	Severe	140	20.0
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Assessment of physical status on SF-36 scores reported mean physical functioning of 65.2 ± 12.4 , followed by pain score 58.7 ± 14.1 , and mean general health score was 60.5 ± 13.2 (Table 4).

Table 4: Physical Health Status Based on SF-36 Scores

Parameter	Mean $\pm$ SD
Physical Functioning	65.2 ± 12.4
Pain Score	58.7 ± 14.1
General Health	60.5 ± 13.2

More than half of the residents (54.3%) reported moderate social support, while 21.4% had poor social support. A majority of residents (74.3%) reported irregular or no exercise habits, while 30.0% reported substance use (Table 5).

Table 5: Social Support Assessment and Lifestyle Habits of Participants (N = 700)

Category		Frequency (n)	Percentage (%)
Social Support	Poor	150	21.4
	Moderate	380	54.3
	Good	170	24.3
Exercise Habits	Regular	180	25.7
	Irregular	320	45.7
	None	200	28.6
Substance Use	Yes	210	30.0
	No	490	70.0

Residents sleeping for less than 6 hours had significantly higher rates of moderate-to-severe stress compared to those sleeping for 6 hours or more ($p < 0.001$) (Table 6).

Table 6: Association Between Sleep Duration and Stress Levels

Sleep Duration	Moderate-to-Severe Stress n (%)	p-value
<6 hours	326 (68.0)	<0.001
≥ 6 hours	70 (31.8)	

There was a significant positive correlation between weekly work hours and stress scores, indicating that increased work hours were associated with higher stress levels (Table 7).

Table 7: Correlation Between Work Hours and Stress Scores

Variables	Correlation Coefficient (r)	p-value
Weekly work hours vs stress scores	0.62	<0.001

Multiple linear regression analysis showed that increased weekly work hours were independently associated with poor well-being, whereas adequate sleep duration, regular exercise, and good social support were significantly associated with better well-being outcomes (Table 8).

Table 8: Multiple Linear Regression Analysis for Factors Associated with Poor Well-being

Variable	Beta Coefficient (β)	p-value
Weekly Work Hours	0.45	<0.001
Sleep Duration	-0.38	<0.001
Exercise Habits	-0.29	0.002
Social Support	-0.41	<0.001

survey of 636 resident physicians, the mean age was 25.6 years and 52.5% were male, comparable to the

DISCUSSION

This large cross-sectional study among 700 anesthesiology residents demonstrates a large burden of long working hours, sleep restriction and psychological distress, with more than half of participants reporting moderate-to-severe stress and moderate impairment in physical health status. The multivariable analysis further underscores that long weekly work hours, short sleep duration, lack of exercise and poor social support independently predict poorer well-being, highlighting modifiable targets for institutional interventions.

The respondents were predominantly in the 26–30-year age group (50.0%), with a slight male predominance (60.0%), and an almost even distribution across residency years. In a large Chinese

present cohort.¹⁶ Similarly, a Canadian internal-medicine residency survey reported a median age of 28 years.¹⁷ These findings suggest the demographic structure of contemporary residency programmes in Asia and elsewhere

The workload in the present study was high, with 42.9% of residents reporting 60–80 working hours per week and an additional 25.7% exceeding 80 hours. 67.1% performed ≥ 5 -night shifts per month, and 24.2% exceeded 8-night duties monthly. These findings are comparable to the 1-in-4 call schedule in a Canadian internal-medicine programme, where residents worked approximately 65–70 hours per week and up to seven 24-hour calls per month. This model was associated with the highest levels of fatigue and perceived risks to personal health (OR for mismanagement of personal health 4.98, 95% CI 1.77–

13.99).¹⁸ Another multi-specialty study from a university hospital reported average weekly working hours of 75 (SD 21.8), with burnout prevalence of 46.3% among residents.¹⁹ By contrast, Italian residents are legislatively capped at 38 hours per week, and anesthesiology trainees in one Italian centre typically covered only 4–6 night shifts per month, yet still exhibited objectively shortened sleep and increased sleepiness compared with day-working occupational medicine residents.²⁰ Based on the demographic findings and comparison with other relevant studies, we report that our study cohort had higher workload compared to the International population, which signify a need of more robust assessment of workload stress in Indian anesthesiologist residents.

More than two-thirds of residents in the present study slept less than 6 hours per night, with 51.4% reporting only 4–6 hours and 17.1% sleeping <4 hours. This pattern of marked sleep restriction is consistent with and in some respects more adverse than other medical trainee populations. In an Italian study using actigraphy, anesthesiology residents slept 359 ± 39 minutes per night (approximately 6.0 hours), which was 1 hour 20 minutes less than occupational medicine residents (441 ± 38 minutes; $p < 0.001$), and had significantly higher daytime sleepiness scores.²⁰ Bangladeshi medical students reported an average sleep duration of 6.0 ± 1.4 hours, with 67.2% meeting criteria for poor sleep quality on the Pittsburgh Sleep Quality Index (PSQI).²¹

Resident doctors in an Indian government medical college also showed a high prevalence of poor sleep; in that cohort, 71.43% of first-year residents were classified as poor sleepers on PSQI, and 53.24% had daytime sleepiness, including 46.75% with excessive daytime sleepiness. Comparable findings were seen among staff nurses in Puducherry, where 56.7% had poor sleep quality and more than half slept only 5–6 hours per night. Among Indian undergraduate students, multiple studies using PSQI have reported poor sleep quality in 60–68% of participants.²² Collectively, the evidence indicates that sleep restriction and poor sleep quality are pervasive across different levels of the health-care workforce.

Using the DASS-21 stress subscale, 51.4% of residents in this cohort had moderate-to-severe stress and a further 22.9% had mild stress, indicating that nearly three-quarters experienced at least some degree of stress. In comparison, Bangladeshi medical students assessed with DASS-21 had moderate-to-extremely severe stress in 38.6%, along with depression in 55.8% and anxiety in 58.7%.²¹ An Indian undergraduate cohort showed similar patterns with high PSQI scores significantly associated with higher DASS-21 depression, anxiety and stress scores.²³ A recent study of anesthesiology residents in Iran found very high burnout rates: 41.2% had severe emotional exhaustion, 66.7% had high depersonalisation and all residents (100%) reported reduced personal accomplishment, with 17.65% experiencing severe depression and

strong correlations between depressive symptoms and all burnout dimensions.²⁴

In practicing anaesthesiologists in India, a large questionnaire-based survey of 864 respondents reported emotional exhaustion in 39.5%, depersonalisation in 65.0% and low professional efficacy in 50.6%, with burnout particularly common among those aged 26–35 years, working around 12 hours per day and performing 7–10 night shifts per month.²³ Multi-specialty data from China also show high levels of burnout among 636 resident physicians, with a burnout prevalence of 46.07% and significant associations with adverse person–vocation fit and longer working hours.¹⁶ These figures are broadly comparable to the proportion of anesthesiology residents with moderate-to-severe stress in our study, suggesting that the DASS-21 stress findings likely reflect clinically meaningful burnout-related distress.

The strong association between stress and sleep in our data, 68.0% of residents sleeping <6 hours had moderate-to-severe stress versus 31.8% among those sleeping ≥ 6 hours ($p < 0.001$) is consistent with prior DASS-based studies. For example, Indian medical undergraduates demonstrated significant positive correlations between global PSQI scores and all three DASS-21 domains, with poorer sleep linked to higher depression, anxiety and stress.²⁵ Bangladeshi medical students with poor sleep quality had higher odds of depression (86.3% vs 43.1%), anxiety (82.4% vs 45.5%) and stress (91.1% vs 52.2%) compared to those with good sleep.²¹ These convergent findings support the contention that sleep disturbance and psychological distress are bidirectionally reinforcing phenomena in medical trainees.

The mean SF-36 scores in this study (physical functioning 65.2, pain 58.7, general health 60.5) indicate moderate impairment in physical health domains, which is similar to quality-of-life patterns reported in recent student cohorts where most participants had “moderate” overall QOL scores and physical functioning domains were better preserved than psychological domains.²⁶ In the present study, more than half of residents (54.3%) reported only moderate social support and one in five (21.4%) reported poor social support, while 74.3% reported irregular or no exercise and 30.0% reported substance use. Comparable findings regarding lifestyle and support have been observed elsewhere: in the Canadian internal-medicine resident study, having dependents and being in a stable relationship were associated with lower burnout prevalence.¹⁷ A friendly family environment and better perceived career opportunities were associated with better sleep and lower psychological distress.²¹ Our results, therefore reinforce the importance of social and lifestyle resources when addressing resident well-being.

A key finding of the present study is the strong positive correlation between weekly work hours and stress scores ($r = 0.62$, $p < 0.001$), and the independent association of higher weekly work hours with poorer

well-being in multivariable analysis ($\beta=0.45$, $p<0.001$). Longer sleep duration ($\beta=-0.38$), regular exercise ($\beta=-0.29$) and better social support ($\beta=-0.41$) were independently protective. These results mirror those of several recent studies. In Chinese residents, longer daily working hours significantly increased the risk of burnout (OR 1.33 per additional hour), while greater sleep duration reduced emotional exhaustion and depersonalisation and increased personal accomplishment.¹⁶ A large US study of high-burnout specialties reported a strong association between weekly work hours and stress, even when the relationship between hours and categorical burnout was less clear, suggesting that stress may be the more sensitive marker of workload strain.²⁷

The Canadian internal-medicine cohort similarly found that the traditional 1-in-4 call model (approximately 65–70 hours per week) was associated with significantly higher odds of total fatigue (OR 4.15, 95% CI 1.56–11.05) and sleepiness (OR 6.19, 95% CI 2.27–16.90) compared with no-call schedules, and with an increased perceived risk of mismanaging personal health (OR 4.98, 95% CI 1.77–13.99) and occupational or household harm (OR 5.69, 95% CI 1.87–17.30).¹⁷ A 2023 ward-based internal-medicine study found that burnout was present in over half of residents and was closely linked to emotional exhaustion and workload demands.¹² These findings highlight that duty hours, sleep, physical activity and social support act in concert to shape resident well-being, and that interventions that address all of these dimensions are likely to be more effective than measures targeting only one.²⁸

Structured programmes that promote regular physical activity and strengthen social support such as peer-mentoring, facilitated access to counselling, family-friendly policies and team-building interventions may help mitigate the high prevalence of irregular exercise and poor social support observed in this and other cohorts.^{15–19} Routine use of brief, validated tools such as the DASS-21 and PSQI, which have good psychometric properties in student and trainee populations,^{20,22} can aid early identification of at-risk residents and allow timely, targeted interventions rather than relying solely on informal observation.

Strengths and limitations

Strengths of the present study include its large sample size of 700 anaesthesiology residents, the use of validated instruments (DASS-21, SF-36 and SSQ), and the comprehensive assessment of work patterns, sleep, lifestyle and social support in a single analytic framework. The observed associations between work hours, sleep duration, exercise, social support and well-being are robust and consistent with contemporary multicountry literature on residents and medical students.

However, several limitations merit consideration. The cross-sectional design precludes causal inference; it cannot be definitively concluded whether long work

hours and short sleep cause stress, or whether stressed residents are more likely to perceive or report longer hours and shorter sleep. Self-reported measures of work hours, night shifts and sleep duration are susceptible to recall and reporting biases, although the magnitudes reported are broadly consistent with those in other residency studies. The use of the DASS-21 stress subscale, while appropriate for screening, does not provide a formal diagnostic classification of burnout, depression or anxiety. The single-specialty focus on anaesthesiology residents may limit generalisability to other disciplines, although multi-specialty studies have reported similar or higher levels of burnout and distress.

CONCLUSION

This study demonstrated a large burden of occupational stress and impaired well-being among anaesthesiology residents in Tamil Nadu. Long working hours, frequent night duties, inadequate sleep, reduced physical activity, and limited social support were significantly associated with poorer well-being outcomes. Institutional strategies focused on workload regulation, mental health support, sleep hygiene, and resident wellness programmes may help improve both resident health and quality of patient care.

REFERENCES

1. De Hert S. Burnout in healthcare workers: prevalence, impact and preventative strategies. *Local Reg Anesth*. 2020;13:171–83.
2. Edú-Valsania S, Laguía A, Moriano JA. Burnout: a review of theory and measurement. *Int J Environ Res Public Health*. 2022;19(3):1780.
3. Ungur AP, Bărsan M, Socaciu AI, et al. A narrative review of burnout syndrome in medical personnel. *Diagnostics (Basel)*. 2024;14(17):1971.
4. World Health Organization. Burn-out an “occupational phenomenon”: international classification of diseases [Internet]. Geneva: WHO; 2019 [cited 2026 May 18]. Available from: <https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases>
5. Morse G, Salyers MP, Rollins AL, et al. Burnout in mental health services: a review of the problem and its remediation. *Adm Policy Ment Health*. 2012;39(5):341–52.
6. Gupta L. The silent threat: fatigue, burnout, and patient safety in anaesthesia. 2024.
7. Berger-Estilita J, Salvisberg D, Köseleli E, et al. Impact of burnout on anaesthesiologists. *Turk J Anaesthesiol Reanim*. 2024;52(2):54–59.
8. Verma R, Mohan B, Attri JP, et al. Anaesthesiologist: the silent force behind the scene. *Anesth Essays Res*. 2015;9(3):293–7.
9. Koutsimani P, Montgomery A, Georganta K. The relationship between burnout, depression, and anxiety: a systematic review and meta-analysis. *Front Psychol*. 2019;10:284.
10. Romito BT, Okoro EN, Ringqvist JRB, et al. Burnout and wellness: the anesthesiologist's

- perspective. *Am J Lifestyle Med.* 2020;15(2):118-25.
11. Ayoğlu H, Ayoğlu FN. Occupational risks for anaesthesiologists and precautions. *Turk J Anaesthesiol Reanim.* 2021;49(2):93-99.
 12. Anesi GL, Kerlin MP. The impact of resource limitations on care delivery and outcomes: routine variation, the coronavirus disease 2019 pandemic, and persistent shortage. *Curr Opin Crit Care.* 2021;27(5):513-19.
 13. Kaur A, Kallakuri S, Mukherjee A, et al. Mental health related stigma, service provision and utilization in Northern India: situational analysis. *Int J Ment Health Syst.* 2023;17(1):10.
 14. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav.* 1983;24(4):385-96.
 15. Ishak WW, Lederer S, Mandili C, et al. Burnout during residency training: a literature review. *J Grad Med Educ.* 2009;1(2):236-42.
 16. Fan, Yaotian & Zhang, Yue & Pu, Guorong & Zhao, Qian & Xu, Yuanning & Li, Qian & Lin, Ke & You, Zhen. (2025). The relationship between person-vocation fit and burnout among resident physicians: A single-center cross-sectional survey. *PLOS One.* 20. 10.1371/journal.pone.0324707.
 17. Ryden AG, Fuller TC, Rose RS, Lappe KL, Raaum S, Johnson SA. Comparison of internal medicine applicant and resident characteristics with performance on ACGME milestones. *Med Educ Online.* 2023 Dec;28(1):2211359. doi: 10.1080/10872981.2023.2211359. PMID: 37166474; PMCID: PMC10177668.
 18. Yuan JH, Huang Y, Rosgen BK, Donnelly S, Lan X, Katz SJ. Burnout and fatigue amongst internal medicine residents: A cross-sectional study on the impact of alternative scheduling models on resident wellness. *PLoS One.* 2023 Sep 14;18(9):e0291457. doi: 10.1371/journal.pone.0291457. PMID: 37708198; PMCID: PMC10501672.
 19. Surawattanasakul V, Siviroj P, Kiratipaisarl W. Resident physician burnout and association with working conditions, psychiatric determinants, and medical errors: A cross-sectional study. *PLoS One.* 2024 Oct 30;19(10):e0312839. doi: 10.1371/journal.pone.0312839. PMID: 39475932; PMCID: PMC11524500.
 20. Magnavita N, Di Prinzio RR, Meraglia I, Vacca ME, Soave PM, Di Stasio E. Sleep in Residents: A Comparison between Anesthesiology and Occupational Medicine Interns. *Int J Environ Res Public Health.* 2023 Jan 28;20(3):2356. doi: 10.3390/ijerph20032356. PMID: 36767721; PMCID: PMC9915358.
 21. Mueed A, Rahman R, Suchi SI, Ahmed K, Tithi TA. Sleep quality and psychological distress among Bangladeshi medical students: Prevalence, predictors, and sex-institutional differences. *Glob Epidemiol.* 2026 Jan 6;11:100243. doi: 10.1016/j.gloepi.2026.100243. PMID: 41567947; PMCID: PMC12818157.
 22. Manzar MD, Moiz JA, Zannat W, Spence DW, Pandi-Perumal SR; Ahmed S. BaHammam; Hussain ME. Validity of the Pittsburgh Sleep Quality Index in Indian University Students. *Oman Med J.* 2015 May;30(3):193-202. doi: 10.5001/omj.2015.41. PMID: 26171126; PMCID: PMC4459159.
 23. JOHN AS, KUMAR T S. Burnout among anaesthesiologists in India. A questionnaire based study. *Asian J Pharm Clin Res [Internet].* 2021 Jul. 7 [cited 2026 May 19];14(7):27-31.
 24. Karimian M, Dabbagh A, Sezari P, Fani K, Shahrabi M, Shakeri A. The Magnitude of Anesthesiology Residents Burnout at Shahid Beheshti University of Medical Sciences: A Cross-Sectional Study. *Anesth Pain Med.* 2025 Mar 8;15(2):e159987. doi: 10.5812/aapm-159987. PMID: 40421328; PMCID: PMC12103712.
 25. Verma P, Jani H, Bhandari P, Patel B, Parlewar R. Association between Sleep Quality and Mental Health among Medical Students: A College Based Study in Himachal Pradesh, India. *J Pharm Bioallied Sci.* 2025 May;17(Suppl 1):S363-S365. doi: 10.4103/jpbs.jpbs_310_25. Epub 2025 Apr 29. PMID: 40511021; PMCID: PMC12156477.
 26. Nagarajan S, Paramasivan P, Mohan A, Periasamy P. Assessing quality of life, sleep quality, and mental health among undergraduate students in Erode, Tamil Nadu: a multi-scale evaluation. *Eur J Cardiovasc Med.* 2024;14(1):1209-12. Available from: <https://healthcare-bulletin.co.uk/article/assessing-quality-of-life-sleep-quality-and-mental-health-among-undergraduate-students-in-erode-tamil-nadu-a-multi-scale-evaluation-3928/>
 27. Tan SF, Siddiqui H, Pinto A, Paur B, Chen G, Elfenbein DM, Minichiello V, Barrett B, Davidson RJ, Goldberg SB. Work Hours, Stress, and Burnout Among Resident Physicians. *JAMA Netw Open.* 2026 Jan 2;9(1):e2553974. doi: 10.1001/jamanetworkopen.2025.53974. PMID: 41533375; PMCID: PMC12805447.
 28. Wang MK, Geen O, Mach ZH, Khalid Z. Resident Burnout on the Internal Medicine Ward. *J Gen Intern Med.* 2024 Feb;39(3):366-372. doi: 10.1007/s11606-023-08505-9. Epub 2023 Nov 9. PMID: 37946021; PMCID: PMC10897070.