Original Article

Relationship between Problematic Internet Uses with Sleep Problem and Psychological Distress among Medical Students

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ABSTRACT:

Background: *Problematic Internet use (PIU) is a growing concern, particularly among medical students who face significant academic pressures. This study investigates the relationship between PIU, sleep problems, and psychological distress among medical students of Bangladesh and Nepal.*

Objectives: *To assess the prevalence of PIU and its associations with insomnia, depression, anxiety, and stress among medical students.*

Methods: *A cross-sectional observational design was employed, involving a multiphase sampling technique that excluded students with comorbid psychiatric or medical conditions. Data were collected from 100 fifth-year medical students (23rd batch, 2019-2020 session) through self-administered questionnaires. Instruments included the Internet Addiction Test (IAT), Insomnia Severity Index (ISI), and Depression Anxiety Stress Scale (DASS-21). Statistical analyses were performed using SPSS version 25, applying appropriate tests to determine relationships among variables.*

Results: *The results revealed significant PIU prevalence, with 48% exhibiting mild addiction and 6% severe addiction. A significant relationship between internet addiction and insomnia was identified ($p = 0.021$), with higher addiction levels correlating with increased insomnia severity. While depression levels showed a trend towards significance ($p = 0.067$), anxiety and stress did not demonstrate significant associations with PIU ($p = 0.622$ and $p = 0.25$, respectively). Gender differences were observed, with females showing higher rates of mild addiction and males' higher rates of moderate to severe addiction.*

Conclusion: *The study emphasizes the importance of addressing PIU as a public health concern among medical students, integrating mental health support and educational resources to mitigate its adverse effects on well-being and academic performance.*

Key Words:
Problematic Internet Use (PIU), Medical Students, Sleep Problems, Psychological Distress, Mental Health

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Introduction

The internet has become an essential part of everyday life, offering unprecedented access to information, communication, and entertainment. However, excessive use of the internet has given rise to Problematic Internet Use (PIU), a behavioral issue defined by spending exces-

sive time online, which can lead to negative physical, behavioral, and psychosocial consequences.[1] PIU is often synonymous with terms like "excessive internet use," "pathological internet use," and "internet addiction," and is increasingly seen as a public health problem.[2] This concern is especially relevant among medical students, a group often exposed to significant academic pressures, and who rely heavily on the internet for their studies.[3]

Studies have shown that the prevalence of internet use among medical students is alarmingly high. Research indicates rates of internet use as high as 84%, 68.4%, 56.6%, and 18% among medical students in different regions.[4] [7] While moderate internet use may be beneficial for academic purposes, crossing into problematic use can have serious consequences for mental health and academic performance. Medical students are particularly vulnerable to PIU due to the demanding nature of their studies, the stress associated with their training, and the ease with which they can use the internet for escapism.[3]

Impact on Psychological Well-being: One of the major concerns regarding PIU is its close association with psychological distress. Numerous studies have shown that PIU is linked to increased levels of anxiety, depression, and stress.[8] Medical students with PIU often report higher rates of emotional instability and irritability, which may result from the compulsive nature of their internet use.[9] The internet can become a form of avoidance for students, allowing them to temporarily escape from academic stress. However, this only worsens psychological distress in the long run, as students become more disconnected from real-life interactions and responsibilities.[9]

In a study examining medical students, those who exhibited PIU showed significantly higher levels of depression, anxiety, and stress compared to those who did not engage in problematic internet use.[10] This suggests a bidirectional relationship, in which psychological distress both drives and is exacerbated by PIU. Given the high prevalence of mental health issues in medical students, addressing PIU is critical to maintaining their well-being and academic success. Impact on Sleep Quality: PIU is also closely linked to sleep disturbances. Medical students, due to their busy academic schedules, often suffer from irregular sleep patterns and poor sleep quality.[11] The excessive use of the internet, particularly before bedtime, can further aggravate these issues. Prolonged screen time disrupts the body's natural circadian rhythm by suppressing melatonin production, making it harder to fall asleep and leading to reduced sleep duration.[12]

Sleep problems are particularly concerning for medical students, as lack of sleep can impair cognitive function, reduce attention, and negatively impact academic performance.[13] A systematic review on the relationship between PIU and sleep found that individuals who excessively use the internet are more likely to experience insomnia, poor sleep quality, and shorter sleep duration.[14] These sleep problems can exacerbate psychological distress, creating a cycle in which poor mental health and disrupted sleep patterns feed into one another, further worsening academic performance and overall well-being. This study aims to explore the relationship between PIU, sleep problems, and psychological distress among medical students. By investigating these factors, the study seeks to highlight the prevalence and consequences of PIU in this population, with the hope of encouraging awareness and promoting interventions to improve mental health and academic success. The objective of this study was to assess the prevalence of problematic internet use, psychological distress, and sleep problems among medical students. Specific objectives includes evaluation of the relationship between problematic internet use and sleep problems among medical students. Also assessing the association between problematic internet use and psychological distress in medical students. And finally to analyze the relationship between students' demographic characteristics (such as age, gender, academic year) and their levels of problematic internet use.

Methods and Materials

This study was a cross-sectional observational study conducted in a renowned medical college of Sylhet division. A multiphase sampling technique was used, wherein all 5th-year medical students were initially included. In the first phase, students with comorbid psychiatric or medical conditions were excluded. The total population consists of 111 students, and data was collected from 100 students who met the inclusion criteria after exclusions. Permissions was obtained from the medical college authorities, and the study was approved by the Institutional Ethical Review Board (IERB) before beginning. Students were notified in

advance about the study, and written informed consent was acquired from participants who agreed to participate. Data collection occurred face-to-face in a single hall over two separate days, with the investigator supervising the process. On the first day, students completed a pre-designed semi-structured questionnaire to identify and exclude those with comorbid psychiatric or medical conditions. On the second day, eligible students completed the full set of questionnaires, including those to assess problematic internet use, sleep problems, and psychological distress. All 5th-year medical students who were willing to participate in the study was included in this study. Exclusion Criteria includes Students diagnosed with comorbid psychiatric illnesses such as anxiety disorders, depressive disorders, schizophrenia, or substance use disorders. Students with medical conditions that significantly affect mental health, including diabetes mellitus, thyroid disorders, Cushing's syndrome, and rheumatic diseases.

Data Collection Instruments: Pre-designed semi-structured questionnaire for sociodemographic data and exclusion of students with comorbid psychiatric or medical conditions. Internet Addiction Test (IAT) to assess the severity of problematic internet use, classifying it into normal, mild, moderate, or severe addiction. Insomnia Severity Index (ISI) to assess sleep problems, ranging from no clinically significant insomnia to severe insomnia.

Depression Anxiety Stress Scale (DASS-21) to measure psychological distress, including depression, anxiety, and stress.

Statistical Analysis: Data was systematically recorded using a pre-designed checklist. Quantitative data was summarized using means and standard deviations, while qualitative data was presented as frequencies and percentages. Statistical analyses were performed using SPSS version 25. Appropriate statistical tests such as Pearson's correlation coefficient, Chi-square tests, independent t-tests, or ANOVA were employed depending on the type of data. The relationships between problematic internet use, psychological distress, sleep problems, and demographic factors were examined. A p-value < 0.05 was considered statistically significant.

Results:

Table 1: Sociodemographic and Clinical Characteristics of the Students

		Count	Percentage %
Age of the Students (Mean±SD)		24	1
Sex of the Students	Male	57	57.0
	Female	43	43.0
Religion of the Students	Muslim	36	36.0
	Hindu	61	61.0
	Christian	1	1.0
	Buddhist	1	1.0
	Others	1	1.0
Marital status	Single	96	96.0
	Married	4	4.0
Country of residence of the students	Bangladesh	52	52.0
	Nepal	48	48.0
Occupation of father	Service	39	39.0
	Business	40	40.0
	Others	21	21.0
Habitat of the Students	Urban	79	79.0
	Rural	21	21.0
Residential place	Hostel	66	66.0
	Own home	26	26.0
	Others	8	8.0
Family history of psychiatric illness	Present	5	5.0
	Absent	95	95.0
Duration of internet usage/day	≤2 hours	14	14.0
	3-6 hours	59	59.0
	>6 hours	27	27.0
Religion	Muslim	36	36.0
	Hindu and others	64	64.0

The sociodemographic and clinical characteristics of the students revealed a diverse and informative snapshot. The average age of the students was 24 years, with a slight male majority (57%) over females (43%). The religious composition was predominantly Hindu (61%), followed by Muslims (36%), with a small representation from Christians, Buddhists, and others (each 1%). The vast majority of students were single (96%) and primarily reside in either Bangladesh (52%) or Nepal (48%). Fathers of these students were nearly equally engaged in service (39%) and business (40%), with the remaining 21% in other occupations. Urban residency is predominant (79%), and a significant portion of students lived in hostels (66%). Small percentage reported a family history of psychiatric illness (5%). Internet usage was found significant, with the majority spending 3-6 hours online daily (59%).

Table 2: Distribution of student internet addiction levels and their corresponding rates

		Count	Percentage (%)
Student Internet addiction level	Normal	11	11.0
	Mild	48	48.0
	Moderate	35	35.0
	Severe	6	6.0
Insomnia	No clinically significant insomnia	43	43.0
	Subthreshold insomnia	35	35.0
	Clincal insomnia (moderate severity)	19	19.0
	Clincal insomnia (severe)	3	3.0
Depression	Normal	58	58.0
	Mild	14	14.0
	Moderate	14	14.0
	Severe	7	7.0
	Extremely Severe	7	7.0
Anxiety	Normal	68	68.0
	Mild	13	13.0
	Moderate	12	12.0
	Severe	3	3.0
	Extremely Severe	4	4.0
Stress	Normal	50	50.0
	Mild	17	17.0
	Moderate	16	16.0
	Severe	13	13.0
	Extremely Severe	4	4.0

The data illustrates the distribution of student internet addiction levels and their corresponding rates of insomnia, depression, anxiety, and stress. Among the students, 11% exhibited normal internet use, while 48% showed mild addiction, 35% moderate addiction, and 6% severe addiction. Regarding insomnia, 43% of the students had no clinically significant insomnia, 35% had subthreshold insomnia, 19% suffered from clinical insomnia of moderate severity, and 3% experienced severe clinical insomnia. For depression, 58% of students were normal, 14% had mild depression, 14% moderate, and both severe and extremely severe depression were observed in 7% each. Anxiety levels were mostly normal in 68% of students, with 13% having mild anxiety, 12% moderate, 3% severe, and 4% extremely severe. Stress levels showed that 50% of the students were normal, 17% had mild stress, 16% moderate, 13% severe, and 4% extremely severe. This data indicates that as internet addiction increases, there tends to be a rise in the severity of insomnia, depression, anxiety, and stress among students.

Table 3: Association between student Internet addiction levels and their corresponding levels

		Student Internet addiction level								P-value*
		Normal		Mild		Moderate		Severe		
		Count	Column N %	Count	Column N %	Count	Column N %	Count	Column N %	
Insomnia	No clinically significant insomnia	8	72.7	23	47.9	10	28.6	2	33.3	0.021
	Subthreshold insomnia	2	18.2	19	39.6	12	34.3	2	33.3	
	Clinical insomnia (moderate to severity)	1	9.1	4	8.3	13	37.1	1	16.7	
	Clincal insomnia (severe)	0	0.0	2	4.2	0	0.0	1	16.7	
Depression	Normal	8	72.7	33	68.8	15	42.9	2	33.3	0.067
	Mild	1	9.1	8	16.7	5	14.3	0	0.0	
	Moderate	1	9.1	3	6.3	7	20.0	3	50.0	
	Severe	0	0.0	1	2.1	5	14.3	1	16.7	
	Extremely Severe	1	9.1	3	6.3	3	8.6	0	0.0	
Anxiety	Normal	8	72.7	35	72.9	22	62.9	3	50.0	0.622
	Mild	2	18.2	5	10.4	4	11.4	2	33.3	
	Moderate	1	9.1	5	10.4	6	17.1	0	0.0	
	Severe	0	0.0	1	2.1	1	2.9	1	16.7	
	Extremely Severe	0	0.0	2	4.2	2	5.7	0	0.0	
Stress	Normal	8	72.7	28	58.3	12	34.3	2	33.3	0.25
	Mild	0	0.0	9	18.8	7	20.0	1	16.7	
	Moderate	3	27.3	4	8.3	8	22.9	1	16.7	
	Severe	0	0.0	5	10.4	6	17.1	2	33.3	
	Extremely Severe	0	0.0	2	4.2	2	5.7	0	0.0	

**Since some expected cell counts are less than 5, the p-values of the chi-square test were calculated based on Monte Carlo simulation.*

The study analyzed the association between student Internet addiction levels and their corresponding levels of insomnia, depression, anxiety, and stress. The findings showed a significant relationship between Internet addiction and insomnia (p=0.021). Specifically, the proportion of students with no clinically significant insomnia decreased as the severity of Internet addiction increased, with 72.7% of normal users experiencing no insomnia compared to only 33.3% of severe users. Conversely, clinical insomnia (moderate to severe) was more prevalent among those with higher addiction levels. Depression levels, although not statistically significant (p=0.067), exhibited a notable trend where higher Internet addiction was associated with more severe depression. For example, 42.9% of moderate addiction users had normal depression levels, whereas only 33.3%

of severe addiction users did. Additionally, 50% of severe addiction users experienced moderate depression, compared to only 6.3% of normal users. Anxiety and stress levels did not show significant associations with Internet addiction, with p-values of 0.622 and 0.25, respectively. However, some patterns were observed. For instance, severe anxiety was more common among severely addicted students (16.7%) than among normal users (0.0%). Similarly, severe stress was reported by 33.3% of severe addiction users, compared to 0.0% of normal users. These results suggest a potential link between increased Internet addiction and higher levels of insomnia, depression, and stress, though further research with larger sample sizes might be needed to confirm these trends.

Table 4: Various demographic factors in relation to student internet addiction levels

		Student Internet addiction level								P-value*
		Normal		Mild		Moderate		Severe		
		Count	Column N %	Count	Column N %	Count	Column N %	Count	Column N %	
Sex of the Students	Male	1	54.5	13	50.0	17	65.7	5	66.7	0.556
	Female	5	45.5	24	50.0	12	34.3	2	33.3	
Religion of the Students	Muslim	1	9.1	13	27.1	17	48.6	5	83.3	0.004
	Others	10	90.9	35	72.9	18	51.4	1	16.7	
Marital status	Single	9	81.8	47	97.9	34	97.1	6	100.0	0.099
	Married	2	18.2	1	2.1	1	2.9	0	0.0	
Country of residence of the students	Bangladesh	0	0.0	23	47.9	23	65.7	6	100.0	<0.001
	Nepal	11	100.0	25	52.1	12	34.3	0	0.0	
Occupation of father	Service	3	27.3	21	43.8	14	40.0	1	16.7	0.089
	Business	8	72.7	15	31.3	15	42.9	2	33.3	
	Others	0	0.0	12	25.0	6	17.1	3	50.0	
Habitat of the Students	Urban	9	81.8	38	79.2	26	74.3	6	100.0	0.563
	Rural	2	18.2	10	20.8	9	25.7	0	0.0	
Residential place	Hostel	8	72.7	34	70.8	21	60.0	3	50.0	0.231
	Own home	3	27.3	13	27.1	8	22.9	2	33.3	
	Others	0	0.0	1	2.1	6	17.1	1	16.7	

**Since some expected cell counts are less than 5, the p-values of the chi-square test were calculated based on Monte Carlo simulation.*

The data examines various demographic factors in relation to student internet addiction levels. Among students with severe internet addiction, 66.7% were male, while 33.3% were female. Muslims represent 83.3% of the severe addiction group, whereas Hindus account for 16.7%. All students with severe addiction were single. Bangladeshi students make up 100% of the severe addiction group, contrasting with no representation from Nepal. Fathers of these students were mostly in service or business, with 50% in other occupations. All students with severe addiction lived in urban areas, with 50% residing in hostels. This data highlights significant correlations between severe internet addiction and factors like gender, religion, country of residence, and urban living, as well as the absence of comorbid psychiatric conditions. The analysis reveals significant associations between certain demographic factors and the level of Internet addiction among students. Notably, religion and country of residence are significantly associated with Internet addiction levels. Muslim students and those residing in Bangladesh exhibit higher levels of moderate and severe Internet addiction compared to their counterparts from other religions and Nepal, with p-values of 0.004 and less than 0.001, respectively.

Table 5: Correlation shows the relationships between Internet Addiction Test (IAT) scores and various mental health indices

Correlations						
		Internet Addiction Test Score	Insomnia Severity Index	Depression	Anxiety	Stress
Internet Addiction Test Score	Pearson Correlation	1	.329**	0.188	0.083	.288**
	Sig. (2-tailed)		0.001	0.062	0.414	0.004
	N	100	100	100	100	100
Insomnia Severity Index	Pearson Correlation	.329**	1	0.186	.237*	.291**
	Sig. (2-tailed)	0.001		0.064	0.018	0.003
	N	100	100	100	100	100
Depression	Pearson Correlation	0.188	0.186	1	.579**	.647**
	Sig. (2-tailed)	0.062	0.064		0.000	0.000
	N	100	100	100	100	100
Anxiety	Pearson Correlation	0.083	.237*	.579**	1	.690**
	Sig. (2-tailed)	0.414	0.018	0.000		0.000
	N	100	100	100	100	100
Stress	Pearson Correlation	.288**	.291**	.647**	.690**	1
	Sig. (2-tailed)	0.004	0.003	0.000	0.000	
	N	100	100	100	100	100

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

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation table shows the relationships between Internet Addiction Test (IAT) scores and various mental health indices: insomnia severity, depression, anxiety, and stress. There is a significant positive correlation between IAT scores and the Insomnia Severity Index (r = .329, p = .001), indicating that higher internet addiction is associated with more severe insomnia. Although IAT scores correlate positively with depression (r = .188, p = .062) and anxiety (r = .083, p = .414), these correlations are not statistically significant. However, a significant positive correlation exists between IAT scores and stress (r = .288, p = .004), suggesting that higher internet addiction is linked to increased stress levels. Additionally, the Insomnia Severity Index shows a significant positive correlation with both anxiety (r = .237, p = .018) and stress (r = .291, p = .003), indicating that more severe insomnia is associated with higher anxiety and stress. Depression is significantly correlated with both anxiety (r = .579, p = .000) and stress (r = .647, p = .000), reflecting that higher levels of depression are related to higher levels of anxiety and stress. Lastly, anxiety and stress are highly correlated (r = .690, p = .000), indicating a strong relationship between these two variables. Overall, the data highlights the interconnections between internet addiction and various mental health challenges, emphasizing the importance of addressing these issues concurrently.

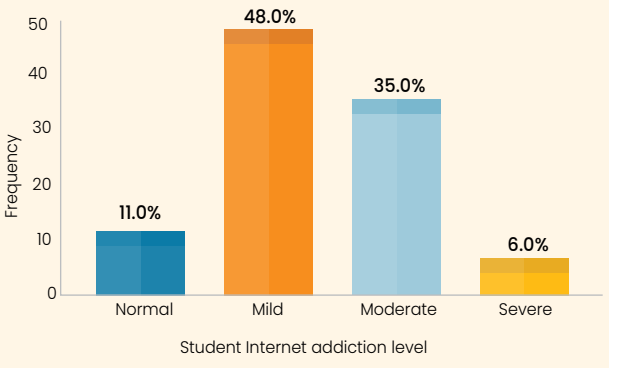

Fig. 1: Distribution of student internet addiction levels across four categories

The bar chart presents the distribution of student internet addiction levels across four categories: normal, mild, moderate, and severe. The largest group, comprising 48.0% of students, falls under the mild addiction level. This is followed by 35.0% of students who are categorized as having a moderate level of internet addiction. A smaller portion, 11.0%, is considered to have a normal level of internet use without significant addiction. Lastly, 6.0% of students experience severe internet addiction. This data highlights that the majority of students are experiencing some level of internet addiction, with a notable proportion falling into the mild and moderate categories.

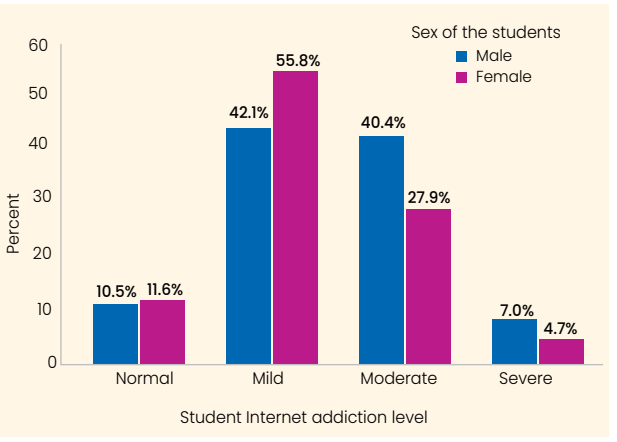

Fig. 2: distribution of student internet addiction levels by gender across four categories

The bar chart presents the distribution of student internet addiction levels by gender across four categories: normal, mild, moderate, and severe. Among the students, 10.5% of males and 11.6% of females exhibit normal internet usage. In the mild addiction category, a significantly higher proportion of females (55.8%) compared to males (42.1%) is observed. Conversely, the moderate addiction level shows a higher percentage of males (40.4%) than females (27.9%). Finally, in the severe addiction category, 7.0% of males and 4.7% of females are represented.

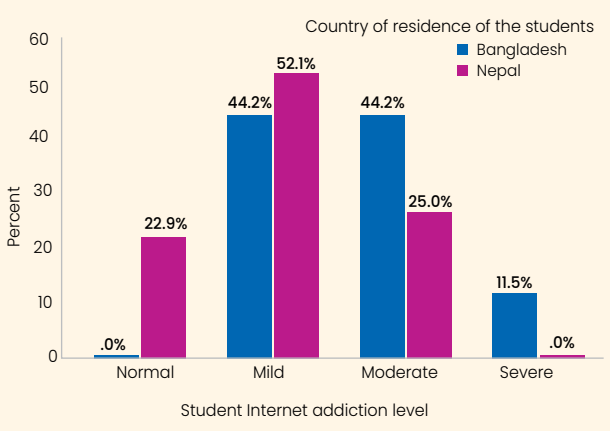

Fig. 3: Distribution of student internet addiction levels by country of residence, specifically comparing students from Bangladesh and Nepal across four categories

The bar chart depicts the distribution of student internet addiction levels by country of residence, specifically comparing students from Bangladesh and Nepal across four categories: normal, mild, moderate, and severe. For the normal category, none of the Bangladeshi students fall into this group, whereas 22.9% of Nepali students do. In the mild addiction category, 44.2% of Bangladeshi students are represented, while a higher percentage of 52.1% is seen among Nepali students. Both Bangladeshi and Nepali students have an equal percentage (44.2%) in the moderate addiction category. However, in the severe addiction category, 11.5% of Bangladeshi students are classified, with no Nepali students falling into this group.

Discussion

This study examines the relationship between problematic internet use (PIU), sleep problems, and psychological distress among medical students, revealing significant insights into the mental health landscape of this population. The data demonstrates a concerning prevalence of internet addiction and its associated mental health impacts, particularly insomnia, depression, anxiety, and stress. The sociodemographic characteristics of the participants reveal that the majority of students are young, single, and urban-dwelling, predominantly from Bangladesh and Nepal. This demographic is at heightened risk for PIU due to increased exposure to digital technologies and academic pressures often associated with medical education. Previous research has shown that urban environments and access to high-speed internet contribute to higher rates of PIU among students, which aligns with the findings of this study[11,12]. The predominance of students from upper-middle-income families further suggests that economic factors may play a role in internet accessibility and usage patterns[13].

A notable finding of this study is the significant relationship between internet addiction and insomnia ($p = 0.021$). As internet addiction levels increased, the prevalence of clinically significant insomnia also rose. This trend aligns with existing literature that indicates excessive screen time and late-night internet use can disrupt circadian rhythms, leading to sleep disturbances[14,15]. The high percentage of students experiencing insomnia highlights the need for targeted interventions to promote healthier internet use practices and improve sleep hygiene[16].

While the relationship between PIU and depression was not statistically significant ($p = 0.067$), the data suggest a concerning trend where higher levels of internet addiction correlate with more severe depressive symptoms. This aligns with findings from previous studies that have linked excessive internet use with increased feelings of loneliness and depression among adolescents and young adults17,18. The lack of significant findings for anxiety and stress levels ($p = 0.622$ and $p = 0.25$, respectively) may indicate that while there are patterns suggesting increased psychological distress with higher addiction levels, these relationships may require larger sample sizes or longitudinal studies to establish more robust conclusions[19,20].

The study observed distinct gender differences in the prevalence of internet addiction, with females showing higher rates of mild addiction and males displaying higher rates of moderate to severe addiction. This finding supports previous research indicating that males are more

likely to engage in higher-risk internet activities, such as gaming, while females may gravitate towards social media platforms[21]. The implications of these gendered usage patterns should be considered in designing interventions aimed at addressing PIU among medical students, ensuring they are tailored to meet the specific needs of both genders.

The study found that severe internet addiction was exclusively observed among Bangladeshi students, with none of the Nepali students falling into this category. This suggests potential cultural differences in internet use, academic pressure, and social norms surrounding digital engagement. Previous studies have noted that cultural context can significantly influence internet use patterns, with higher addiction levels often reported in populations facing greater academic and social pressures[22,23]. Understanding these cultural dynamics is essential for developing effective, culturally sensitive interventions aimed at reducing PIU.

Correlation analysis demonstrated significant positive relationships between internet addiction and insomnia ($r = 0.329$, $p = 0.001$) and stress ($r = 0.288$, $p = 0.004$). These findings underscore the interconnections between PIU and various mental health challenges, reinforcing the idea that excessive internet use exacerbates mental health issues while also serving as a coping mechanism for stress and anxiety[24]. The positive correlations between insomnia severity and both anxiety ($r = 0.237$, $p = 0.018$) and stress ($r = 0.291$, $p = 0.003$) further illustrate the complex interplay among these variables, emphasizing the importance of addressing them concurrently[25].

Conclusion

In summary, the findings of this study highlight the urgent need for interventions addressing problematic internet use and its associated mental health consequences among medical students. Given the high prevalence of internet addiction and its links to sleep disturbances and psychological distress, universities should consider implementing programs that promote healthy internet use habits, enhance mental health support services, and encourage better sleep hygiene. Future research should aim to explore these relationships further, using larger and more diverse samples to validate the trends observed in this study.

Recommendation: It is essential to develop targeted intervention programs to educate medical students about healthy internet usage and promote good sleep hygiene. Enhancing mental health support services, including counseling and stress management resources, can provide vital assistance. Regular assessments of internet usage patterns and mental health should be implemented to identify at-risk students early. Additionally, conducting further research on the long-term effects of problematic internet use on academic performance and mental health is crucial. Collaborative efforts with parents and guardians to promote healthy internet habits at home can also play a significant role in addressing these issues.

Conflict of interest: The authors declare that there are no conflicts of interest related to this study. All research was conducted independently, and no financial or personal relationships that could influence the study's outcomes have been disclosed.

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