Original article

Relation of Indices of Stress with Degree of Insomnia and with Indicators of Academic Performance in Undergraduate Medical Students of Multan

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ABSTRACT

Background: Studying medicine is quite challenging as medical students have to study hours and hours which leads to continuous psychological stress resulting in decrease in sleep duration and quality. This study aims to determine the prevalence as well as the relationship of academic stress and pattern of sleeping problems among medical students.

Methodology: In this cross-sectional comparative study, 128 non-obese medical students (calculated via WHO software) from First Year to Final year (18 -23 years old, BMI=18.5-24.9) were included and divided into 2 groups, with equal distribution of male and female undergraduate students, as non-stressed (K10≤19) and stressed (K10>19) medical students. Kessler Psychological Distress Scale (K10), Pittsburgh Sleep Quality Index Scale (PSQI) and percentage of Professional Examination Result were used to assess stress, sleep quality and academic performance, respectively. The collected data was analyzed using IBM SPSS-26 for normality distribution via Shapiro- Wilk and Kolmogorov Smirnov tests.

Results: PSQI scores were less in the stressed [8.5(3—17)] as compared to non-stressed [6(1—17)] subjects (p=0.000) while academic score (percentage) in stressed [70.9(59—77)] was lesser than that of non-stressed [76.7(57—86)] subjects (p=0.000).Within the non-stressed subjects, K10 scores were positively correlated to PSQI scores (rho=0.294, p=0.018) and negatively correlated to academic score (rho= -0.319, p=0.010). Similarly in the stressed subjects there was a positive correlation between K10 and PSQI scores (rho=0.435, p=0.000) and a negative correlation between K10 and academic scores (rho= -0.251, p=0.045).

Conclusion: Both, sleep quality and academic performance, reduces with increase in stress among non-obese medical students.

Keywords:

Stress, non-obese, medical students, sleep quality, academic performance.

INTRODUCTION

Medical profession is a stressful and hectic job, but studying medicine can also be quite challenging as medical students have to work more hours than students in other professional programs due to stressors like high workload, extensive academic curriculum and constant fear of failure.[1] The ranges of stress and anxiety among medical students span a staggering high percentage from 44% to 74.2% according to different studies.[2] Similarly, the indices of insomnia ranged from 9.4% to 56.7% in a study conducted in Poland and 68.8% in Hong Kong.[3] Adequate amount of sleep plays a significant role in physical and mental health as well as in the cognitive powers. Different studies conducted in India, Australia and the United States reflect that students with poor sleep quality tend to show poor academic performance and were found to be more depressed than their fellow counterparts.[4]

Sleep, probably the most significant sedentary function of human body, plays a crucial role in mental health, proper functioning of body and a good quality of life.[5] In reference to a study conducted on medical students in Morocco in 2018, a poor sleep quality determined by PSQI ≥5 was related to poor academic score at the end of the study year.[6] A very important triggering factor for insomnia is psychological stress which also has a bidirectional association with poor sleep quality. This association represents a vicious cycle which is strongly related to adverse mental health problems. A strong association is also found between poor sleep quality and dysregulation of human metabolism.[7] Pakistan offers a 5-year-long Bachelor of Medicine and Bachelor of Surgery (MBBS). Medical schools in Pakistan use conventional teaching methods such as teacher centered pedagogic techniques, lengthy lectures, long tutorials, and hectic practical tasks. Students are continuously being assessed with oral, written and practical

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examinations that spans the whole year followed by the final Professional Examination, lasting more than a month, conducted by the University of Health Sciences in Lahore.[8]

The rationale of this study is to evaluate the correlation between the sleep disturbances and academic performance and the relative stress caused by it. The study aims to determine the prevalence as well as the relationship of academic stress and pattern of sleeping problems among medical students.

SUBJECTS AND METHODS

This cross-sectional comparative study was conducted at Nishtar Medical University, Multan for 2 months from November and December 2022. Sample size was calculated for the primary outcome of this study which is a discrete variable using population size of 1657 medical students, a 95% confidence level and a 5% margin of error. The calculated sample size was 128 using the WHO software, 'Sample size determination in health studies _A practical manual Version 2.0.21. [9] On the basis of simple random sampling, one hundred and twenty eight (128) age (18-23) and BMI matched non-obese (BMI 18.5-24.9) medical students from First Year to Final Year MBBS (both male and female) were included in this study setting as obesity is known to be a confounding factor in the study setting of stress and insomnia. One hundred and seventy (170) responses were gathered, out of which 101 responses belonged to the category of stressed (K10>20) and 69 responses belonged to the category of non-stressed (K10<20) undergraduate medical students.

Total 37 stressed and 5 non-stressed responses out of a total of 42 from both categories were disqualified due to the exclusionary criteria which includes obese medical students (BMI > 24.9), students with a previous history or family history of psychiatric ailment, students taking recreational or psychostimulant drugs and students with history of any kind of endocrine disorders were excluded from the study. The subjects of the study were divided into two equal groups with equal distribution of both male and female medical students. Group A consisted of 64 non-obese, non-stressed (BMI < 24.9, K10 < 20) medical students, while Group B comprised of 64 non-obese, stressed (BMI <24.9 K10> 20) medical students. Obese medical students (BMI > 24.9), students with a previous history or family history of psychiatric ailment, students taking recreational or psychostimulant drugs and students with history of any kind of endocrine disorders were excluded from the study.

The study questionnaire consisted of five sections: (1) Demographics, (2) consent form, (3) Academic performance, (4) Kessler Psychological Distress Scale (K10) and (5) Pittsburgh Sleep Quality Index (PSQI). The demographics consisted of name, age, gender, height, weight and BMI. Weight and height were measured on the spot via portable weighing machine (in kg) and portable height measuring board (in m) respectively, then BMI was calculated using standard formula. Written consent in both English and Urdu were taken from the participants. Academic Performance was based on the result of last Professional Examination from the official website of University of Health Sciences (UHS) Lahore. Kessler Psychological Distress Scale (K10) was used to calculate the levels of non-specific psychological stress. It has a Cronbach's alpha of 0.84.[10] The K10 scale involves 10 questions about emotional states each with a five-level Likert response scale (minimum score being 10 and maximum being 50). The measure can be used as a brief screen to identify levels of distress. Participants who scored 20 or more were considered stressed. Sleep quality and patterns were inferred with Pittsburgh Sleep Quality Index (PSQI). It has a Cronbach's alpha value of 0.83.[11] PSQI differentiates "poor" from "good" sleep quality by measuring seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the last month. All the seven components are added together to get a Global PSQI score. Each component has a score between 0 and 3, and the Global score, ranging from 0 to 21. The collected data was analyzed using IBM SPSS-26 for normality distribution via Shapiro- Wilk and Kolmogorov Smirnov tests. Majority of the study parameters were non-normally distributed and hence non parametric tests were applied for further analysis. Mann-Whitney U Test was applied to compare [Median (IQR)] scores of sleep quality and academic performance of both groups, while Spearman's *rho* correlation was used to derive correlations between K10 scores, PSQI scores and Academic Performance scores.

RESULTS

Anthropometric characteristics of both the study groups have been given in Table 1. The PSQI scores of Group B subjects were higher (p=0.000) than PSQI scores of Group A subjects while academic performance (AP) of Group B subjects was lesser than academic score of

Table 1: Anthropometric characteristics of Group A and Group B.

Parameter	Group A (non-stressed) n=64	Group B (stressed) n=64
Age (year)	22 (1.00)	22 (0.00)
Height (m)	1.64 (0.13)	1.64 (0.16)
Weight (kg)	58 (13.7)	60 (9.00)
BMI*	21.8 (365)	22 (3.68)

*Body Mass Index

Table 2: Comparison of PSQI scores and academic performance scores of Group A and B.

Parameter	Group A (non-stressed) n=64	Group B (stressed) n=64	*P*
PSQI*	6.00(4.00)	8.50(5.00)	0.000
Academic performance	76.75(5.55)	70.95(7.98)	0.000

*Pittsburgh Sleep Quality Index

Table 3: Correlation of PSQI scores and academic performance within Groups A and B.

Parameter	Group A (non-stressed) n=64		Group B (stressed) n=64	
	rho	*p*	*rho*	*p*
PSQI*	0.294	0.018	0.435	0.000
Academic performance	-0.319	0.010	-0.251	0.045

*Pittsburgh Sleep Quality Index

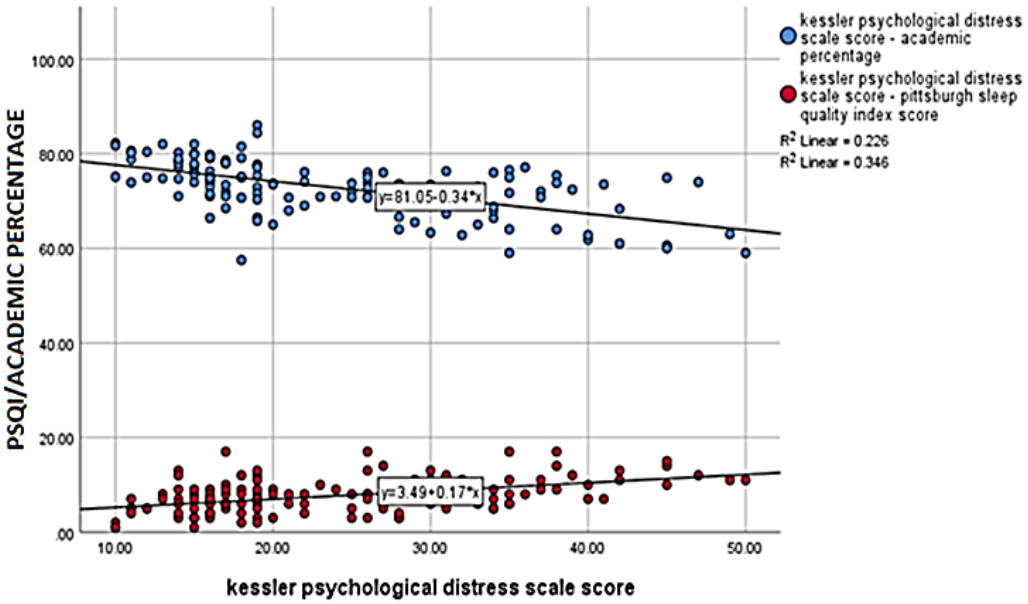

Figure 1: Simple scatter of Pittsburgh sleep quality index score, academic percentage score by Kessler psychological distress scale score.

Group A subjects (p=0.000). This comparison, drawn through application of Mann-Whitney U Test has been represented in Table 2. Within the non-stressed subjects, K10 scores were positively correlated to PSQI scores (*rho*=0.294, *p*=0.018) and negatively correlated to academic score (*rho*= -0.319, *p*=0.010). Similarly in the stressed subjects there was a positive correlation between K10 and PSQI scores (*rho*=0.435, *p*=0.000) a negative correlation between K10 and academic scores (*rho*= -0.251, *p*=0.045) as per calculated using Spearman's *rho* correlation. (Table 3). A correlation of stress with academic score and sleep quality in whole study population is represented in Figure 1.

DISCUSSION

The prevalence of stress in medical students of Nishtar Medical University, Pakistan is 63.3% which is in line with the studies conducted in Lebanon (62%) and USA (57%).[15,16] Moreover, the prevalence of poor sleep quality is 71%. Similar results were found in Hong Kong (68.8%)[3] and Pakistan (77%).[7] The PSQI scores and Academic Performance scores of the non-stressed

Group A individuals were significantly lower and higher, respectively, as compared to their significant counterparts of the stressed Group B individuals.

These findings support the hypothesis that psychological distress, sleep quality, and relative academic performance are significantly correlated. The findings are consistent with our hypothesis as well as with earlier research on this subject.[2-4,7] According to a cross-sectional study done at Universitas Indonesia, university students who have poor sleep quality have a 4.7 times greater chance of experiencing stress[12], and the relationship holds true the other way around as well. Comparing the academic performances in the aforementioned groups, stressed individuals (Group B) tend to perform poorer academically as compared to non-stressed individuals (Group A) due to the fact that academic stress leads to the activation of sympathetic overactivation affecting the normal neuronal circuitry of nocturnal sleep that in turns leaves students with a tiresome mind and less hours to study as the mind tends to rest in the working hours of the day leading to less than required time to study effectively.[13,14] Within the individual study groups, PSQI scores are positively correlated and AP scores are negatively corelated respectively with indices of stress i.e. K10 scores. The autonomic sympatho-adrenal system and the hypothalamic-pituitary-adrenal (HPA) axis are thought to be the main neuroendocrine systems that are activated by stress, which accounts for the deteriorating effect of psychological distress on poor sleep quality. These two systems coordinate a detrimental effect on sleep pathways through a complicated interplay with various other neuroendocrine systems.[13]

This study plays a significant role in highlighting serious factors like psychological distress and poor sleep quality affecting the academic performance in medical students, in a region like South Asia where there are only a few, if not many studies conducted on the concerned topic. An international review article acknowledges the scarcity of research on stress in Asia and Africa as compared to studies in America and Europe.[16] Additionally, the effect of obesity as a stressor[18] was ruled out due the inclusion of only non-obese medical students in the study.

Although the results of this study as well as previous studies conducted on this topic are in line with the hypothesis, yet this study is far from being perfect. Inferences concerning the causation and temporality of sleeping quality, psychological discomfort, and academic performance are constrained by the cross-sectional study design and the small sample size, and hence, the results cannot be declared generalized. National and international scholars should delve deeply into this subject and carry out more thorough studies including all medical institutes of Pakistan rather than just one medical institute. Due to the limitation of recalling bias, psychometric instruments should be replaced with more objective measures like Heart Rate Variability Analysis (for stress) and Polysomnography (for sleep quality) should be used in future studies.

CONCLUSION

Medical students had a high prevalence of stress and poor sleep, indicating a substantial correlation between the two. The correlation between increasing psychological stress and an increase in sleep disturbance and a decline in academic performance points to an indirect relationship between psychological stress and poor academic performance as well as a direct relationship between psychological stress and poor sleep.

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