

Investigating Burnout in Medical Students in Associations with Demographics, Academics, and Sleep: A Cross-Sectional Study in Erode, Tamilnadu

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Abstract:

Introduction: The objective of this study was to investigate the frequency of burnout syndrome and examine how burnout symptoms are related to sociodemographic characteristics in medical students.

Methods: An observational study was carried out among students ranging from their first year to final year in a district of Erode, spanning from June 2023 to August 2023. The study involved 308 medical students' participants, with Mean age of 19.79+1.26 years of age. The convenience sampling method was employed. Data collection was conducted subsequent to obtaining ethical approval from the institutional review committee. Students at Government Erode Medical College in Tamilnadu, data were collected in January –March 2023. The survey was conducted using a semi-structured and self-reported questionnaire by using Google Forms and a shareable link was generated and distributed via email and social media for 4 weeks' s containing informed consent along with sections (Demographic Details, self-rated sleep quality, academic performance and The Maslach Burnout Inventory–Student Survey burnout questionnaire). Correlation between academic performances, sleep quality, Emotional Exhaustion Cynicism and Academic Efficacy was analysed using Karl Pearson correlation method.

Results: The prevalence of burnout among medical students 56 out of 308 (18.18%). The study found that individuals aged 21-24 years and students beyond their first year have a higher percentage of burnout (30.23%) compared to those aged 17-20 years (13.51%) (p=0.02). Poor sleep quality (25.58%) and individuals scoring less than 60% marks (26.47%) (p=0.01) also have a higher percentage of burnout compared to those scoring above 60% marks (11.63%).

Conclusions: Medical student's burnout leads to low academic performance. Final year students, male, and poor sleep have a significant association with burnout. The high prevalence

of burnout syndrome necessitates appropriate interventions to identify and reduce the prevalence of burnout in medical students.

Keywords: Burnout, medical students, sleeps quality, Academic performance, Emotional Exhaustion, Cynicism and Academic Efficacy.

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Introduction

Undergraduate medical education is an arduous and rigorous journey that might make many students more susceptible to experiencing burnout and stress. The occurrence of burnout syndrome can have a substantial impact on the cognitive capacity of medical students, leading to both physical and psychological disruptions.[1] Burnout is defined as the waning of motivation or drive in situations where expected outcomes are not attained despite dedicated pursuit of a goal.[2] Chronic stress caused by burnout results in physical and emotional fatigue, apathy, and a sense of underachievement in persons who work in high-stress environments.[3] Healthcare practitioners are particularly susceptible to stress and anxiety due to the high level of accountability and the little margin for error in delivering healthcare services. Ensuring the well-being of medical students is crucial in order to effectively handle the demands of medical education in a highly stressful setting.[4,5]

Burnout syndrome comprises two key elements, namely emotional fatigue (EE) and depersonalisation (DP). Emotional exhaustion (EE) is characterised by emotional insensitivity and a diminished sense of personal accomplishment. Depersonalisation is characterised by a lack of empathy, reduced motivation, and heightened feelings of isolation.[6]

Burnout syndrome not only impairs the learning abilities of medical students, but also gives rise to various physical, mental, and social risks such as drowsiness, fatigue, eating disorders, migraine, emotional instability, and, in extreme cases, drug abuse.[7,8] Studies have shown that a significant number of medical students in

the UK and Australia experience burnout during their medical education, which is often accompanied by psychiatric disorders and thoughts of suicide.[9] Similarly, a high prevalence of burnout has also been observed among students in both public and private medical institutions in Pakistan.[10,11]

Although student-centred learning methodologies have been used, the prevalence of stress in medical students is still influenced by factors such as communication with patients and engagement with other healthcare practitioners, which have a negative impact on their physical and psychological well-being.[12]

The primary elements contributing to stress in medical students have been reported to be the ambiguity around study behaviour, progress, and aptitude.[13]. So the present study this study sought to evaluate the frequency of burnout syndrome and examine the correlation between burnout symptoms and pertinent sociodemographic characteristics among medical students in the Erode region of Tamilnadu.

Methodology

A cross-sectional survey was done among male and female undergraduate MBBS students in a district of Erode. The survey included students from their first year to final year, and it took place from January to March 2023. The sample size was determined using the Epi Info tool version 7.2. There was a total of 308 undergraduate students in the sample. The study participants were chosen using the simple random selection technique. Within college, students were randomly selected.

The inclusion criterion consisted of students who were currently enrolled at the Government Erode Medical College and studying at the Erode district campus during the survey. The exclusion criteria encompassed individuals who expressed a lack of willingness to engage in the study.

The participants were personally given a self-administered questionnaire through Google Form. The questionnaire consists of the following components: containing informed consent a) Personal data, such as age, sex, marital status, and family income, self-rated sleep quality; b) Academic data, which include academic level, name of college, course, and year of study; c) The Maslach Burnout Inventory–Student Survey burnout questionnaire.

Prior to data collection, formal authorizations were obtained from the relevant authorities of the targeted colleges to conduct the study in the specified location. The participants were informed about the study aims and assured of data anonymity and confidentiality. Voluntary participation was required for the study. The authors affirm that the study adhered to

the ethical guidelines established by the appropriate national and institutional bodies on human research. The project was also authorized by the Institutional Ethical Committee. Participants provided informed consent. All unfinished questionnaires were discarded.

The data were inputted, verified, and analyzed using the Statistical Package for the Social Sciences (SPSS) version 22 software. The study utilized 95% confidence intervals (95% CIs) to determine the important components linked to stress in college students.

The threshold for statistical significance was established at a p-value of less than 0.05.

Results

A total of 308 medical students participated in this study. Mean age of the study participants was 19.79+1.26 years of age, minimum age 17 and maximum age of participants was 24. Male mean age was 19.59+1.21 years and female mean age was 19.93+1.27 years.

Table 1: Demographic Information

Demographic variables		Number of students	%
Gender of Respondent	Male	126	40.91%
	Female	182	59.09%
Age of respondent	17 Years	4	1.30%
	18 Years	40	12.99%
	19 Years	90	29.22%
	20 Years	88	28.57%
	21 Years	64	20.78%
	22 Years	16	5.19%
	23 Years	2	0.65%
	24 Years	4	1.30%
Year of Study	First Year	186	60.39%
	Second Year	70	22.73%
	Third Year	32	10.39%
	Fourth Year	20	6.49%
Type of family	Nuclear	256	83.12%
	Joint	52	16.88%
Place of Living	Rural	78	25.32%
	Semi-urban	112	36.36%

	Urban	118	38.31%
Monthly family income Rs:	Less than 10,000	28	9.09%
	11,000-20,000	34	11.04%
	21,000-40,000	74	24.03%
	41,000-60,000	80	25.97%
	61,000-75,000	28	9.09%
	76,000-90,000	22	7.14%
	More than 90,000	42	13.64%

The table 1 presents demographic information gathered from a survey of students, detailing various factors such as gender, age, year of study, family type, place of living, and monthly family income. Among the respondents, 40.91% were male and 59.09% were female. Regarding age distribution, the majority fell within the range of 19 to 20 years old, comprising 29.22% and 28.57% respectively. In terms of academic progression, the largest proportion of students were in their first

year (60.39%), followed by second year (22.73%). The majority of students came from nuclear families (83.12%), with a minority from joint families (16.88%). In terms of residency, a slightly larger percentage resided in urban areas (38.31%) compared to semi-urban (36.36%) and rural areas (25.32%). Lastly, the monthly family income varied, with the highest percentage falling in the range of 41,000 to 60,000 Rs (25.97%), followed by 21,000 to 40,000 Rs (24.03%).

Table 2: Academic Details

		Number of students	%
Sleep quality rating	Very bad	4	1.30%
	Bad	28	9.09%
	ok	104	33.77%
	Good	108	35.06%
	Very Good	64	20.78%
Average percentage of Internal Marks scored	No Mark secured	6	1.95%
	1-10% Marks	0	0.00%
	11-20% marks	4	1.30%
	21-30% Marks	6	1.95%
	31-40% Marks	18	5.84%
	41-50 Marks	68	22.08%
	51-60% Marks	70	22.73%
	61-70% Marks	68	22.08%
	71-80% Marks	36	11.69%
	81-90% Marks	16	5.19%
91-100% Marks	16	5.19%	

The table 2 provides academic details based on the responses of the surveyed students. It outlines their sleep quality ratings and the distribution of their average percentage of internal marks scored. Concerning sleep quality, the majority of students rated their sleep as either "good" (35.06%) or "very good" (20.78%), while smaller percentages

rated it as "ok" (33.77%), "bad" (9.09%), or "very bad" (1.30%).

Regarding academic performance, the distribution of average internal marks scored varied, with the largest proportion falling in the range of 51% to 60% (22.73%), followed closely by 41% to 50% (22.08%). There were also notable

percentages of students scoring in the ranges of 61% to 70% (22.08%) and 71% to 80% (11.69%).

Additionally, a small percentage of students did not secure any marks (1.95%), while others scored within the ranges of 1% to 10% and 91% to 100% (both 5.19%).

Table 3: Gender wise Prevalence of Burnout

	Total students	Burnout students	% of burnout	95%CI
Overall	308	56	18.18%	12.89%-25.02%
Male	126	24	19.05%	11.25%-30.41%
Female	182	32	17.58%	11.12%-26.67%

Table 3 presents the gender-wise prevalence of burnout among the surveyed students. The total number of students surveyed was 308, with 56 students experiencing burnout, representing an overall burnout rate of 18.18%, with a 95% confidence interval of 12.89% to 25.02%.

When broken down by gender, out of the 126 male students surveyed, 24 experienced burnout, resulting in a burnout rate of 19.05% with a 95% confidence interval of 11.25% to 30.41%. Among the 182 female students surveyed, 32 experienced burnout, resulting in a burnout rate of 17.58% with a 95% confidence interval of 11.12% to 26.67%. Figure 1 the chart shows that a higher percentage of female students experience non-burnout compared to male students. Specifically, 82.42% of female students experience non-burnout, while only 80.95% of male

students do. Conversely, a higher percentage of male students experience burnout compared to female students. In the chart, 19.05% of male students experience burnout, whereas only 17.58% of female students do. Table 4 provides the percentage of emotional exhaustion, cynicism, and academic efficacy among the surveyed students. For instance, the statement "I feel emotionally drained by my studies" represented 54.00% of the mean score. Similarly, other statements related to emotional exhaustion, cynicism, and academic efficacy are detailed with their respective statistics.

These findings offer insights into the perceptions and experiences of the students regarding their academic journey, highlighting aspects of exhaustion, cynicism, and efficacy in their educational endeavors.

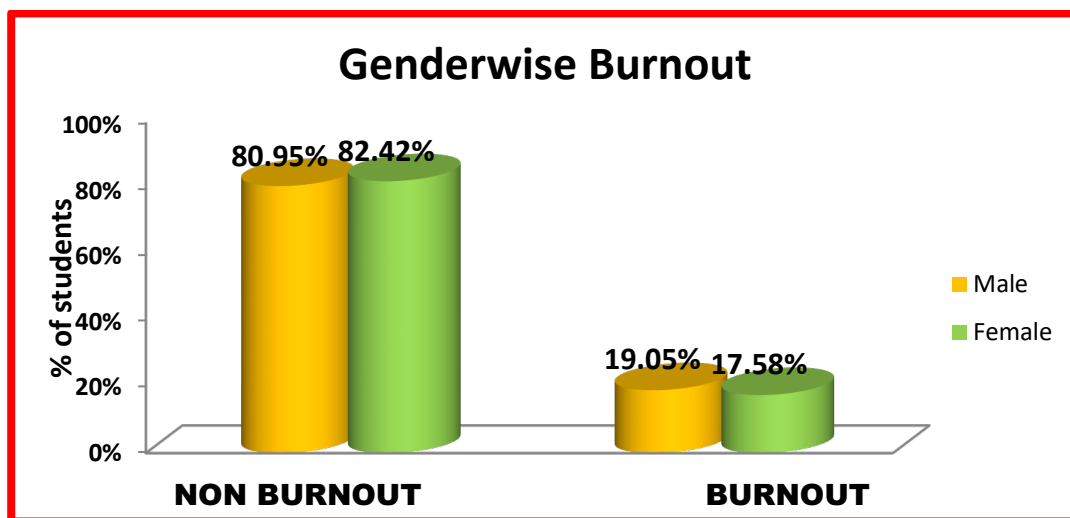


Figure 1: Multiple bar diagram compares percentage of burnout score between male and female students

Table 4: Percentage of Emotional Exhaustion, Cynicism and Academic Efficacy

	Maximum score	Mean	Standard Deviation	% of mean score
1. I feel emotionally drained by my studies]	7	3.78	1.91	54.00%
4. I feel used up at the end of a day at College/ university]	7	3.97	1.89	56.71%
7. I feel tired when I get up in the morning and I have to face another day at the College/ university]	7	3.76	1.99	53.71%
10. Studying or attending a class is really a strain for me]	7	3.38	1.76	48.29%
13. I feel burned out from my studies]	7	3.64	1.79	52.00%
2. I have become less interested in my studies since my enrolment at the College/university]	7	3.23	1.95	46.14%
5. I have become less enthusiastic about my studies]	7	3.62	1.93	51.71%
11. I doubt the significance of my studies]	7	3.28	1.81	46.86%
14. I have learnt many interesting things during the course of my studies]	7	5.08	1.75	72.57%
3. I can effectively solve the problems that arise in my studies]	7	4.47	1.82	63.86%
6. I believe that I make an effective contribution to the classes that I attend]	7	4.27	1.71	61.00%
8. I have become more cynical about the potential usefulness of my studies]	7	3.71	1.71	53.00%
9. In my opinion, I am a good student]	7	4.98	1.71	71.14%
12. I feel stimulated when I achieve my study goals]	7	5.06	1.77	72.29%
15. During class I feel confident that I am effective in getting things done]	7	4.52	1.79	64.57%

Table 5: Demographic information wise MBI-SS subscale scores

		EE		CY		AE	
		Mean	SD	Mean	SD	Mean	SD
Age	17-18 years	18.23	7.20	26.64	7.19	32.91	11.45
	19-20 years	19.48	6.56	27.12	6.75	35.25	10.42
	>20 years	16.70	8.37	26.95	9.83	31.07	14.40
Year of Study	First Year	19.04	6.49	27.11	6.37	34.10	10.03
	Second Year	18.74	7.83	27.91	7.96	35.34	13.47
	Third Year	17.19	8.98	24.37	11.79	30.88	15.26
	Fourth Year	15.10	8.88	27.10	10.76	29.50	15.64
Type of family	Nuclear	18.98	7.25	27.50	7.47	34.65	11.89
	Joint	16.27	6.94	24.58	8.69	29.31	10.91
Place of Living	Rural	16.82	6.95	26.64	8.07	30.79	11.05
	Semi-urban	20.48	7.14	27.34	7.28	37.02	11.79
	Urban	17.80	7.25	26.93	8.05	32.59	11.92
	< Rs.20000	16.48	6.67	25.55	7.40	30.61	10.90

Monthly family income Rs:	Rs.21000- 60000	19.45	7.53	27.97	7.45	35.12	12.16
	>Rs.60000	18.35	6.99	26.37	8.35	33.57	11.81

Table 5 presents the mean and standard deviation values for the Maslach Burnout Inventory-Student Survey (MBI-SS) subscale scores (Emotional Exhaustion, Cynicism, and Academic Efficacy) across different demographic categories. Here's a numerical summary of the significance:

Students aged 19-20 years exhibit higher mean scores for all subscales compared to other age groups, with Emotional Exhaustion (EE) at 19.48, Cynicism (CY) at 27.12, and Academic Efficacy (AE) at 35.25. Third-year students have the lowest mean scores for all subscales, with EE at 17.19, CY at 24.37, and AE at 30.88. Students from nuclear families generally report higher mean scores across

all subscales compared to those from joint families. Students residing in semi-urban areas tend to have higher mean scores for all subscales compared to those in rural or urban areas.

Students with a monthly family income between Rs. 21,000-60,000 exhibit higher mean scores for all subscales compared to those with incomes below Rs. 20,000 or above Rs. 60,000. These results values underscore the varying degrees of burnout experienced by students across different demographic categories, highlighting potential areas for targeted interventions and support strategies aimed at addressing burnout and promoting student well-being.

Table 6: Academic information wise MBI-SS subscale scores

		EE		CY		AE	
		Mean	SD	Mean	SD	Mean	SD
Sleep quality rating	Very bad	31.00	1.41	25.00	1.41	32.50	.71
	Bad	20.71	6.01	14.86	5.20	26.21	6.22
	ok	20.08	6.49	16.12	4.49	27.13	6.41
	Good	18.41	7.10	15.67	5.24	28.83	6.56
	Very Good	14.47	7.46	12.56	5.93	23.72	10.91
Average percentage of Internal Marks scored	No Mark secured	17.67	7.64	11.67	2.89	21.33	4.51
	1-10% Marks
	11-20% marks	20.50	3.54	17.00	2.83	24.50	4.95
	21-30% Marks	19.67	10.02	17.33	7.57	29.33	2.52
	31-40% Marks	24.89	6.58	20.22	3.87	28.67	7.42
	41-50 Marks	19.85	6.10	16.59	5.51	26.74	4.69
	51-60% Marks	17.80	6.45	14.91	4.24	27.23	7.26
	61-70% Marks	19.97	6.75	15.68	4.56	29.26	7.28
	71-80% Marks	15.28	7.54	12.89	5.83	27.56	9.14
81-90% Marks	14.50	8.05	12.13	5.33	24.13	12.03	
91-100% Marks	13.50	10.36	11.63	7.85	19.25	12.29	

Table 6 presents the mean and standard deviation values for the Maslach Burnout Inventory-Student Survey (MBI-SS) subscale scores (Emotional Exhaustion, Cynicism, and Academic Efficacy) across different academic information categories.

Here's a numerical summary of the significance:

Students reporting "Very Bad" sleep quality have the highest mean scores for emotional exhaustion (31.00) and cynicism (25.00),

while those with "Very Good" sleep quality have the lowest mean scores.

Students who scored higher percentages of internal marks tend to have lower mean scores for emotional exhaustion, cynicism, and higher mean scores for academic efficacy. For instance, students scoring between 91-100% marks have the lowest mean scores for emotional exhaustion (13.50) and cynicism (11.63), and the highest mean score for academic efficacy (19.25).

These numerical values indicate a significant association between sleep

quality and academic performance with burnout levels among students. Specifically, poorer sleep quality and lower academic performance are correlated with higher levels of emotional exhaustion and cynicism, and lower levels of academic efficacy. Conversely, better sleep quality and higher academic performance are associated with lower burnout levels and higher academic efficacy. This underscores the importance of addressing sleep quality and academic performance as potential factors in mitigating student burnout and promoting overall well-being.

Table 7: Identification of influencing factors for burnout score using univariate analysis

		Burnout				n	Chi square test
		Burn out		Non -Burn out			
		n	%	n	%		
Age	17-20 years	30	13.51%	192	86.49%	111	$\chi^2=5.82$ $p=0.02^*(S)$
	21-24 years	26	30.23%	60	69.77%		
Year of Study	First Year	22	11.83%	164	88.17%	93	$\chi^2=6.37$ $p=0.01^{**}(S)$
	> First Year	34	27.87%	88	72.13%	61	
Type of family	Nuclear	42	16.41%	214	83.59%	128	$\chi^2=1.60$ $p=0.20(NS)$
	Joint	14	26.92%	38	73.08%	26	
Place of Living	Rural	16	20.51%	62	79.49%	39	$\chi^2=0.19$ $p=0.66(NS)$
	urban/semiurban	40	17.39%	190	82.61%	115	
Monthly family income Rs:	< Rs.20000	12	19.35%	50	80.65%	31	$\chi^2=0.04$ $p=0.85(NS)$
	>Rs.20000	44	17.89%	202	82.11%	123	
Sleep quality rating	Poor	12	8.82%	124	91.18%	68	$\chi^2=7.16$ $p=0.01^{**}(S)$
	Good	44	25.58%	128	74.42%	86	
Average percentage of Internal Marks scored	<60% Marks	20	11.63%	152	88.37%	86	$\chi^2=5.62$ $p=0.02^*(S)$
	>60% Marks	36	26.47%	100	73.53%	68	

Table 7 presents the results of univariate analysis to identify factors influencing burnout scores among the surveyed individuals. The table displays the number and percentage of individuals categorized as burnout and non-burnout for each factor, along with the results of the chi-square test assessing the significance of the association between each factor and burnout.

Individuals aged 21-24 years have a significantly higher percentage of burnout (30.23%) compared to those aged 17-20

years (13.51%), with a chi-square value of 5.82 and a p-value of 0.02, indicating statistical significance. Students beyond their first year have a significantly higher percentage of burnout (27.87%) compared to first-year students (11.83%), with a chi-square value of 6.37 and a p-value of 0.01, indicating statistical significance. Monthly family income does not show a significant association with burnout, as indicated by a chi-square value of 0.04 and a p-value of 0.85.

Poor sleep quality is significantly associated with a higher percentage of burnout (25.58%) compared to good sleep quality (8.82%), with a chi-square value of 7.16 and a p-value of 0.01. Individuals scoring less than 60% marks have a significantly higher percentage of burnout (26.47%) compared to those scoring above 60% marks (11.63%), with a chi-square

value of 5.62 and a p-value of 0.02. These findings underscore the importance of age, year of study, sleep quality, and academic performance as potential influencing factors for burnout among the surveyed individuals, highlighting areas that may warrant targeted interventions and support strategies to mitigate burnout and promote well-being.

Table 8: Identification of influencing factors for burnout score using Multivariate logistic regression

		Reference variable	Burnout				n	OR (95%CI)	p-value
			Burn out		Non -Burn out				
			n	%	n	%			
Age	17-20 years	0	3 0	13.51 %	19 2	86.49 %	11 1	2.56(1.0 5-6.47)	0.02 *
	21-24 years	1	2 6	30.23 %	60 6	69.77 %			
Year of Study	First Year	0	2 2	11.83 %	16 4	88.17 %	93 61	1.76(0.4 9-6.40)	0.36
	> First Year	1	3 4	27.87 %	88 72.13	72.13 %			
Type of family	Nuclear	0	4 2	16.41 %	21 4	83.59 %	12 8	1.73(0.5 6-5.31)	0.47
	Joint	1	1 4	26.92 %	38 73.08	73.08 %			
Place of Living	Rural	0	1 6	20.51 %	62 79.49	79.49 %	39 11	0.91(0.3 2-2.60)	0.70
	urban/semiurban	1	4 0	17.39 %	19 0	82.61 %			
Sleep quality rating	Poor	0	1 2	8.82% %	12 4	91.18 %	68 86	2.98(1.0 9-8.18)	0.04 *
	Good	1	4 4	25.58 %	12 8	74.42 %			
Average percentage of Internal Marks scored	<60% Marks	0	2 0	11.63 %	15 2	88.37 %	86 68	2.45(1.0 3-6.12)	0.05 *
	>60% marks	1	3 6	26.47 %	10 0	73.53 %			

*p≤0.05 significant. Adjusted odds ratio was given with 95% confidence interval.

Table 8 presents the results of a multivariate logistic regression analysis aimed at identifying factors influencing burnout scores among the surveyed individuals.

Each factor's reference category is compared to an alternative category and the odds ratios (OR) with 95% confidence intervals (CI) and p-values are provided to

assess the significance of the association between each factor and burnout.

Individuals aged 21-24 years have significantly higher odds of experiencing burnout compared to those aged 17-20 years, with an odds ratio of 2.56 and a p-value of 0.02. There is no significant association between the year of study (first year vs. beyond first year) and burnout, as indicated by an odds ratio of 1.76 and a p-value of 0.36. Similarly, there is no significant association between the type of family (nuclear vs. joint) and burnout, with an odds ratio of 1.73 and a p-value of 0.47. The place of living (rural vs. urban/semiurban) does not show a significant association with burnout, with

an odds ratio of 0.91 and a p-value of 0.70.

Individuals with poor sleep quality have significantly higher odds of experiencing burnout compared to those with good sleep quality, with an odds ratio of 2.98 and a p-value of 0.04. Individuals scoring above 60% marks have significantly higher odds of experiencing burnout compared to those scoring below 60% marks, with an odds ratio of 2.45 and a p-value of 0.05.

These findings highlight age, sleep quality, and academic performance as significant predictors of burnout among the surveyed individuals, providing valuable insights for targeted interventions and support strategies aimed at mitigating burnout and promoting well-being.

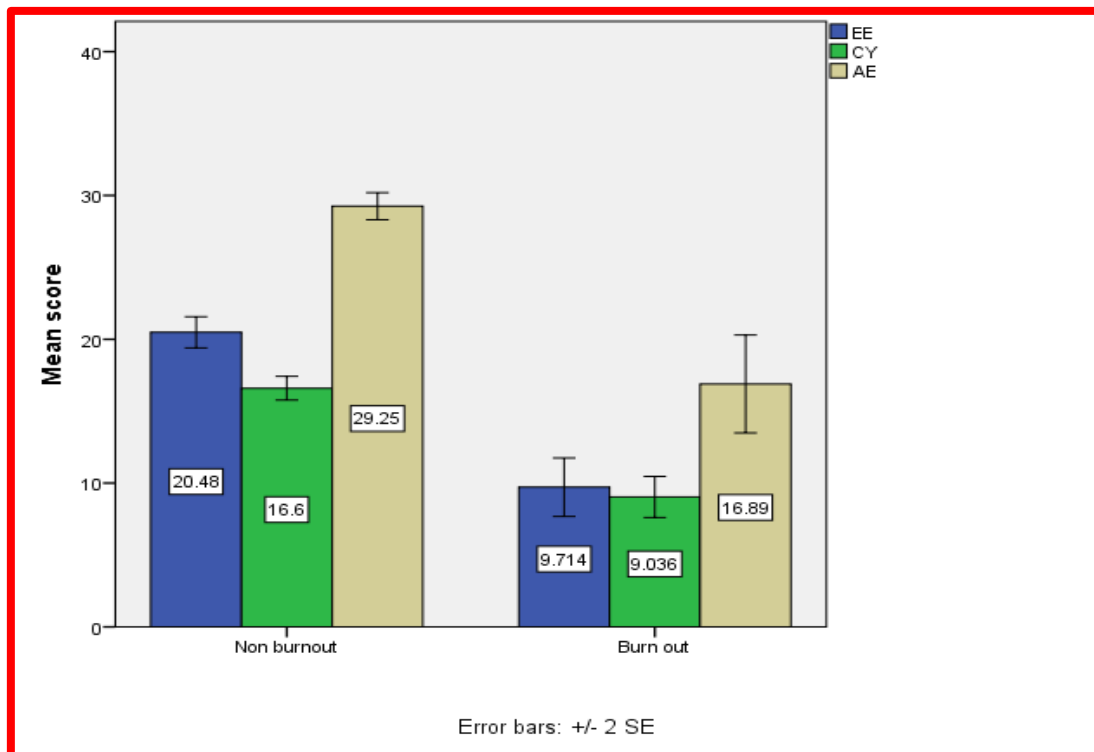


Figure 2: Simple bar with 2 standard error bar diagram compares the MBI-SS subscale scores of medical students

The figure 2 bar graph showing the results of a study on burnout among students. The graph displays the average MBI-SS scores for emotional exhaustion (EE), cynicism (CY), and academic engagement (AE) for students experiencing burnout compared to students not experiencing burnout. The

error bars show the standard error (SE) of the means.

Discussion

Our research revealed that there was a greater occurrence of burnout in females, day scholars, students experiencing sleep deprivation, and those leading a sedentary

lifestyle. However, it is important to note that this link did not reach statistical significance. These findings align with a study conducted by Shah et al, which indicated that stress was notably more prevalent in females and in students who reported sleep difficulties. However, unlike our findings, this study did not demonstrate a significant correlation between stress and low household income.[11]

According to other studies, stress was more common in the early years and equally common in both genders. These results run counter to our findings, which showed that stress levels were high throughout the final years and that men had higher levels of stress than their female counterparts.[14, 15]

Our research revealed that a lack of sleep is one of the major causes of burnout in medical students. Other studies have examined this relationship, finding that a decrease in sleep quantity and quality is associated with poor health outcomes, including anxiety, depression, and feelings of self-pity. According to a recent study done in Pakistan, the primary cause of burnout in medical students was discovered to be emotional tiredness.[16] In order to lessen stress and burnout, it may be helpful to adopt excellent sleep hygiene routines and behaviours. Poor sleep quality may further impair students' capacity to handle emotional issues.[17–18]

Conclusion

In conclusion, the consistent evidence from various studies supports the notion that there is a clear association between insufficient poor sleep quality and medical student's burnout leads to poor academic performance. Medical student's burnout leads to low academic performance. Final year students, male, and poor sleep have a significant association with burnout. The high prevalence of burnout syndrome necessitates appropriate interventions to identify and reduce the prevalence of burnout in medical

Limitation: This study has several constraints. Initially, the data were acquired by a self-administered questionnaire, which could potentially be influenced by recall bias. The study was conducted in only one medical college; further research should use a national approach. Additionally, unassessed variables may influence the felt stress levels during the study, including other academic, social, economic, and cultural aspects.

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Ethical statement: Institutional ethical committee accepted this study. The study was approved by the institutional human ethics committee, Government Erode Medical College, Perundurai, Erode. Informed written consent was obtained from all the study participants and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

Authors' contributions: Dr. R.K.Viswanathan & Dr. T. Kokila - conceptualization, data curation, investigation, methodology, project administration, visualization, writing—original draft, writing—review and editing; Dr.Vignesh Sivaraj-conceptualization, methodology, writing—original draft, writing—review and editing; Dr. Sasikala Gunasekaran & Dr Panneerselvam Periasamy - methodology, writing—original draft, writing, review and editing. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work. All authors have

read and agreed to the published version of the manuscript.

Data Availability: All datasets generated or analyzed during this study are included in the manuscript.

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