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INTERNET ADDICTION AMONG UNDERGRADUATE MEDICAL STUDENTS IN NORTHEAST INDIA- A MIXED METHOD STUDY

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ABSTRACT: Background: The internet has become an integral part of daily life, with its usage growing exponentially. However, excessive use may lead to addictive behaviors and mental health challenges. Medical undergraduates are particularly susceptible due to their extensive engagement with online platforms. **Aim:** To estimate the prevalence and pattern of internet addiction among medical undergraduates and explore perceived reasons for excessive internet use. **Methods:** A convergent parallel mixed-methods study was conducted among 110 medical undergraduates across all academic phases between March and August 2024. Young's Internet Addiction Test (IAT) was used to assess addiction levels, along with a structured questionnaire to collect related information. Qualitative open-ended question was included to gain deeper insights into students' experiences with internet use. Quantitative data was analyzed by using proportions and chi square test. Thematic analysis was performed on transcribed qualitative responses, and a word cloud was generated to depict frequently occurring terms. **Results:** Among participants, 70.91% had mild addiction or were average users, 20.91% had moderate addiction and 8.18% were not addicted. Thematic analysis revealed six dominant themes driving excessive internet use: coping with stress and loneliness, entertainment dependency and information seeking, social validation and connection, unregulated access, compulsive use, and academic avoidance. **Conclusion:** The study reveals a high prevalence of internet addiction among medical undergraduates, influenced by an interplay of psychosocial and academic factors. This calls for institutional policies promoting healthy screen-time behaviour and psychosocial support systems including mentoring within medical institutions.

INTRODUCTION: Internet has become an integral part of our everyday lives and there has been an explosive growth in its use in recent times. Studies have suggested that excessive internet use could represent addictive behavior with mental health implications [1, 2].

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The term "Internet addiction" was proposed by Dr. Ivan Goldberg in 1995 for pathological compulsive internet use [3]. Griffiths (1998) considered Internet addiction to be a kind of technological addiction and one in a subset of behavioral addiction (such as compulsive gambling).

Kandell (1998) defined Internet addiction as "a psychological dependence on the internet, regardless of the type of activity once logged on" [4]. Studies have shown that the prevalence of internet addiction varies from 03% to 38% depending on the study population, methodology and diagnostic instrument used to assess internet addiction [5, 6].

Many studies have shown that internet addiction affects the adolescent and college goers because of their psychosocial and environmental characteristics leaving them disproportionately vulnerable to internet addiction [7, 8].

Medical students are a particularly vulnerable on account of the amount of time they spend on the internet [9]. After the COVID-19 pandemic, the internet has emerged as a significant addition to traditional classroom learning like online classes, E-quiz, E-workshops, webinars which the medical students use to sharpen their skills and add to their exposure. This has further enhanced the dependency of the medical student on the internet.

Very few studies in India have included the detailed aspect of this emerging public health issue. It was therefore considered relevant to design this study to estimate the prevalence and pattern of internet addiction among the medical undergraduates and to explore the perceived reasons for excessive internet use among the medical undergraduate students.

MATERIALS AND METHODS:

Study Design and Study Setting: A convergent parallel mixed-methods study was conducted to assess the prevalence of internet addiction and explore the perceived reasons for excessive internet use among undergraduate medical students of Jorhat Medical College, Jorhat, Assam. Ethical clearance was obtained from the Institutional Ethical Review committee of Jorhat Medical College [IEC approval no. SMEJ/JMCH/MEU/841/Pt-1/2011/4860]. The study was carried out over six months from March to August 2024.

Sample size: Considering 47.14% as the prevalence of internet addiction among undergraduate medical students, an absolute precision of 10% and a non-response rate of 10%, the required sample size was calculated to be 110 [9].

Sampling Technique: The Undergraduate Medical Students were enrolled in the study by two stage sampling. In the first stage, a stratified random sampling technique was adopted for selection of subgroups of student population according to their year of academic course, i.e., 1st, 2nd, 3rd and final year (4 batches). In the second stage, equal number of participants was selected from each subgroup by simple random sampling method so that each academic year will have equal representation in a study sample.

Data Collection Procedure: All the participants who were enrolled in the study were briefed about the purpose of the study and after obtaining written informed consent, the data were collected.

Quantitative Component: A pre designed, pre-tested, structured, self-administered questionnaire was used incorporating socio-demographic details, information about internet use and the Young's Internet Addiction Test for screening the levels of internet addiction [10].

Qualitative Component: To enrich understanding of reasons behind perceived internet addiction, a qualitative open-ended question was included at the end of the questionnaire, "In your own words, please describe why you feel you use the internet excessively or feel addicted to it."

Participants responded in writing. All 110 responses were collected anonymously and confidentiality of information was ensured in order to encourage participation and elicit truthful response. Any queries relating to the questionnaire that participants had were answered. However, those students with a history of using internet for less than a year and who did not give valid consent were excluded from the study. Responses to the open-ended question were optional and non-identifiable.

Internet Addiction Test Scale: Internet addiction test scale developed by Dr. Kimberly Young was adopted in our study. It is a self-rated scale developed for screening and measuring level of internet addiction used extensively for this purpose worldwide. It contains twenty questions related to internet usage to be scored on Likert scale from 1 (rarely) to 5 (always). After all questions were answered, numbers for each response were added to obtain a final score with possible scores ranging from 0 to 100. A total score of 0-19 represent normal user/ less than average online user; between 20 and 49 represent mild addiction / average online user; between 50 and 79 represent moderate addiction/ possible addict and between 80 and 100 represent severe addiction / addicts [11, 12].

The validity and reliability of Young's internet addiction scale in Indian population and college students has been tested in many studies [13, 14].

Data Analysis:

Quantitative Data Analysis: After checking for completeness of data, the responses were entered in MS Excel 2019 and subjected to statistical analysis comprising of calculating proportion, mean and standard deviation. Association was determined using chi-square test. P value <0.05 was considered significant for all tests.

Qualitative Data Analysis: The responses were analyzed using thematic analysis manually. The number of times the same codeword or sentence was repeated was noted. The percentage of final themes were drawn. A word cloud was generated to visualize the most frequently occurring terms which served as an exploratory tool to support and enrich the interpretation of students' internet use behavior.

RESULTS:

Socio-Demographic Profile of the Respondents: 6.36% of study participants belonged to the age group 18-20 years, 37.27% belonged to 20-22 years, 41.81% belonged to 22-24 years and 14.54% belonged to 24-26 years. Mean age was 21.79 ± 1.5 years. Among them, 52.7% were males and 47.3% were females. 24.5% of the students belonged to first year, 24.5% belonged to second year, 25.4% belonged to third year and 25.4% belonged to final year of their MBBS course. 97.27% of them were hostellers and only 2.7% were day scholars. Most of them belonged to Hindu religion (81.8%) followed by Muslim (13.64%) and 2.72% Christians. Majority of them (70%) belonged to Socio Economic Class I according to Modified BG Prasad Classification followed by 16.36% students belonging to Class II. 8.18% belonged to Socio Economic class III and 5.45% belonged to class IV. However, none of the students belonged to socioeconomic class V.

Internet Addiction among the Study Participants: 70.91% of students had mild internet addiction or were average online users, 20.91% had moderate addiction or were possible addicts and 8.18% were not addicted or were less than average online users according to their IAT score. Among males, majority had mild internet addiction (81.04%) followed by moderate addiction (13.79%). Similarly, majority off the female participants had mild internet addiction (70.91%). However, it was observed that a higher frequency of female respondents (11.5%) was not addicted to the internet compared to their male counterparts (5.17%). None of the study participants were severely addicted to internet. This relation of sex of respondents and level of internet addiction was found to be statistically significant (p=0.047279) **Table 1.**

TABLE 1: GENDER WISE DISTRIBUTION OF INTERNET ADDICTION SCORES

Internet Addiction score	Male (%)	Female (%)	Total (%)
Not addicted/ less than average (0-19)	3(5.17)	6(11.54)	9 (8.18)
Mild addiction/ average online user (20-49)	47(81.04)	31(59.62)	78(70.91)
Moderate addiction/ possible addict (50-79)	8(13.79)	15(28.85)	23 (20.91)
Severe addiction/ addict (80-100)	0	0	0
Total	58(100)	52 (100)	110 (100)

$\chi 2 = 6.1034$, p-value=0.047279. The result is significant at $p < .05$.

Table 2 shows that most of the students in each academic year were average online users (mild addiction) followed by possible addicts (moderate addiction). There was no significant association between year of study and level of internet addiction (p-value=0.84562).

TABLE 2: INTERNET ADDICTION SCORES ACCORDING TO YEAR OF STUDY

Internet Addiction score	1st year (%)	2nd year (%)	3rd year (%)	4th year (%)	Total (%)
0-19	2(7.41)	0(0)	4(14.29)	3(10.71)	9(100%)
20-49	18(66.67)	22(81.48)	19(67.85)	19(67.86)	78(100%)
50-79	7(25.92)	5(18.52)	5(17.86)	6(21.43)	23(100%)
80-100	0	0	0	0	0
Total	27(100%)	27(100%)	28(100%)	28(100%)	110 (100%)

$\chi 2 = 2.6985$, p-value=0.84562. The result is not significant at $p < .05$.

Pattern of Internet use among Study Participants: Table 3 shows that 54.54% respondents used internet for 4-6 hours per day followed by 38.18% who used internet for 1-3 hours per day. The duration of internet use was similar for both male and females i.e. 53.45% and 55.77% respectively. The most common mode of internet access was mobile internet (99.1%) followed by Wi-Fi (20%). Access to internet was most commonly through mobile phone (100%) followed by laptop (19.1% respondents), tablet (6.36%) and desktop (0.9%). Majority spend less than Rs 300 per month on internet (59.1%) followed by Rs 300-600 per month (40%). Only 0.9% spends more than Rs 600 per month on internet use. The most preferred time for internet use has been found to be night time (54.54%). The most common reasons for internet use include social networking (89.09%) followed by education (88.18%), recreation (66.36%) and gaming (43.64%). Male students used internet most commonly for education (89.65%), followed by social networking (87.93%). However, female students used internet mostly for social networking (90.38%), followed by educational purpose (86.54%).

TABLE 3: PATTERN OF INTERNET USE AMONG STUDY PARTICIPANTS

Hours spent on internet per day	Frequency (%)		Total No (%)
	Male	Female	
1-3	23(39.65)	19(36.53)	42(38.18)
4-6	31(53.45)	29(55.77)	60(54.54)
7-9	4(6.9)	4(7.7)	8(7.28)
Type of internet connection used*			
Mobile Internet	58(100)	51(98.07)	109 (99.1)
Broad Band	1(1.72)	0(0)	1 (0.9)
Wi Fi	10(17.24)	12(23.07)	22 (20)
Types of devices used for internet connection*			
Desktop	1(1.72)	0(0)	1(0.9)
Laptop	14(24.14)	7(13.46)	21(19.1)
Mobile	58(100)	52(100)	110 (100)
Tablet	6(10.34)	1(1.92)	7 (6.36)
Expenditure on internet per month			
Less Than 300	37(63.8)	28(53.8)	65(59.1)
300 - 600	21(36.2)	23(44.3)	44(40)
More Than 600	0(0)	1(1.9)	1(0.9)
Reasons For Internet Use*			
Educational	52(89.65)	45(86.54)	97 (88.18)
Social Networking	51(87.93)	47(90.38)	98 (89.09)
Recreational	38(65.51)	35(67.30)	73 (66.36)
Gaming	33(56.89)	15(28.84)	48 (43.64)
Others	4(6.89)	1(1.92)	5 (4.54)
Preferred Time of Internet Use*			
Morning	4(6.89)	2(3.84)	6 (5.45)
Afternoon	14(24.13)	10(19.23)	24 (21.81)
Evening	20(34.48)	18(34.61)	38 (34.54)
Night	35(60.34)	25(48.07)	60 (54.54)
Not Specific	18(31.03)	23(44.23)	41 (37.27)
Total	58	52	110

(*multiple responses).

Perceived Reasons for Excessive Internet use among Undergraduate Medical Students: To explore the underlying reasons for excessive internet use among medical students, written responses from all 110 study participants were collected. Among them, 98 (89.09%) provided analyzable responses. The responses were analyzed using thematic analysis. Thematic saturation was achieved within this dataset. Six major themes which emerged were coping with stress and loneliness, entertainment dependency and information seeking, social validation and connection, unregulated access, compulsive use and academic avoidance. **Table 4** Select participant quotes (coded anonymously) are presented to support each theme.

TABLE 4: PERSPECTIVES OF STUDENTS REGARDING THE UNDERLYING REASONS FOR EXCESSIVE INTERNET USE

Themes	Codes/Subthemes	No. of repeats (%) (n= 98)
Coping Mechanism	Stress relief, boredom, loneliness, emotional escape, lack of recreational alternatives	40(40.81%)
Entertainment dependency and information seeking	Entertainment, pleasure, recreation, curiosity, access to information, learn new skills	38 (38.77%)
Social Validation & Comparison	Peer comparison, fear of missing out, need for social connection	32(32.65%)
Unregulated access	Easy access, low cost	19(19.39%)
Compulsive Use	Habitual checking, lack of self-control, mindless browsing, digital dependency	16(16.32%)
Academic Avoidance	Escape, study fatigue, lack of focus, academic stress	15(15.30%)

Theme 1: Coping with Stress and Loneliness: Many students reported using the internet as a means to manage stress, escape from reality or to overcome emotional fatigue.

“Whenever I feel frustrated with studies or hostel life, I just watch YouTube or scroll Instagram to relax.” – P14

‘’When I miss my parents at home, I start playing online games to distract myself’’ - P85

It suggests that internet use served as an emotional buffer, indicating a coping strategy among students.

Theme 2: Entertainment Dependency and Information Seeking: Students reported using internet as a source of entertainment and recreation at the comfort of their rooms. Internet is also used by students to have access to new information and learn new skills in order to upgrade themselves.

‘’I watch Netflix series every night to relax myself’’ -P 88

‘’I go through online content to understand my academics in greater detail as there is unlimited content available on the internet’’- P 23

This reflects that students use internet not only for entertainment, but also for academic improvement.

Theme 3: Social Validation and Connection: Several students expressed dependency on social media platforms to compare themselves with peers and keep in touch with the world.

“I go through social media to see what my friends back home are doing and stay connected with them.” – P33

“I keep checking for likes or comments on my posts as it makes me feel noticed.” – P48

Theme 4: Unregulated Access: Several students expressed that easy and cheap access to internet without any regulation for its use makes it popular among them.

"Earlier at home, my parents allowed limited use of my phone. In the hostel, I can use it whenever I want, even at night." - P19

"Unlimited data plans at low cost make it very easy to stay online all the time." - P72

Theme 5: Compulsive Use: A pattern of compulsive or habitual internet checking without any specific purpose emerged, which reflects lack of self-control even after being aware of its negative impact.

“I check my phone every few minutes even if there’s nothing new.”–P05

“I can’t stop myself from browsing.” – P72

Theme 6: Academic Avoidance: Students frequently admitted to using the internet as an escape mechanism, particularly when facing academic pressure or burnout and when they needed distraction.

“I watch reels to escape the pressure of studies.” – P57

‘’Whenever I lack focus and motivation and cannot see the real goal in my life, I end up scrolling through the internet for hours’’ – P43

This behavior reflects that students avoid or delay academic responsibilities resulting in poor time management and increased screen time.

All the themes highlight multi-dimensional reasons of internet overuse among medical students which include emotional, social and behavioral factors contributing to their perceived addiction.

A word cloud was generated using the codes obtained from the transcribed responses to visually represent frequently occurring terms. Words like 'easy access', 'social media', 'entertainment', 'loneliness', 'boredom', 'information' and 'escape' featured prominently, which supported the thematic analysis **Fig. 1.**

FIG. 1: WORD CLOUD SHOWING MOST FREQUENTLY OCCURRING TERMS

DISCUSSION: Currently internet has become an important tool for education, entertainment and communication. Increased internet usage can cause addiction, which can result in adverse academic, mental, physical and social outcomes. Medical students are also among the vulnerable group on account of time they spend on internet [1, 9].

The present study found that 70.91% of participants were average users or mildly addicted, 20.91% showed moderate addiction while 8.18% were not addicted and no participants had severe addiction. In a study carried out in Nagpur, Maharashtra it was observed that 61.47% were average online users, 34.83% were possible addicts and 3.68% were addict using Young's IAT scoring [15].

Similar findings were observed in another study where 74.5% internet users were moderate users, 24.8% were possible addicts and 0.7% were addicts [16]. Setty *et al,* in their study, did not find any students with severe internet addiction [17]. Recent studies in India report prevalence as high as 78.7% in Jammu region and 80% in West Bengal, with strong links to depression, anxiety and stress [18, 19]. All the study findings are comparable with the findings of our study.

However, Joseph J *et al* reported that among 19 states in India, the prevalence was found to be 19.9% among young adults [20] Also, a study on internet addiction carried out in Jodhpur among undergraduate students of diverse streams reported mild, moderate and severe addiction as 31.8%, 18.5%, and 0.7% respectively which shows lower rates of mild and moderate addiction, potentially reflecting regional variations in access, usage patterns, or cultural norms [5]. All the findings reflect the high burden of the problem among the medical undergraduates.

A statistically significant association between gender and internet addiction was observed ($p = 0.047$), with males showing higher addiction levels. This is consistent with literature suggesting that male students are more likely to engage in non-academic internet use and have less parental supervision, contributing to higher screen time and addiction risk [5, 16]. Our findings of significant male predominance also echo those by Kumari *et al* and Abbas *et al* [18, 21].

Majority of the students in each academic year were average online users (mild addiction) followed by possible addicts (moderate addiction). Most of them (54.54%) used internet for 4-6 hours per day while 38.18% used it for 1-3 hours per day. Similar trends were observed in a study in Bangalore, where they reported that 50% of the students were using internet for 4-6 hours while 35 % were online for 1-3 hours per day [9]. However, Patel MV *et al* observed that majority of the students (69.06%) used the internet between 1-3 hours followed by 4-6 hours (27.34%) [22]. Both male (53.45%) and female (55.77%) respondents in our study used internet for 4-6 hours per day. Contrary to our results, Patel MV *et al* reported that majority of both males (67.9%) and females

(70.69%) used internet between 1-3 hours followed by 4-6 hours [22]. The findings show a variation in the hours spent on internet in various studies which might be due to differences in the populations studied.

The most common mode of internet access in our study was mobile internet (99.1%) followed by Wi-Fi (20%). Access was most commonly through mobile phone (100%) followed by laptop (19.1%), tablet (6.36%) and desktop (0.9%). Similar findings were observed by other researchers [9, 22]. Moreover, in our study, most of the students spend less than Rs 300 per month on internet (59.1%) followed by Rs 300 - 600 per month (40%). Similar results were observed by other studies [16, 22]. This shows that the dominance of mobile internet and low-cost data plans underscores the accessibility of digital platforms in India, which, though empowering, also fuels unregulated use.

Social networking and entertainment were the most common reasons for internet use (89.09%). Other studies show that most common use of internet is for social networking and media download rather than academics [19, 22]. This aligns with findings from multicentric studies indicating that over 80% of medical students rely on digital media for non-academic activities [23].

Notably, this study incorporated a qualitative analysis that enriched understanding of behavioral patterns, revealing six thematic drivers of excessive use: stress coping, entertainment dependency, social validation, unregulated access, compulsive use, and academic avoidance.

The predominant theme identified was the use of the internet as a compensatory strategy to manage emotional stress. Students frequently described resorting to social media and streaming platforms for alleviating feelings of stress, loneliness and general emotional exhaustion. Moreover, youth are often vulnerable to boredom, impulsive behaviour, are at a high risk for addictive behaviours [24, 25]. This aligns with findings from a multi-centric epidemiological study, which reported that psychological morbidity is notably elevated among medical students, which is often managed through maladaptive digital engagement [26]. Furthermore, the ICMR-ICSSR task force report on youth mental health underscored that escalating patterns of internet overuse among Indian adolescents and young adults often stem from inadequate institutional and familial support systems, and are symptomatic of broader psychosocial vulnerabilities [27]. Our study reaffirms the fact that digital engagement often serves as an emotional coping strategy in absence of alternate healthier coping mechanisms.

Dependency on internet as a source of entertainment and information emerged as another important factor responsible for excessive internet use among the students. Easy accessibility of online platforms and also detailed online learning materials were utilized by the students. Another crucial theme was the role of social media in fostering dependency through social validation and need to connect with the world. Students reported comparing themselves with their peers and felt pressurized to keep themselves in touch with the world.

These narratives are congruent with recent findings from tertiary institutions, where social media use has been positively correlated with anxiety, depression, and body image dissatisfaction among medical trainees [28]. Further, qualitative explorations in West Bengal have highlighted the complex relationship between online social comparison and academic anxiety in medical cohorts [29]. This shows that although a reasonable use of the internet is helpful for students, excessive and uncontrolled internet use can lead to internet addiction without even understanding about its consequences [30].

The easy availability and accessibility of high-speed internet services without any regulation or restriction emerged as another important theme for overuse of internet services which enables them to remain online throughout the night resulting in addiction. The dimension of compulsive internet use characterized by diminished self-control despite awareness of negative consequences corresponds with the diagnostic features of behavioral addictions as originally delineated by Young [31]. Indian validation studies of the Internet Addiction Test (IAT) have consistently demonstrated high rates of compulsivity among medical students, even among those not classified as clinically addicted [32].

Another study documented 96.2% of medical students reporting uncontrollable Facebook use, corroborating our theme of social validation and compulsive use [33].

Academic avoidance was another recurring behavioral pattern, wherein students intentionally deferred academic obligations and used the internet as an escape mechanism. In fact, since the beginning of COVID-19 pandemic, education system is becoming more online based [34]. This pattern has been extensively documented in literature examining behavioral responses to academic stress. A southern Indian cross-sectional study reported that 60% of medical students used smartphones primarily to escape academic overload, thereby compromising their cognitive productivity and academic outcomes [35]. Our findings extend this understanding where the high-pressure environment, competitive evaluation systems and difficulty in maintaining balance contribute to their preference for immediate digital gratification over long-term academic goals. All the themes deducted in this study corroborates with the findings of other studies in different parts of the country [26, 36].

CONCLUSION: The present study highlights a high prevalence of internet addiction among medical undergraduates, with a considerable proportion exhibiting mild to moderate levels of dependence. The integration of qualitative findings revealed that excessive internet use is influenced by interplay of psychosocial, academic, and behavioral factors which included stress coping, entertainment dependency**,** social validation needs, compulsive use, unregulated access and academic avoidance. These insights underscore the urgent need for institutional policies promoting healthy screen-time behavior and psychosocial support systems including structured mentorship in undergraduate medical education, in alignment with the NMC's emphasis on student well-being [37]. This will enable to support and protect the future generation of doctors, particularly in the context of increasing digital integration in medical education.

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CONFLICT OF INTEREST: Nil

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