ONLINE ISSN :3007-309X
PRINT ISSN :3007-3081

Journal of Medical & Health Sciences Review

ASSOCIATION OF EXCESSIVE SLEEPINESS WITH DEPRESSION AND SUICIDAL THOUGHTS AMONG MEDICAL STUDENTS IN PRIVATE MEDICAL COLLEGES

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ARTICLE INFO

Keywords: Depression, Excessive daytime sleepiness, Suicidal thoughts, Sleep hours, Sleep quality, psychological stress

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ABSTRACT

Depression is a highly prevalent mental health condition affecting millions worldwide, including medical students who face unique stressors. This study aimed to assess the relationship between excessive daytime sleepiness and depression among medical students in various institutions across Pakistan. A semi-structured questionnaire was administered to 151 medical students. Responses were evaluated using validated scales including the Pittsburgh Sleep Quality Index (PSQI), Patient Health Questionnaire-9 (PHQ-9), Epworth Sleepiness Scale (ESS), and Suicidal Ideation Attributes Scale (SIDAS). Each scale assessed specific parameters such as depression severity, sleep quality, and suicidal ideation. While no statistically significant **direct** association was found between excessive daytime sleepiness and either depression or suicidal ideation, an **indirect** relationship was observed. Notably, poor sleep quality and reduced sleep duration were significantly associated with higher scores on depression and suicidality scales. In conclusion, although a direct link between daytime sleepiness and depression was not established, sleep quality and duration appear to indirectly influence depressive symptoms and suicidal thoughts among medical students.

INTRODUCTION:

Sleep is a normal, reversible and recurrent state of reduced responsiveness to external stimulation that is accompanied by complex and predictable physiological changes (1). Sleep is a very important component of an individual's daily life, and sleep deprivation is associated with a wide variety of diseases (2). Its significance is further highlighted by the fact that it is a key component of lifestyle medicine, which explains how lifestyle factors like diet, exercise, stress management, and sleep impact health and disease. Depression (major depressive disorder) is a serious mood disorder in which person experiences persistent feeling of sadness, hopelessness and loss of interest in daily activities (3). Depression is a very common condition throughout the world, according to the World Health Organization (WHO), about 280 million people worldwide have depression, including 5% of the world's adults and 5.7% of adults above age 60 (4). The National Institute of Mental Health (NIMH) estimates that 21 million U.S. adults had at least one major depressive episode in 2021, which represents 8.3% of the U.S. adult population (5). Despite being so prevalent, 60 percent of the affected individuals don't seek treatment for depression (6). This links it with suicidal thoughts, which is defined as thoughts about self-harm with deliberate consideration or planning of possible techniques causing one's own death (7). Depression has also been linked with psychological stress (8), which is very common among medical students. According to a number of studies, medical students are more likely than the general population and their age-matched peers to experience depression, with overall psychological distress levels being continuously greater (9) (10). Information and input overload, financial debt, a lack of free time, and the pressure to make decisions about one's profession and career are the stressors that are unique to medical school and contribute to the development of depression (11) (12). This also may be associated with excessive daytime sleepiness, which further affects the acquiring and consolidation of knowledge, which is a huge part of the medical curriculum.

Therefore, the objectives of this research are:

Whether excessive daytime sleepiness is associated with either one of variables (depression and suicidal thoughts) or has no association with them. Which of the two variables (depression and suicidal thoughts) has more association with excessive daytime sleepiness. What is the gender distribution affects the link between excessive sleepiness and depression and suicidal thoughts.

Methodology:

A self-administered questionnaire was distributed online via Google Forms, comprising validated standard screening tools alongside demographic data (age, gender, height, and weight). The included measures were the Pittsburgh Sleep Quality Index (PSQI), which assesses sleep quality and duration; the Patient Health Questionnaire-9 (PHQ-9), used to screen for depression; the Epworth Sleepiness Scale (ESS), which evaluates daytime sleepiness; and the Suicidal Ideation Attributes Scale (SIDAS), designed to measure the presence and severity of suicidal thoughts. The study followed a quantitative, cross-sectional observational design.

All the responses collected were assessed by all the scales mentioned above by the following criteria:

PSQI: assesses sleep duration and quality and has seven components, The sum of these components is then used to calculate the ***"global score."*** The global score can range from 0 to 21. A global score of ***5 or less*** is considered ***"good quality sleep,"*** while a ***global score >5*** is considered ***"poor quality sleep."***

PHQ9: assesses the severity of depression. It is comprised of 9 questions, which are given a corresponding score depending on the response of the participant. Participants' responses are given numeric values from 0-3, and then their sum is used to categorize the severity of depression. Possible scores can range from 0 to a maximum of 27. A score of ***10 or less*** corresponds to ***the "normal***," and a score ***>10*** indicates ***pathological depression***.

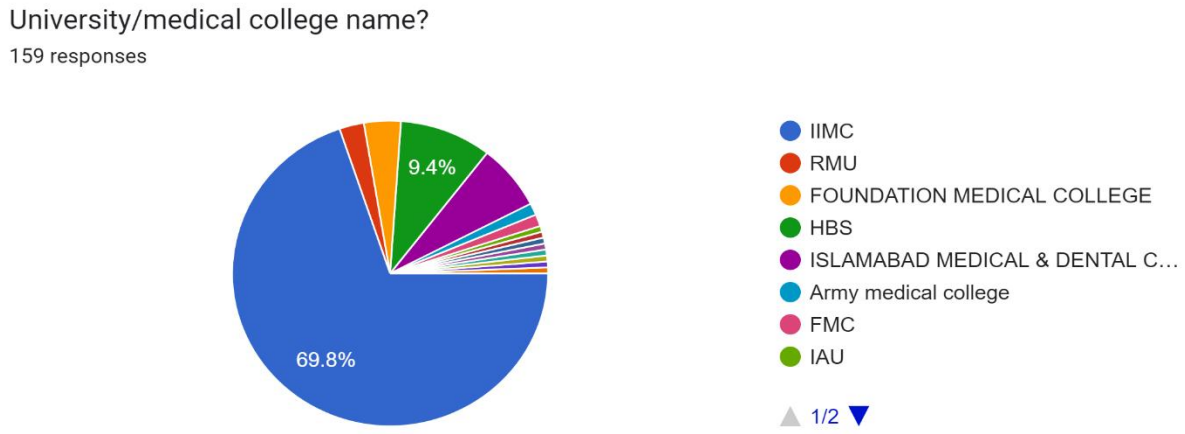
ESS: assesses the subjective daytime sleepiness. It is composed of 8 questions, which are given a corresponding score depending on the response of the participant. Participants rate their chances of dosing-off during certain activities, with each question being graded from 0 to 3 and then summed for a total score. Scores of ***10 or less*** are considered ***normal***, and scores ***>10*** indicates ***excessive daytime sleepiness.***

SIDAS: assess suicidal ideation. It is composed of 5 questions which are given a corresponding score on the response of the participant. Participant responses are given numeric values from 0-10 and their sum is used to categorize severity of suicidal ideation of a participant. A score of ***0*** corresponds to ***normal*** and a score of ***< 21*** indicates ***low suicidal ideation*** and a score of ***> 21*** indicates ***high suicidal ideation***.

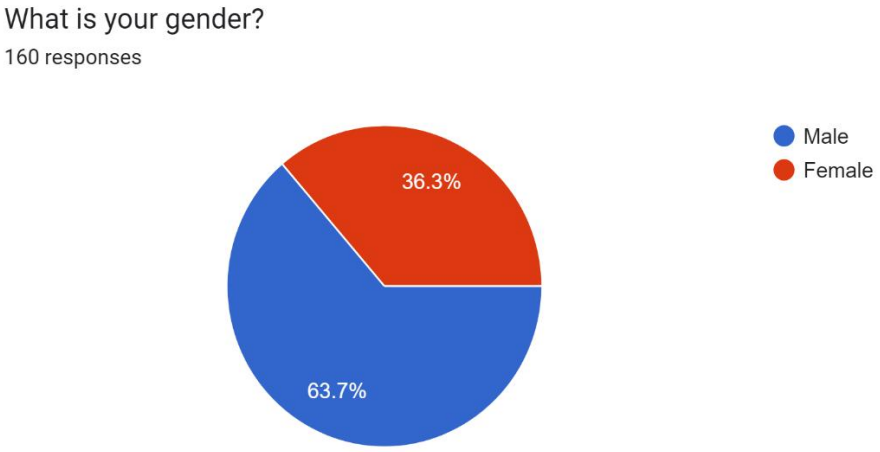
The target population were potential participants i.e. medical students who have either depression or suicidal thoughts or both of them. The Inclusion criteria was undergraduate students of private medical colleges/universities of Rawalpindi & Islamabad aged 18 to 29 years. Exclusion criteria was the students of medical colleges/universities below age of 18 & above age of 29 and students of medical colleges & teachers, students, other people of other schools, colleges, universities and other educational institutions. All candidate participated in this research had given informed consent prior to their participation. A total of 151 participants filled out the questionnaire. Sampling technique utilized in our study is convenience type of nonprobability sampling.

Results:

The participants were from across 8 different medical colleges, with "Islamic International Medical College" having the most people taking part in the research as shown below:



The gender distribution is predominantly females (63.7 %) as shown below:



As for the year of study, 19.4 % participants were from the 1st year, 25 % from 2nd year, 18.1 % from 3rd year, 31.9 percent from 4th year, and the remaining from final year.

The table below shows the descriptive statistics of questionnaires for all the responders:

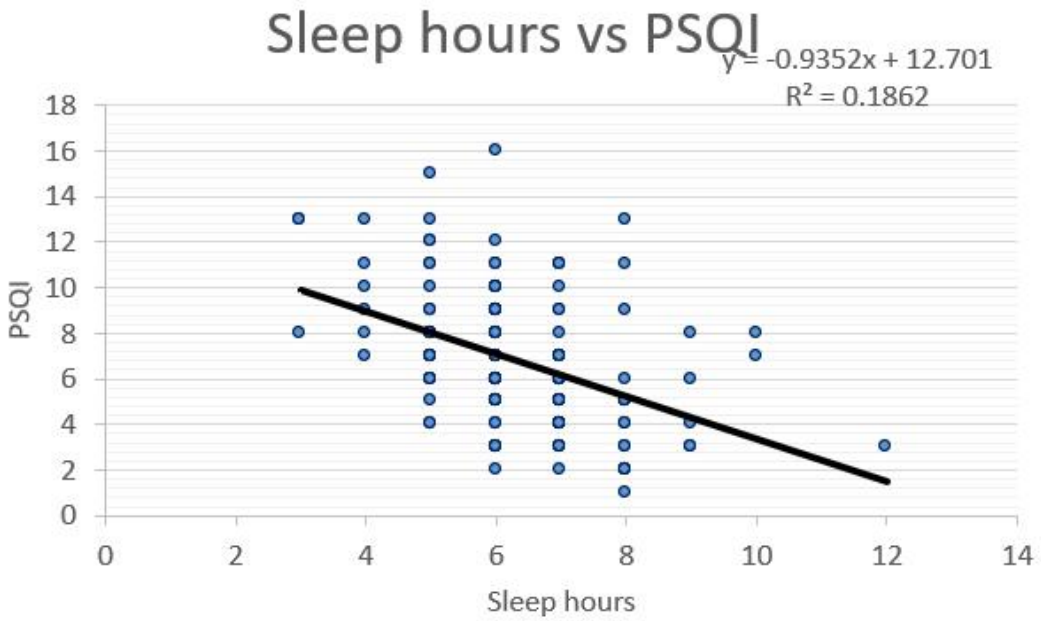
	Sleep hours	**Sleep quality & quantity PSQI SCORE**	**Excessive Daytime sleepiness ESS**	**Depression PHQ9 TOTAL SCORE**	**Suicidal ideation SIDAS**
n=151					
Mean	6.36	6.63	9.14	10.57	5.85
SD	1.36	2.98	4.79	6.92	9.70
Median	6	6	9	10	0
Minimum	3	1	0	0	0
Maximum	12	16	23	27	32

As for the gender, excessive daytime sleepiness and depressive indicators are significantly more in female students compared to males as shown in the table below:

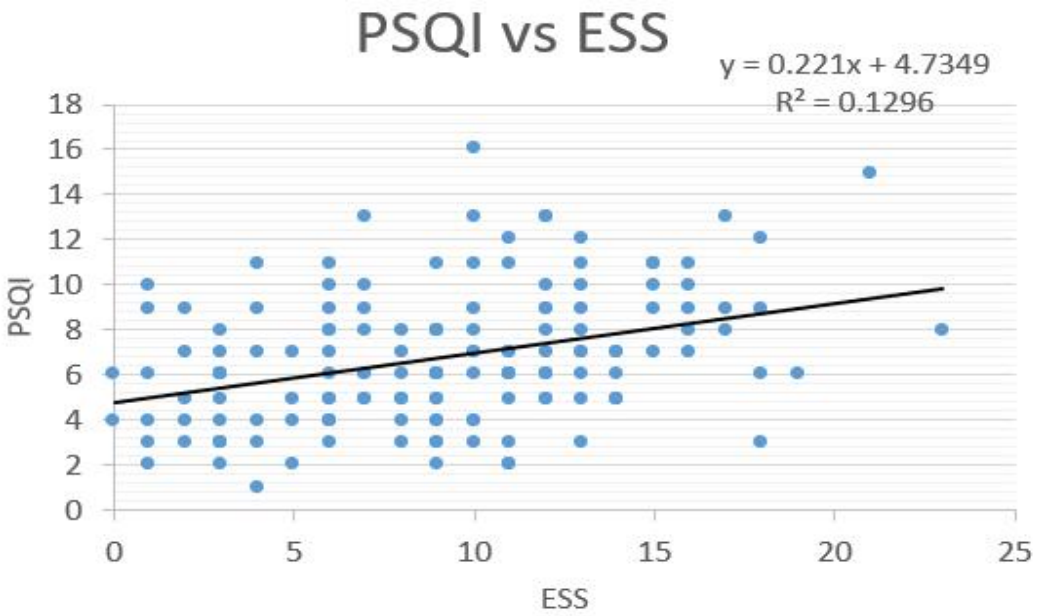
	Sleep hours	**TOTAL PSQI SCORE**	**ESS TOTAL SCORE**	**PHQ9 TOTAL SCORE**	**SIDAS TOTAL**
Males	6.39 (1.23)	6.30 (3.04)	8.41 (4.68)	9.35 (6.51)	5.24 (9.60)
Females	6.31 (1.55)	7.19 (2.83)	10.31 (4.78)	12.64 (7.14)	6.88 (9.85)
P value	0.737	0.070	0.017 *	0.004**	0.310

Now we shall discuss the results in form of the different scales mentioned above, and the correlation of the scales.

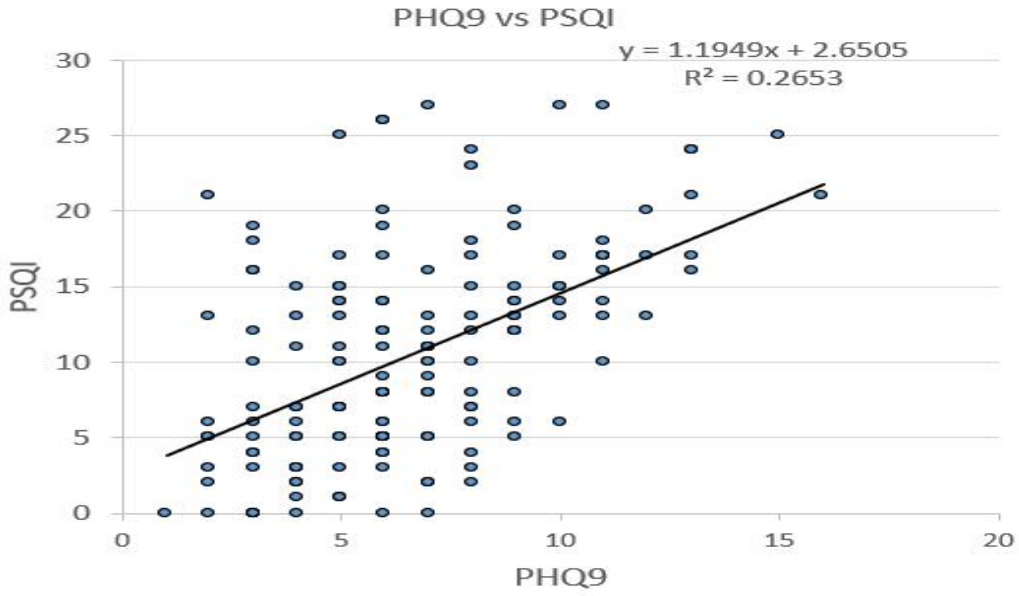
The graph below shows that the lesser the number of sleep hours the higher the PSQI score. Negative (Inverse) correlation. Means the lesser the number of hours of nighttime sleep the worse is the sleep quality:



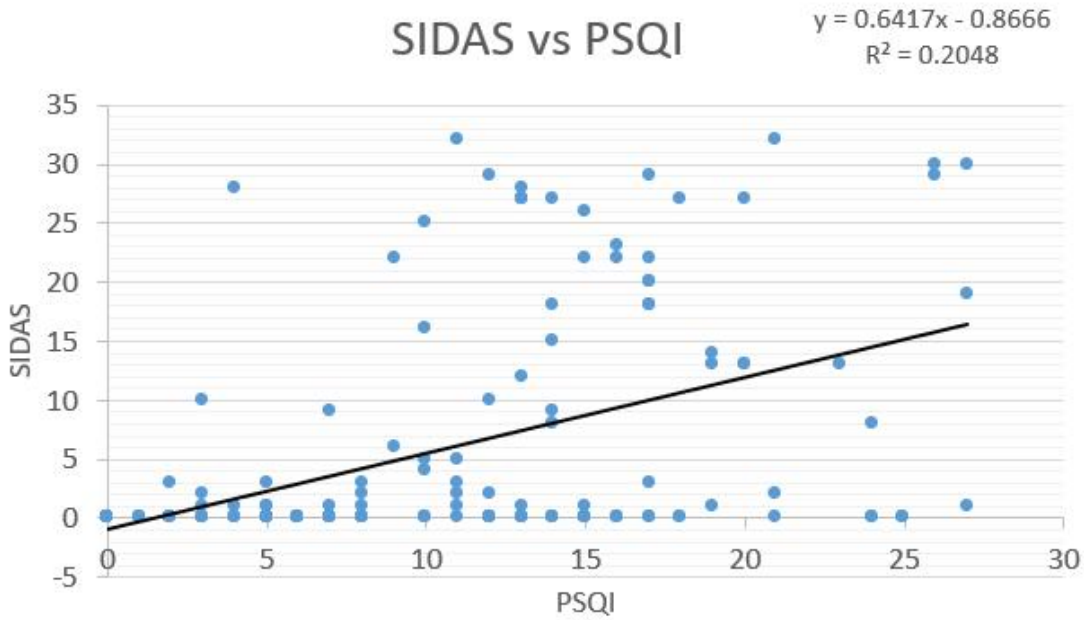
The higher the PSQI score the higher the ESS score. Direct positive correlation. Meaning the more disturbed nighttime sleep the greater the chances of daytime sleepiness as shown below:



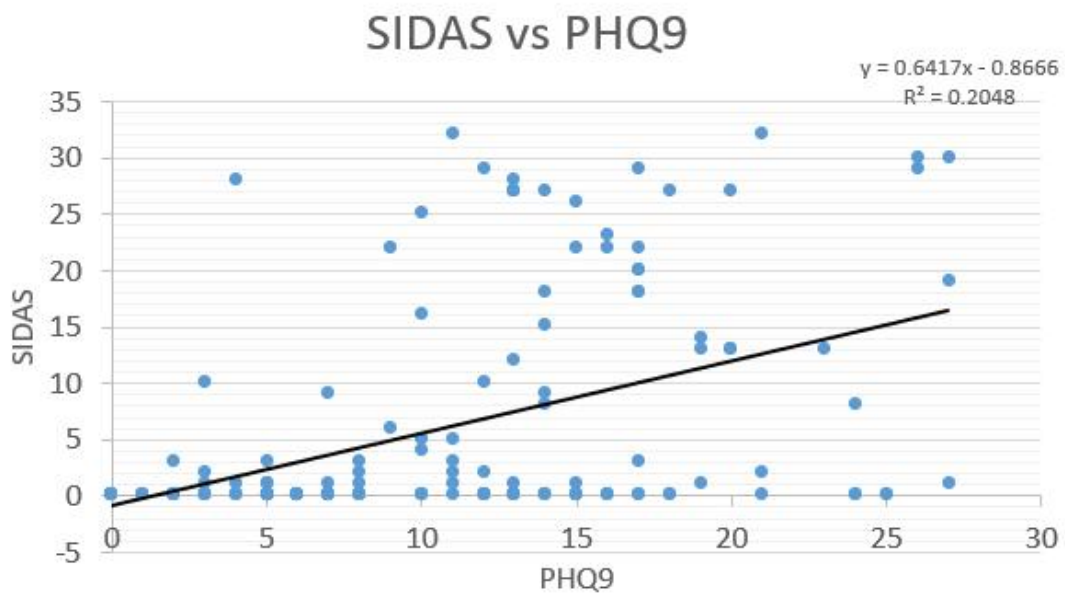
As for the relation between the PSQI and PHQ9 scores, the higher the PSQI score the higher the PHQ9 score. Direct positive correlation. Meaning the more disturbed nighttime sleep the greater the chances of depression as shown below:



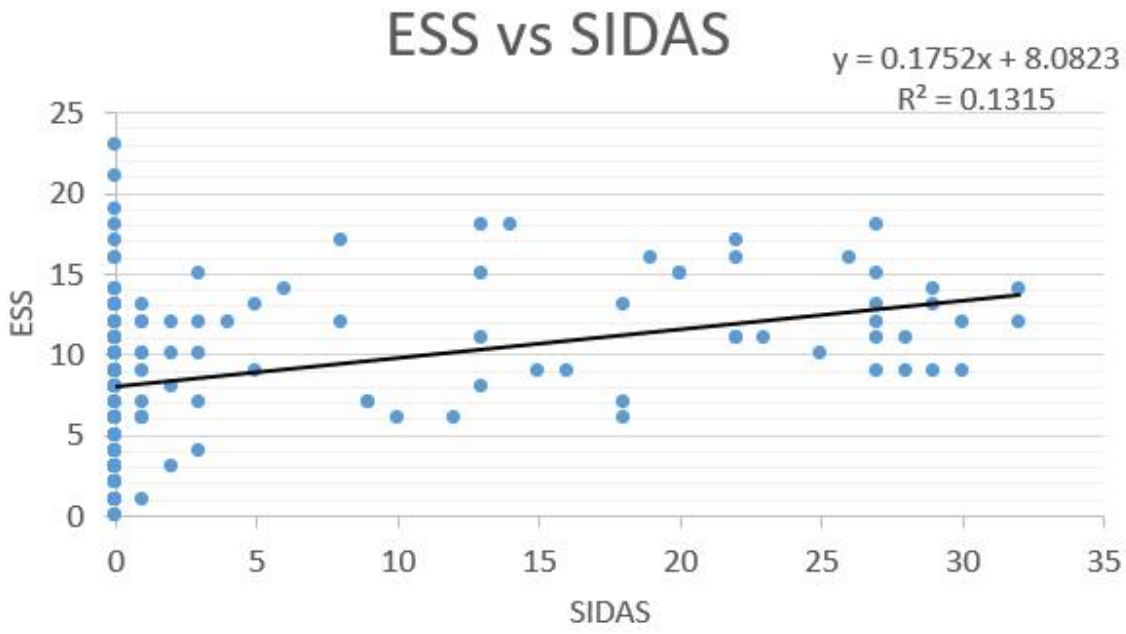
The higher the PSQI score the higher the SIDAS score. Direct positive correlation. Meaning the more disturbed nighttime sleep the greater the chances of suicidal ideation as shown below:



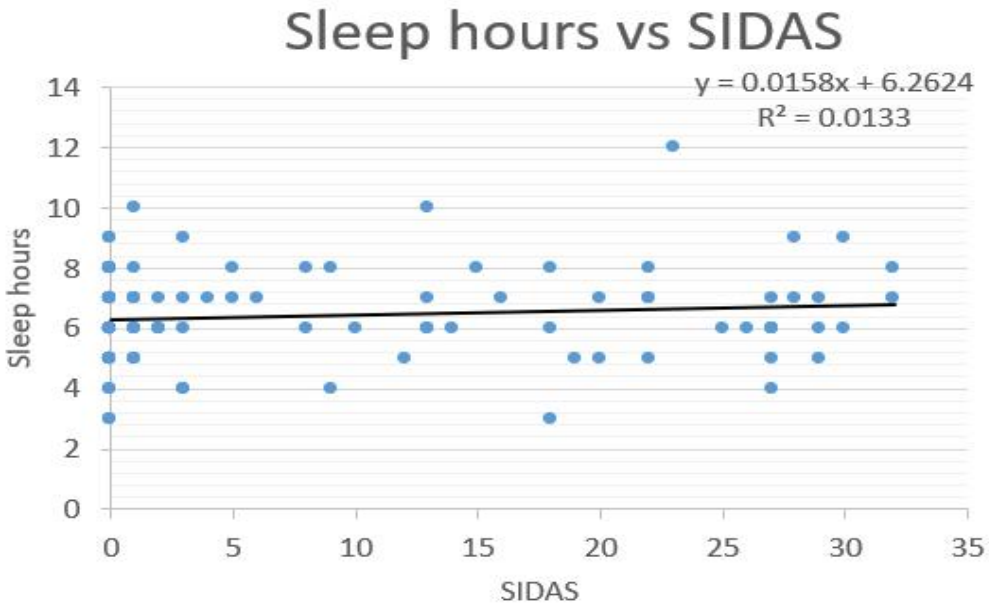
The higher the PHQ9 score the higher the SIDAS score. Direct positive correlation. Meaning the more the evidence of depression the greater the chances of suicidal ideation as shown below:



The higher the ESS score the higher the SIDAS score. Direct positive correlation. Meaning the greater the daytime sleepiness the greater the chances of suicidal ideation. It is probably reflection of disturbed nighttime sleep and associated depression as shown below:



There is no correlation of sleep hours with SIDAS score. Probably meaning that it is the quality of sleep that is more important than the quantity of sleep that is associated with suicidal ideation as shown below:



Discussion:

As apparent from the results above, disturbed sleep duration has significant association with disturbed PSQI score which has been significantly affecting the scores of other scales. On the other hand, sleep hours directly do not have a significant effect on ESS, PHQ-9 and SIDAS score. This shows that excessive sleep is not directly associated with depression and suicidal thoughts but excessive sleep in terms of hours is significantly associated with poor sleep quality indicated by score greater than 5 of PSQI responses which in turn is associated with higher incidence of depression and suicidal ideation among medical students. So, an indirect relation is established between disturbed sleep quality and routine with Depression and suicidal thoughts. Another finding of this study was that majority of the students and faculty at the university sleep less than the recommended 7-9 hours of sleep (13) (14) (15). As for the gender, males who sleep 5 or fewer hours or 10 or more hours have a higher mortality risk as compared to females in which mortality risk is associated with 8 or 9 hours of sleep. These findings show that recommendations for a healthy sleep duration must consider gender into \ account, as it was found to be an important predictor in increased morbidity and mortality (16) (17). These findings are in consistent with previous researches on a related topic on medical students which also aimed to assess the relationship of sleep and several other morbidities. An observation by a faculty in a medical college in Saudia Arabia showed a strong U-shaped association between sleep duration and several morbidities (obesity, diabetes or CVS disease) and mortality (18) (19) (20). A large cohort study conducted in more than 300,000 people in Japan found J shaped association between sleep duration and all case mortality favoring the ultimate survival among individuals having average sleep of 7 to 8 hours. Similar U-shaped association was found between ***sleep duration and depression*** thus implying strong bi-directional relation between depression & sleep disturbances. Studies show that ***extreme sleep duration*** *(<5 & >9 HRS) are significantly* associated with development of depression having corresponding score of range 10-25 (18). Different studies also showed that short (<5 hrs) and long (>9 hrs) ***sleep*** was associated was associated with ***higher score using phq-9*** and same has been replicated in large cohort study highlighting importance of the issue**.**

Another research in China showed that prevalence of suicidal ideation to be 38.6% in data having female medical students' predominance. Variables such as physical disorder history, age, anxiety or depression were independently associated with suicidal ideation (21).

Depression is tip of ice berg of long list of problems caused by it. Even long duration of sleep has been associated with cognitive decline and Abeta deposition, a marker indicative of Alzheimer disease, detrimental effects of disturbed sleep routine are of significant value to students particularly medical students whose healthy cognitive function is vital for academic performance; healthy sleep occurs to be important mediator for this relationship. Medical students usually face a lot of challenges in their career, which include psychological stress, cognitive overload, keeping up with unrealistic timelines, clearing hard exams, decreased sleep, difficulty in adjustment, imposter syndrome and later on even more challenges when the actual clinical work starts. This is why this relationship is especially important in medical students, and it is important to create awareness about this and equip them to tackle the above-mentioned situations effectively. Even in medicine, there is a whole field "Lifestyle Medicine" dedicated to show how lifestyle factors like sleep, stress, diet and exercise affects a person's health, and how is it related to many co morbidities like coronary heart disease, diabetes mellitus, asthma, stroke, Alzheimer's disease etc.

Our recommendations after this research are: A proper night's sleep, averaging at least seven hours, is essential, as disrupted or poor-quality sleep can initiate a vicious cycle. This cycle often begins with excessive daytime sleepiness (EDS) and depression, eventually progressing to more complex health issues such as obesity, cardiovascular disease, diabetes, cognitive decline, and even Alzheimer's disease. Notably, some cases lack any identifiable organic cause despite thorough medical examination, further complicating diagnosis and management. Sleep disturbances not only exacerbate daily life challenges but also contribute to the frustration and distress experienced by both patients and healthcare providers, particularly amid already demanding schedules. To promote adequate and restorative sleep, the following measures are recommended: adopting simple lifestyle modifications, practicing effective time management, and cultivating a healthier mindset or perspective on life. These steps can significantly improve overall well-being, alleviate daily stressors, and help prevent the onset of serious, long-term health complications—all while easing the burden of life's inherent challenges. The final conclusion of this research is that Disturbed sleep duration shows a significant association with disturbed PSQI scores, which in turn significantly affect the scores of other scales. However, the number of sleep hours alone does not directly have a significant impact on ESS, PHQ-9, and SIDAS scores. The limitations of this study were that this study was initially designed to include students from both public and private medical colleges and universities. However, due to time constraints, limited resources, and the busy schedules of students at Rawalpindi Medical University (RMU) and private medical universities, it was not possible to reach the target sample size of 235 calculated using Raosoft software (with a 90% confidence interval, 5% margin of error, and an estimated population of 5,000 students assuming a 50% response distribution). Despite this, a significant number of medical students (approximately 160) from different academic years and institutions participated in the research. Additionally, our questionnaire did not separately quantify excessive daytime and nighttime sleepiness, which could have provided more unique insights and contributed further to existing literature.

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