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THE SLEEP-ACADEMIC PERFORMANCE NEXUS: A SURVEY-BASED CROSS-SECTIONAL STUDY OF MEDICAL STUDENTS IN PUNJAB, PAKISTAN

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ABSTRACT

Sleep disturbance is a problem very prevalent all over the world, and there is unfortunately an unacceptably high rate in the academic community and this includes medical students. This study investigates the prevalence and causes of sleep disturbance in Pakistani medical students and their sensitivity to help overcome the damaging consequences. The cross-sectional, descriptive design was used to give the current situation of prevalence and factors related to sleep disturbance among students belonging to Punjab state in Pakistan. The research samples a reasonable population of 500 medical students to reveal the substantial relationship between sleep disruptions and academic performance. The findings showed that the sleep problems of medical students are a complicated and valid issue of their education and the medico-education community. Lastly, the academic performance of pupils in medical school and sleep problems present a multi-faceted and complex relationship.

Keywords: medical students, academic performance, Sleep disturbance

1. Introduction

1.1 Background

As per[1], sleep disturbance is the problem very prevalent all over the world, and there is unfortunately the unacceptably high rate of the academic community and this includes medical students. The stressful nature of medical school training which features finding time to study, attending classes, and having clinical shift, pushes students into irregular and disrupted sleeping patterns. In recent times, a viewpoint on the rising load of patients in Pakistan particularly the students of medical college has become the most discussed issue due to the high probability of sleep disturbances. This study is aimed at the detection of epidemic outbreak brought about by sleep dysfunction among medical students from several universities in Pakistan, through the cross-sectional study approach using a questionnaire-based method.

The sleep is a physio-process, which is of a fundamental character in order to preserve physical health, cognitive function and overall the man's wellbeing[2]. Higher academic demands as well as social diversity may distort the students' sleep pattern and contribute to the emergence of sleep disorders (Insomnia, restless legs syndrome, sleep apnea, etc.) which is very common among medical students. According to[3], the disruptions deteriorate the integrity of sleep as well as its duration yet also negatively impact academic results, mental state, and work productivity.

There are several research involved the sleep disturbances among medical students demonstrated by international study. A study held in the USA shows that more than 60% of medical students report having poor sleep quality, and association chains link sleep disturbances to not only depression, burnout, but also poor academic performance[4]. Likewise, investigation from India brought the prevalence of sleeping disturbances from 18% to 58% among medical students, thus underscoring an enormous burden of disordered sleep in this population[5].

The importance of “sleep on health” cannot be overstated. A restful night's sleep allows the body to repair itself, enabling a person to feel rejuvenated and prepared to face the day[6]. However, a large number of individuals struggle with sleep, which prevents them from obtaining the required rest. The amount of sleep we require differs by age and between individuals. Most adults need seven to nine hours of good sleep every night. However, around 62% of adults around the world say that they don’t sleep properly[7].

Sleep disturbances, also known as sleep–wake disorders are problems with the quality, quantity, and timing of sleep that cause disturbances during the day and functional impairment. Sleep-wake disorders are frequently associated with several physiological, psychosocial, and emotional disorders like anxiety, depression, and neurocognitive disorders. Sleep disturbance can occur in various manifestations involving insomnia being the most common. Other sleep-wake disorders besides obstructive sleep apnoea, parasomnias, narcolepsy, and restless leg syndrome are many others[8].

Lack of sleep, sleep deprivation, and sleep disturbance have been associated with increased incidence of sleep paralysis[9]. Sleep disturbance is also associated with migraine, headaches, tension, and depression, which can cause high levels of uric acid and blood sugars in serum. Sleep disturbance has been mildly found to be associated with restless leg syndrome (RLS)[10].

Students generally have poor sleeping habits and it has an impact on their academic performance, however, this is not often acknowledged by them. A vast majority of the students sleep late on weekends to make up for lost sleep during the week. However, this is not a healthy or effective fix for sleep deprivation[11]. Sleep disturbance and insomnia might be a deterrence to concentration during studying and hence low academic performance in university students[12]. Students with sleeping difficulties show high levels of mental stress and burnout affecting their academic as well as psychosocial lives[13]. Too many college students, the problem of poor sleep quality is a real issue with 60% among them having poor sleep quality[14]. These surveys only paint a particular aspect of the global poor sleep and its adverse effects on health. According to several studies, university-level

students from various countries sleep less than 7 hours every night. The statistics are much worse when narrowed down to medical students who are under acute stress because of their rigorous academic and professional demands[15]. Studies conducted in resource-poor nations have also concluded that 32.5-76% of medical students had inadequate sleeping patterns. Sleep disturbance among undergraduate medical students in Pakistan is nothing different and deteriorating. Studies have demonstrated that proper sleep in medical students is not only associated with good mental and physical health but also contributes to good academic performance[16].

With regards to Pakistan the studies focused on sleep interruptions have not been carried out publically to know the level of sleep disturbance in medical students from the large sample. Nevertheless, the findings presented by the researchers studying sleep disturbances and patterns in healthy Pakistanis indicates a high prevalence and relationship with the negative effects. Pakistan university students' recent survey, which mainly focused on the sleep quality, stated that about 70% of the respondents had poor sleep, with academic stress specific to number one contributing factor[17]. Also, a cross sectional study was done in Karachi, Pakistan, which reported high incidences of insomnia symptoms among adults plus the associated psychological distress as well impaired quality of life[18]. Although these studies provide indispensable insight into sleep disorder in the Pakistani context, there has been little work done on subject specific to this population with this struggling common problem. As given the challenging curriculum and nature of medical learning in Pakistan, thus it will be important to have in view the population, the determinants, and the outcomes of sleep disorders among the medical students completely[19]. Factors of sleep disruptions and their impacts on the academic performance and mental health of young people will be understood in order to create tailored interventions that can help students cope with good sleep habits[20].
To begin with, the end point of the discussion means addressing the sleep disturbances in the medical students of Pakistan. This study will be using the cross-sectional survey approach to look at the factors which contribute to the sleep disturbances and associated health outcomes of medical students in Pakistan, so that evidence-based strategies for promoting sleep health and academic success will be developed[21].

1.2 Problem Statement

There is an emerging epidemic of sleep disruption among Pakistani medical students. The last few decades have observed an increasing frequency of prevalence rates for sleep disorders in this age group that affects their studies, psycho-spiritual state, and overall physical health[22]. Initially, understanding the root causes of this problem is important since knowledge about underlying factors that magnify sleep disturbances will help solve current challenges for medical student’s sleeping disorders.

1.3 Rationale

According to[23], medical students are unnecessarily put under stress due to tight academic work, clinical duties, and personal obligations. Although sleep disturbance does more than destroy cognitive function and learning capabilities, it also leads to a higher risk of burnout as well as mental health disorders. Through researching sleep disturbance in this population, the scope and determinants of it could be established. It will help discover specific stress factors for medical students to organize effective interventions destined to improve their sleeping behavior as well as psychological development.

1.4 Aim and Objectives

This study aims to investigate the prevalence and causes of sleep disturbance in Pakistani medical students and their sensitivity to help overcome the damaging consequences. The following objectives were covered in this aspect:

- To determine factors associated with poor sleep among medical students

- To determine the association between sleep problems and the academic performance of medical students

1.5 Research Questions

The following questions were covered to achieve the research aim:

1 What are the factors associated with poor sleep among medical students?

2 What is the association between sleep problems and the academic performance of medical students?

2. METHODS

2.1 Study Design

The cross-sectional, descriptive design was used to give the current situation of prevalence and factors related to sleep disturbance among students belonging to Punjab state in Pakistan. Such sampling allows to gathering of data from a considerable cohort of medical students attending different years[24]. Thus, by evaluating sleep characteristics and associated variables simultaneously, the study provides inferences about correlations and trends that would give insights to researchers into a state of contemporary wellness among this population regarding healthy sleeping.

2.2 Sampling Technique

With the aid of a non-probability purposive sampling technique, participants who fulfilled certain criteria established in relevance to research objectives were selected. The sample for this particular study is medics studying in different academic years across the province of Punjab, Pakistan. This deliberate focus on sleep disorders within the medical student community ensures that such a study is conducted group allows deep analysis of sleeping problems among people who are still at the prime age to help in reducing their risks as well[25].

2.3 Sample Size

The research samples a reasonable population of 500 medical students to reveal the substantial relationship between sleep disruptions and academic performance. Through including a substantial sample, this study aims to increase the generalizability of the results to the medical student population in Punjab, Pakistan, and also improve reliability while analyzing sleep-related patterns and determinants. A 500 sample size was defined employing statistical method i.e. the Cochrane formula that taken into account the desired precision level, expected effect size and required statistical power for detecting variations and associations meaningfully[26]. Inclusion of a broad sample allows for the extraction of generalizable results to the medical students as well thereby increasing the reliability.

2.4 Study Setting

The study was conducted in the medical set up out of medical college and universities of Punjab, Pakistan’s The multiple-site assignment and rotations ensure the presence of a wide pool of medical students from many academic institutions so as to cover regional diversity in the teacher-student relationship and socio-demographic setup.

2.5 Study Duration

The data collection procedure that the research operates in consumes two months and offers medical students to generate proper responses as sample population participants on the basis of time. This time schedule aids in that the distribution of the survey tool, collection of data and the analysis of the information are well done at the beginning to avoid problems that may arise from long periods. The task is carried out with a high level of discipline as per the required time and feasibility for disclosure of the evidence in context this knowledge may be used in academia and public policy.

2.6 Inclusion Criteria

The standard for selecting a participant is almost the same as the MBBS students in the different institutes of medical colleges with different academic years such as first year to final year in Punjab, Pakistan. This criterion guarantees the involvement of medical students from various stages of clinical education, allowing for a systematic evaluation both regarding the physiological prevalence and factors associated with sleep disturbance at all educational levels. In terms of the range, by including students at different levels of education it is possible to reflect differences in stressors underlying academic environment and sleep-related practices relevant for each stage of medical training.

2.7 Exclusion Criteria

The non-medical students were excluded from the research. The criterion of exclusion guarantees that the results are unique to the target population, thus eliminating confounding aspects and improving internal validity in interpreting study outcomes. Besides, exclude the selected cohort based on some psychiatric illness or those who are taking any medicine that cause sleep disturbance.

2.8 Data Collection Procedure

For variable – academic performance was used to gather data from medical students in Punjab, Pakistan adapted [32]. However, an Alberta Medical Association Sleep Disruption questionnaire was also adopted to measure sleep problems/disruptions among participants. The questionnaire was distributed through diverse digital platforms making it reach a broad range of the target audience. Through online data collection, it becomes very easy to collect a sufficient amount of information at an appropriate time from the respondents as they can answer survey items whenever convenient for them thus ensuring anonymity and confidentiality[27].

2.9 Data Analysis Procedure

All empirical data generated from the online questionnaire was processed using SPSS software v 23. Descriptive statistics, correlation analyses, and regression models were used to investigate relationships between sleep disturbance and academic results/performance. Using this analytical approach helps to find major predictors of sleep disturbance among medical students such interventions and policy recommendations that can improve the state of their sleep health are proposed.

2.10 Ethical Considerations

During data collection; ethical approval was permitted from the Research Ethics Committee at Shalamar medical and dental college, Lahore. The study follows ethical practices such as free and willing participants, respect for privacy imposed by anonymity, and securing information online using the signature question. Participants are informed regarding the motif of research, their rights as participants, and measures taken to maintain confidentiality. Ethical issues also encompass provisions for the participants' withdrawal at any stage of the study while respecting their autonomy and supporting ethical integrity from all perspectives throughout[28].

2.11 Deliverables/Outputs

The main deliverable of the study is a manuscript targeting publishing into highly rated journals. The manuscript will provide a synthesis of the research findings including prevalence rates of sleep disturbance among medical students in Punjab Pakistan and data about causal factors and implications associated with both their medical education aspect as well as public health. Dissemination of findings through publication enhances the academic debate, reflects evidence-based practices, and shapes future research aimed at solving sleep-related problems among medical students.

3. RESULTS AND DISCUSSION

3.1 Findings and Analysis

3.1.1 Demographics

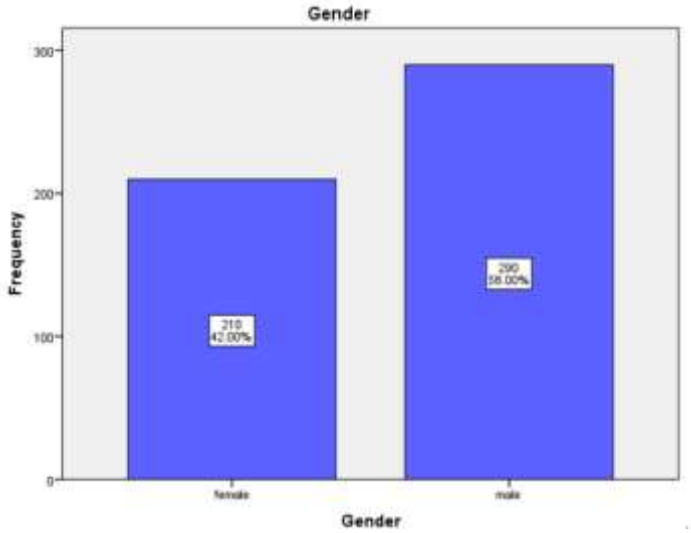

Figure 1: Gender

The results in Figure 1 provide effects on the gender distribution of the sample population, including a total of 500 individuals. In this sample,42% are female totaling 210 individuals, while the remaining 58% are male, constituting 290 individuals.

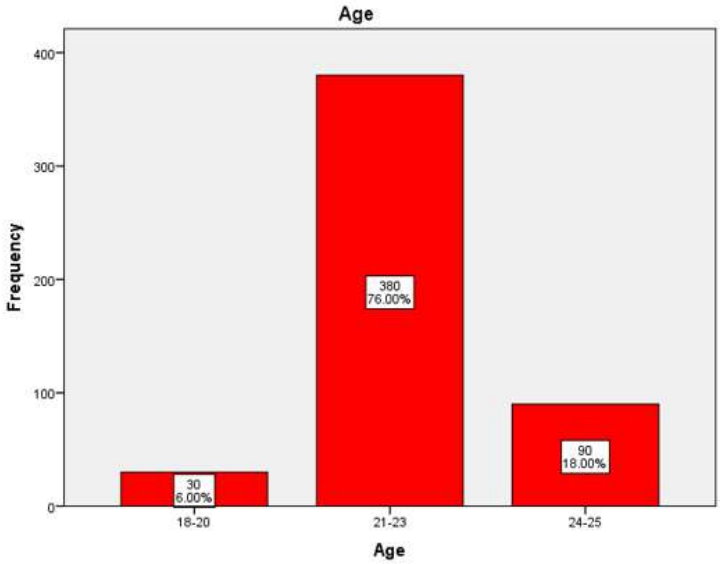

Figure 2: Age

Figure 2 provides the current distribution of age groups within the sample population totaling 500 individuals. The majority of the people fall within the age range of 21-23 years old, starting with 76% of the sample, with a frequency of 380 individuals. Resulting in the age group of 24-25 years signifies 18% of the model with 90 individuals. Finally, the age group of the youngest, 18-20 years covers 6% of the sample, with the frequency of 330 people.

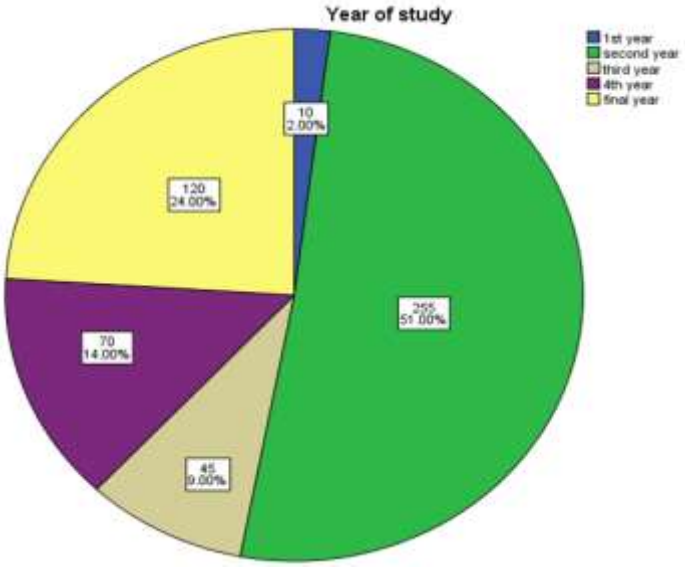

Figure 3: Year of Study

Figure 3 provides insights into the distribution of the pupils across different academic years. In this sample, the mainstream of the students is in the 2nd year and 51% of the total with a frequency of 255 students. The subsequent data of the students are in their last year to create the significant portion, showing 24% of the data, with 120 individuals. Moreover, in other academic years, the number of students is fewer but still significant. Of the sample the third-year students comprise 9% of the data totalling 45 individuals, while 4-year students make up 14% of the sample, with 70 individuals, the first-year group is the smallest presenting the sample of only 2% with the frequency of 10 individuals.

3.1.2: Frequency Analysis

Table 1: Frequency Table of all the Questions

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q1: My overall academic performance in the past semester has been satisfactory.	2%	2%	8%	45%	43%
Q2: When I experience sleep problems, I notice a decline in my grades or academic achievements.	2%	0%	16%	51%	31%
Q3: I find it challenging to concentrate on my studies due to sleep-related issues.	2%	0%	16%	51%	31%
Q4: Poor sleep quality significantly affects my academic performance.	4%	1.8%	21%	47.8%	25.4%
Q5: Poor sleep quality significantly affects my academic performance.	0%	5%	12%	58%	25%
Q6: Feedback from instructors or peers often suggests a correlation between my sleep patterns and academic performance.	2%	0%	17%	56%	25%
Q7: Addressing my sleep problems could potentially lead to improvements in my grades or academic achievements.	2%	0%	16%	61%	21%
Q8: Do you have trouble falling asleep?	11%	7.8%	20.2%	39.4%	21.6%
Q9: Do you take anything to help you sleep?	9.4%	22.2%	33.8%	23%	11.6%
Q10: Do you have any medical conditions that disrupt your sleep?	9.8%	20.2%	24%	30.2%	15.8%

Q11: Have you lost interest in hobbies or activities?	2%	2%	9%	43%	44%
Q12: Are your legs restless and/or uncomfortable before bed?	26%	9.6%	21.4%	36%	7%
Q13: Do you have any unusual behaviors or movements during sleep?	4%	28%	18%	49%	1%
Q14: Do you have trouble staying asleep?	2%	55%	17.6%	25.4%	0%
Q15: Do you use alcohol to help you sleep?	17.6%	25.2%	32.6%	19%	5.6%
Q16: Do you feel sad, irritable, or hopeless?	17.6%	25.2%	32.6%	19%	5.6%
Q17: Do you feel nervous or worried?	4%	28%	18%	49%	1%
Q18: Do you think something is wrong with your body?	4%	28%	18%	49%	1%
Q19: Are you a shift worker or is your sleep schedule irregular?	3%	24.2%	15.4%	56%	1.4%
Q20: Have you been told that you are restless or that you kick your legs in your sleep?	4%	28%	18%	49%	1%
Q21: Do you have any unusual behaviors or movements during sleep?	4%	28%	18%	49%	1%
Q22: Do you snore?	2%	0%	16%	61%	21%
Q23: Do you have difficulty staying awake during the day?	4%	28%	18%	49%	1%

3.1.3 Reliability Statistics

The reliability statistics gives the Cronbach's Alpha coefficient, the reliability of the internal measure, for the set of items. The Cronbach's Alpha ranges from 0 to 1, in which the values closer to 1 show greater internal consistency in the items. The number of .882 in Table 1 shows a strong relationship between the academic performance and sleep problems of Pakistani medical students, signifying the measure of the same underlying concept.

Table 2: Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.882	2

3.1.4 Descriptive Statistics

The sample population of 500 people in descriptive statistics shown in Table 2 has two variables: "Academic Performance of Medical Students" and "Sleep Problems among Medical Students" In the "Academic Performance of Medical Students," the standard deviation of .57611 and a mean of 0.879 the data ranges from a minimum 1.00 to maximum of 4.00. The value of 0.532 shows a moderate skewness, showing that data is a little skewed to the left. Furthermore, the value of kurtosis is -1.198 showing that the distribution is leptokurtic, meaning it has relatively heavy tails related to a normal distribution.

Similarly, for "Sleep Problems among Medical Students," the data ranges from a minimum of 1.00 to a maximum of 5.00, with a mean of 2.6980 and a standard deviation of 1.13197. The skewness value of 0.114 also indicates a moderate skew, similar to the academic performance variable. However, the kurtosis value of -0.767 suggests a slightly less heavy-tailed distribution compared to the academic performance variable.

Table 3: Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AcademicPerformanceofMedicalStudents	500	1.00	4.00	2.6640	.87900	.532	.109	-1.198	.218
SleepProblemsamongMedicalStudents	500	1.00	5.00	2.6980	1.13197	.114	.109	-.767	.218
Valid N (listwise)	500								

3.1.5 Correlation analysis

The correlation analysis conducted between "Academic Performance of Medical Students" and "Sleep Problems among Medical Students" reveals a strong positive correlation coefficient of .752, which is statistically significant at the 0.01 level (2-tailed) (Refer to table 3). This indicates that there is a notable relationship between these two variables. The positive correlation suggests that as one variable (academic performance) increases, the other variable (sleep problems) tends to increase as well, and vice versa. In other words, medical students who experience higher levels of sleep problems are likely to have lower academic performance, and those with better academic performance may experience fewer sleep problems. Overall, this correlation analysis provides valuable insights into the relationship between academic performance and sleep problems among medical students, highlighting the interconnectedness of these variables and the need for holistic approaches to support student success and well-being.

Table 4: Correlation

Correlations

		AcademicPerformanceofMedicalStudents	SleepProblemsamongMedicalStudents
AcademicPerformanceofMedicalStudents	Pearson Correlation	1	.752**
	Sig. (2-tailed)		.000
	N	500	500
SleepProblemsamongMedicalStudents	Pearson Correlation	.752**	1
	Sig. (2-tailed)	.000	
	N	500	500

**. Correlation is significant at the 0.01 level (2-tailed).

3.1.6 Regression analysis

The provided data in Table 5 presents the results of a regression analysis examining the relationship between "Sleep Problems among Medical Students" and "Academic Performance of Medical Students." The model summary indicates that the predictor variable, "Sleep Problems among Medical Students," accounts for 52.3% of the variance in academic performance, as reflected by the R-square value of .523. It shows that there is a correlation between the night sleep and academic performance up to 53.1% for standing student. The R-squared of the model was also adjusted to reflect the number of predictors. The adjusted R-squared still lies at .531.

The final ANOVA table supplies additional evidence of the regression model's superiority with a massive p-value of .0001, which projects an extremely significant F-statistic of 304.154. That means the overall regression model, including the presence of sleep problems as the predictors of academic performance, is the statistically significant one. Viewing the coefficients, naturally, the unstandardized coefficient (B) stands as .760; thus, every unit rise in sleep problems, according to this prediction, denotes an increase in academic performance by .760 points. The estimated coefficient for

it is highly significant in statistical terms ($p < .0001$), thus, sleep problems are a major contributing factor in stress among the med student. In conclusion, the regression analysis suggests that sleep problems among medical students are a strong predictor of academic performance.

Table 5: Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.650[a]	.523	.531	.43824

a. Predictors: (Constant), SleepProblemsamongMedicalStudents

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	69.975	1	69.975	304.154	.000[b]
	Residual	95.642	498	.192		
	Total	165.617	499			

a. Dependent Variable: AcademicPerformanceofMedicalStudents

b. Predictors: (Constant), SleepProblemsamongMedicalStudents

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.966	.163		6.263	.000
	SleepProblemsamongMedicalStudents	.760	.040	.650	17.188	.000

a. Dependent Variable: AcademicPerformanceofMedicalStudents

3.2 Discussion

The sleep problems of medical students are a complicated and valid issue of their education and medico-education community. Medical student's life is framed with the urgency of medical education, and more intensively multicentre rotations, clinical rounds, and exams frequently cause sleep disturbance. This relationship is one of a key issues in devising interventions which wield the students' well-being, and enhance their performance in learning.

Academic achievement embraces a complex notion, which can be broken up into several components like student's grades, test scores, and conduct at work place and in clinical setting. "Disturbed sleep" describes the disorders with taking a long time to fall asleep or prolonged waking up at night, poor sleep quality or the excessive daytime sleepiness[29]. Many years of research established undeniable link between inadequate sleep, in favour of study time, and poor academic performance among medical students.

On the contrary in several cases study people the connection between sleep and academic performance of medical training and education has been investigated. For instance, a group of researchers[30] have found out that medical students with sleeping disorders are more prone to be academically achievement-oriented than those who practice proper sleeping habits. Just like the study by[31], a meta-analysis discovered also that sleep difficulties are seen connected to lower grades of medical students. There are many issues that may impact the sleep hygiene of medical students. Besides the gruelling study load, sleepless nights, erratic schedule, and a high-stress later, these are some of the main enemies of their wellbeing. Further, the prevalence of problems like insomnia, sleep apnea, and restless leg syndrome is widely documented among them as prevalent as that of normal population. In addition to that, sleeping before the bedtime electronic devices usage and variable sleep patterns enhance sleep disorders among students. In spite of an increasing number of researchers who support

the idea that poor sleep running students' performance low, working on this problem is still very underdeveloped. Nevertheless, there have been adopted various means of defending personal health which will help students sleep better during the course in the medical university. These include the educational programs that inform on the sleep hygiene, stress management techniques, relaxation exercises, as well as thoughts directing. In addition to it, putting in place policies on reducing excess workloads, giving access to mental health services and preparing a studying environment which is conducive can also be used in the curvature of sleep problems among the students.

The function of social support that serves to neutralise the effects of disruptive sleeping on student's academic performance should be studied too. The researcher suggested that having adequate support networks, both peer support, family support, and mentorship, could be very beneficial to medical students who can turn to other people in times of stress and help improve their sleep quality. Supplementary, building on the medical education culture of collaboration, teamwork and camaraderie can help students' mental health improve and make them more successful academically. Lastly, academic performance pupils in medical school and sleep problems present a multi-faceted and complex relation. Although research continues to confirm a broad negative relation of these two variables, a more powerful approach is to consider all the obstacles that are specific for medical students. Medical schools can have such interventions as health sleep routines, stress management, and socializing which are aimed at supporting mental health and academic excellence among the medical students. Finally, progress in this direction requires continuous research so as to delineate the intricate mechanisms involved as well as to come up with more successful coping approaches.

3.3 Limitations and Future Directions

One of the limitations that can be noted in this study is it would mainly rely on self-reported data which may also have a challenging effect due to recall bias and social desirability response. Also, the cross-sectional design restricts a cause-and-effect association between sleep problems as well as academic performance. Longitudinal studies in future research might help track the variation over time of sleep and academic performance variables, thus strengthening the validation of their temporal relationship. Additionally, researching the efficacy of solutions aimed at improving sleep quality and academic performance among medical trainees would provide useful knowledge regarding what works in addressing challenges linked to poor sleeping patterns within this population. Additionally, investigating cultural and contextual determinants associated with sleep health as well as the latter's impact on academic performance among medical students representing various backgrounds might increase both the generalizability of findings to other settings and populations.

4. Conclusion

4.1 Conclusion

The research was able to identify several predictors of poor sleep among medical students in Punjab, Pakistan including academic load, stress levels both in home and school environments as well as lifestyle. However, among the medical students that studied were high academic stress levels, lack of appropriate sleep hygiene, and irregular sleeping patterns. These results highlight the multi-factoriality of sleep difficulties in this population and point out the importance of managing modifiable factors to enhance good quality sleep. The findings showed a strong relationship between poor sleeping and the performance of medical students. In particular, as compared to the other students who had better sleep quality; those with disturbed sleep patterns performed worse in terms of academic performance. Whatever adjustment was made for the potential confounders, this association remained indicative and demonstrated a harmful role of sleep problems on educational outcome measures in medical education.

In summary, the findings of this study appear to proclaim that there is a need to highlight the importance of healthful sleeping in medical education settings. Responding to the recognized risk factors and utilizing interventions aimed at improving sleep quality can improve studying in general, reduce damage from poor grades as well as promote student welfare. This has direct relevance to the

way curricula are structured, student support services provided and public health initiatives directed at creating an optimal learning conducive environment as well as improving the holistic personality development of students in medical education.

4.2 Recommendations

To cope with the new outbreak of sleep disorder in Punjab among medical students, several recommendations are given below. First and foremost, it is paramount to induce holistic sleep education curricula into the medical curriculum. These programs should highlight the significance of implementing good sleep patterns, coping with stress as well as identifying consequences that arise with academic performance and general health from lack or insufficient quality overnight rest. Second, there is a compelling need for institution-wide wellness activities customized to meet the needs of medical students. Such programs should offer easy availing of assistance-oriented amenities and services that are aimed at encouraging mental health, reducing stresses, healthy life conductors, etc. Moreover, academic support structures should be reinforced to provide tutoring, counselling as well time management courses which will help the students deal with their study-related problems and promote better sleeping practices.

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