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RESEARCH ARTICLE

SLEEP QUALITY IN MEDICAL STUDENTS ACROSS THE VARIOUS PHASES OF MEDICAL EDUCATION IN CENTRAL TRAVANCORE, KERALA: A CROSS-SECTIONAL STUDY

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Abstract

Background: University students experience significant disturbances in their circadian cycles due to academic environment stressors. This is frequently exacerbated by common lifestyle habits, such as late-night internet surfing, television watching, and substance use. Impairment in sleep quality directly impacts academic performance and emotional well-being,emphasizing the critical importance of evaluating subjective and objective sleep metrics among medical undergraduates.

Methods: This cross-sectional study was conducted between 2 months among undergraduate medical students (aged 17–26 years) studying at medical colleges in Central Travancore, Kerala. Utilizing a convenient sampling technique, data from 343 consenting students were gathered via an electronic semi-structured questionnaire. Sleep quality was assessed using the standardized Pittsburgh Sleep Quality Index (PSQI). Statistical analysis was executed using SPSS version 26.0.

Results: The global PSQI scores revealed that 53.4% of the participants suffered from poor sleep quality (PSQI score >5), while only 46.6% experienced good sleep quality. Subjective sleep quality assessments showed that 16.6% of students rated their sleep as fairly bad, and 2.6% rated it as very bad. Sleep latency was a pronounced issue: 56% experienced an inability to fall asleep within 30 minutes at least once in the past month, with 12% experiencing this three or more times a week. Despite these issues, 72.3% maintained a good habitual sleep efficiency (> 85%). Gender analysis demonstrated that a significantly higher percentage of females experienced poor sleep quality compared to males (58.3% vs. 43.5%).

Conclusion: A high prevalence of poor sleep quality exists among medical students in Central Travancore, with female students showing a higher vulnerability. Although a majority of the population maintained robust habitual

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sleep efficiency, their overall subjective sleep experiences were notably impaired. Institutions must implement active screening, counselling, and structural interventions to foster the mental health and academic well-being of medical students.

Introduction:-

Sleep is a fundamental physiological process vital for health, survival, and optimal cognitive functioning. It serves as an essential parameter for the consolidation of memories, and cumulative sleep deprivation directly diminishes an individual's neuroplastic capacity and ability to learn. Quality of sleep is complex and multifaceted, comprising both subjective dimensions (the individual's perceived depth and restfulness of sleep) and objective dimensions (such as sleep duration, latency, and fragmentation).

University undergraduates, particularly those enrolled in professional medical courses, undergo immense psychological stress due to highly demanding academic schedules, frequent evaluations, and clinical responsibilities. This stress heavily disrupts their physiological circadian cycles. Compounding this academic stress are prevalent modern behavioural trends, including prolonged nighttime internet surfing, smartphone use, television viewing, and a higher prevalence of substance habits like alcohol and tobacco consumption.

Persistent impairments in sleep quality lead to severe downstream consequences, including diminished daytime alertness, cognitive deficits, impaired academic performance, emotional dysregulation, and an elevated risk for mood disorders. While international and localized studies outside Kerala have frequently pointed to a growing crisis in student sleep hygiene, localized data focusing on the various progressive phases of the medical curriculum in Central Travancore, Kerala remain scarce. Understanding these regional patterns is vital for formulating localized institutional policies. Therefore, this study was designed to quantify sleep quality patterns using the Pittsburgh Sleep Quality Index (PSQI) and evaluate underlying gender disparities within this cohort.

Method:-

This cross-sectional, descriptive study was conducted between November and December 2024 across 5 undergraduate medical colleges located in the Central Travancore region of Kerala, India. The target study population comprised undergraduate medical students within 17 to 26 years. Undergraduate medical students studying in Kerala who voluntarily consented to participate were included. Prior to initiating the study, formal ethical clearance was requested and obtained from the Institutional Ethics Committee of the Pushpagiri Institute of Medical Sciences & Research Centre, Thiruvalla. Informed consent was digitally acquired from every participant via the online survey landing page before allowing access to the survey items. Strict measures were implemented to guarantee data anonymity and maintain absolute confidentiality throughout the study. Data collection was completed via convenient sampling. The study instruments were bundled into a self-administered electronic form in the English language and distributed digitally to students across successive phases of their medical training. A final validated cohort of 343 students responded and was included in the analysis.

Data collection instruments:-

The study participants were assessed using the following data collection instruments:-

Semi-structured Sociodemographic Proforma: Used to document age, gender, year/phase of MBBS study, residence of origin, and personal habits (substance use).

Pittsburgh Sleep Quality Index (PSQI): A validated, widely accepted psychometric instrument used to score sleep habits over the preceding one-month period. It measures 7 distinct components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Individual component scores are aggregated to derive a Global PSQI Score ranging from 0 to 21, where a global score >5 designates clinically "poor" sleep quality.

Statistical Analysis

Data was compiled, organized, and statistically evaluated using the Statistical Package for the Social Sciences (SPSS) software, version 26.0. Categorical parameters (e.g., gender, phase of study, and sleep quality groupings) are reported using frequencies and percentages. Continuous parameters (such as sleep duration in hours) are presented as means accompanied by standard deviations (SD). Group comparisons between genders were made using descriptive and cross-tabulation metrics.

Results:-

Sociodemographic CharacteristicsA total of 343 medical students completed the survey protocol. The final sample was predominantly female, with 228 females (66.5%) and 115 males (33.5%) within an active age range of 17 to 26 years. Distribution across academic phases showed that 140 students (40.8%) were in their 1st MBBS year, 62 (18.1%) in the 2nd MBBS year, 60 (17.5%) in 3rd MBBS Part 1, and 81 (23.6%) in 3rd MBBS Part 2. Regarding origin, 60.6% were from urban India, 33.2% from rural India, and 6.1% from outside India. Active substance use was acknowledged by 16.9% of the surveyed cohort.

Table- 1 Sociodemographic profile (n=343)		
Variables	**n**	**(%)**
Year of study		
1st MBBS	**140**	**40.8**
2nd MBBS	62	18.1
3rd MBBS Part 1	60	17.5
3rd MBBS Part 2	81	23.6
Gender		
Female	**228**	**66.5**
Male	115	33.5
Residence of origin		
Urban India	**208**	**60.6**
Rural India	114	33.2
Outside India	21	6.1
Substance Use		
Yes	58	16.9
No	**285**	**83.1**

Analysis of the Seven PSQI Components:-

Subjective Sleep Quality: The majority of respondents (61.8%) rated their overall sleep quality as "fairly good," and 19.0% rated it as "very good". However, a combined 19.2% reported an unfavourable perception, with 16.6% categorizing it as "fairly bad" and 2.6% as "very bad".

Table- 2 Subjective Sleep Quality		
Variables	**n**	**(%)**
Very good	65	19.0
Fairly good	212	61.8
Very bad	9	2.6

Sleep Latency: Sleep latency values highlighted a widespread inability to transition into sleep quickly. While 60.3% reported falling asleep in 15 minutes or less, a considerable proportion required extended periods: 30.6% required 16–30 minutes, 7.6% took 31–60 minutes, and 1.5% spent >60 minutes awake before sleep onset. Furthermore, 56% of the students experienced an inability to fall asleep within 30 minutes at least once or more during the past month, with 12% suffering from this acute delay three or more times a week

Table- 3 Sleep latency distribution frequency		
Variables	**n**	**(%)**
Not during past month	**151**	**44.0**
Less than once a week	80	23.3
Once or twice a week	71	20.7
Three or more times a week	41	12.0

Table- 4 Sleep latency		
Variables	**n**	**(%)**
</=15 minutes	**207**	**60.3**
16-30 minutes	10	30.6
31-60 minutes	26	7.6
>60 minutes	5	1.5

Sleep Duration: The objective nightly sleep duration averaged 5.926 hours, with a Standard Deviation (SD) of 1.452 hours. This indicates a general trend of restricted sleep across the student population.
Habitual Sleep Efficiency (HSE): HSE reflects the proportion of actual sleep time versus total time spent in bed. Encouragingly, 72.3% of students achieved a healthy sleep efficiency of >85 %. However, the remaining quarter of students fell into lower brackets, reflecting inefficient sleep habits.

Table- 5 HSE- Habitual Sleep Efficiency		
Variables	**n**	**(%)**
>85%	248	72.3
75-84%	81	23.6
65-74%	9	2.6
<65%	5	1.5

Sleep Disturbance: Nocturnal sleep disturbances (awaking due to environmental shifts, temperature variations, or minor parasomnias) were common. Only 40.8% of the student cohort documented entirely undisturbed sleep patterns.
Use of Sleep Medication: Pharmacological assistance for sleep induction was rare within this group, with only 2.4% reporting the use of sleep medications at least once or more during the preceding month.
Daytime Dysfunction: Daytime impairment manifested through both a lack of enthusiasm and sleepiness-induced dysfunction. Regarding motivation, 22.2% reported a slight problem and 5.2% called it a very big problem. Concurrently, daytime sleepiness significantly interfered with vital activities (such as trouble staying awake while studying, driving, eating, or engaging in social events) at least once or more a week for more than 20% of the students.

Table- 6 Problem of Lack of Enthusiasm During Day		
Variables	**n**	**(%)**
No problem at all	135	39.4
Only very slight problem	114	33.2
Somewhat of a problem	76	22.2
A very big problem	18	5.2

Table- 7 Day Dysfunction due to Sleepiness		
Variables	**n**	**(%)**
Not during past month	171	49.9
Less than once a week	100	29.2
Once or twice a week	60	17.5
Three or more times a week	12	3.5

Global PSQI Scores and Gender Variance:-

A comprehensive score >5 on the global PSQI algorithm indicates clinically compromised, poor sleep quality. This threshold revealed that 183 students (53.4%) met the criteria for poor sleep, whereas 160 students (46.6%) maintained healthy sleep profiles.

Table- 8 PSQI Score		
Variables	**n**	**(%)**
Poor Sleep (>5)	183	53.4
Good Sleep (<5)	160	46.6

A distinct divergence emerged during gender-stratified cross-analysis. Female medical students showed a significantly higher rate of poor sleep quality than their male peers (58.3% vs. 43.5%). On average, males also secured longer objective sleep durations (6.239 hours) than females (5.768 hours).

Table- 9 Group Statistics			
Variables	**Sex**	**Mean**	**S. D**
Hours in Bed	Male	6.648	1.7244
	Female	6.316	1.4162
Sleep Efficiency	Male	94.256	8.7684
	Female	91.836	10.3609
Sleep duration	Male	6.239	1.6588
	Female	5.768	1.3119

Sleep Quality	**Sex**			
	Male		Female	
	n	**(%)**	**n**	**(%**
Poor Sleep	50	43.5%	133	58.3%
Good Sleep	65	56.5%	95	41.7%

Discussion:-

The findings of this cross-sectional investigation confirm a high prevalence of poor sleep quality among undergraduate medical students in Central Travancore, with 53.4% of the cohort classified as poor sleepers. This underscores a persistent regional public health issue within medical training institutions. These results align closely with existing epidemiological literature from other regions. For instance, a comparable web-based survey among 314 medical students reported a 50.9% prevalence of poor sleep, while a study at the University of Hong Kong identified an even higher poor sleep prevalence of 58%.

A notable paradox observed in our dataset was that while 72.3% of the medical students maintained high habitual sleep efficiency (>85%), more than half reported poor overall sleep quality. This discordance implies that even though students maximize their actual sleep time once in bed, the architecture of their sleep is likely fragmented, or they suffer from restricted sleep windows. The average objective sleep duration was low at 5.926 hours, falling well short of the universally recommended 7 to 8 hours for young adults.

Sleep latency delays represented an acute challenge for this cohort. Fifty-six percent of students could not fall asleep within 30 minutes at least once in the past month, though the average self-reported time to fall asleep was 16.92 minutes. This is slightly more favourable than data from Jordan, where medical undergraduates reported a prolonged average sleep latency of 25.12 minutes, although a slightly lower proportion (48%) experienced delays extending beyond the 30-minute threshold. Our study also highlighted notable gender differences: female medical students experienced shorter sleep durations (5.76 hours vs. 6.64 hours) and a higher prevalence of poor sleep quality (58.3% vs. 43.5%) compared to males. This increased vulnerability among females may stem from a combination of biological susceptibility to hormonal fluctuations, higher self-reported academic anxiety and distinct coping

mechanisms under stress. Additionally, 21% of the total cohort suffered from bad or worse daytime dysfunction due to sleepiness, creating a problematic cycle where poor nocturnal rest directly compromises daytime learning and enthusiasm.

Limitations:-

Several limitations must be considered when interpreting these findings. First, due to its web-based, self-administered design, the study is susceptible to self-selection or responder skewness, as well as social desirability or recall bias. Second, convenient sampling restricts the immediate generalizability of these findings across all medical institutions in India. Lastly, the electronic screening format did not evaluate secondary organic sleep impediments, such as obstructive sleep apnoea, clinical snoring syndromes, or primary parasomnias.

Conclusion:-

In conclusion, over half of the undergraduate medical students surveyed in Central Travancore, Kerala, suffer from poor sleep quality, with female students bearing a disproportionate burden. Although a majority maintain acceptable sleep efficiency, their subjective sleep quality remains compromised by prolonged sleep latencies and truncated sleep durations. These findings emphasize the clear need for target interventions by institutions and academic administrators. Incorporating routine sleep hygiene screenings and establishing active psychological support networks can help identify high-risk students early. Furthermore, structural changes—such as optimizing class schedules, promoting stress-reduction programs, and providing education on healthy sleep hygiene—are essential to preserve the mental and physical well-being of future medical professionals.

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