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Original Research Article

Effects of internet addiction on mental and ocular health of school students of district Amritsar

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ABSTRACT

Background: The popularity of mobile phones is increasing among students because of their multifunctionality as one click allows them to explore multiple applications providing new and varied functions. This excessive use becomes an addiction at later stages that has a negative impact on the mental health of the child. Further emission of blue lights from screens negatively impacts the eyes.
Methods: A cross-sectional study was conducted amongst the students of 9th to 12th class students from 4 Schools of Amritsar where 92 students (23 students per class, 1:1 male to female ratio) from each school were selected using simple random sampling. Based on various symptoms related to ocular and mental health, 11 and 10 questions were framed respectively. The presence of symptoms was scored as one. The Mean was calculated; and anyone who scored above the mean was considered having a negative impact on the ocular and mental health. The association between internet addiction and its effects on ocular & mental health was calculated using the Odds Ratio.
Results: The prevalence of internet addiction was found to be 49%. Mental health problems were present in 45% of the participants. Ocular problems were present in 40% of the participants. Internet addiction was found to be associated with poor mental and ocular health.
Conclusions: 49% of students were addicted to the internet. Internet addiction was found to be associated with poor mental & ocular health.

Keywords: Addiction, Internet, Mental health, Ocular health, Students

INTRODUCTION

In today's world, addiction is no longer restricted to alcohol or substance use. Behavioral addiction among youth is in growing trend noted in the recent past. Researchers define technological addictions as a subset of behavioral addictions – one that involves human-machine interaction; and which develops when people become dependent on a device to reduce negative mood states or increase positive consequences.[1] Excessive internet and screen exposure in school students is linked to increased anxiety, depression, and disrupted sleep. Social media can foster feelings of inadequacy and loneliness, while constant online activity often leads to information overload and cyberbullying. Disrupted sleep patterns, caused by prolonged screen time, further contribute to mental health issues. Balancing digital use with physical activity and offline interactions is essential for students' well-being. The light that is emitted from our phones, tablets, and laptops, and unfortunately, it has been discovered to have detrimental effects on our eye health. It has the potential to cause macular degeneration, bypassing the pupil and cornea to directly target the retina. The blue light is believed to impact our central vision by causing the death of photoreceptor cells in the retina. Unlike certain other cells in our body, once these cells perish, they cannot regrow or reproduce. This implies that any harm inflicted upon them is irreversible.[2]

According to international studies on eye health, dry eye, and diplopia are the most prevalent ocular disorders resulting from excessive use of smartphones and computers, particularly among young adults who are known to be the primary users of these devices. An abnormal blink rate occurs when children keep their eyes open to concentrate on the screen, resulting in a blink rate that can decrease by 5–6 times per minute. This condition prolongs the exposure and evaporation on the eye's surface, causing instability of the tear layer and leading to the complaint of dry eye.[3]

With the rapid progress of technology and increased screen time for children, there is a significant likelihood of mobile addiction among them. The children have easy access to mobile phones, and with the shift to online academic studies due to COVID, their screen time has significantly increased. It was crucial to address this issue at its earliest stage.

This study was conducted on the 9th to 12th Standard students to assess the excessive internet use in them. Since internet addiction is a behavioral disease, we can hinder its development by educating the students in the initial years of life.

METHODS

Study design

This was a cross-sectional study conducted among students of classes 9th to 12th standard of urban and rural schools of Amritsar. An equal number of students from each class was selected, ensuring equal opportunity for both genders. Students who had a history of substance abuse and those who failed to give written informed consent were not included.

Study duration

Time period for the study was 1 year (1st January 2023 to 30th December 2023).

Sample size and sampling technique

The sample size was calculated using the formula for a single proportion $N > Z^2 \times P \times Q/D^2$, considering a 95% confidence interval, a 31% prevalence of internet addiction from previous research, and 0.05 precision, resulting in an initial size of 328.4 Accounting for a 10% non-response rate, it increased to 360, and for equal gender distribution, it was adjusted to 368, with 184 participants each from rural and urban schools.

Data collection tool

A predesigned semi-structured proforma based on the Internet Addiction Test was used for data collection. Another proforma was prepared in the form of a self-constructed questionnaire with questions related to mental and ocular problems.

Ethical approval

Ethical approval was obtained from IEC before starting the study, followed by a meeting with the DEO Amritsar to discuss the study and obtain a list of schools. Data collection involved personal visits to four different higher secondary schools, with parental consent and student assent obtained beforehand. Questionnaires were filled out confidentially during free periods, with the researcher present to address doubts and check for completeness, followed by a brief health education session on the impact of Internet addiction and how to prevent it.

Statistical analysis

For assessing the Internet Addiction, in Internet Addiction Test (IAT) total score is the sum of the ratings given by the examinee for the 20 item responses. Each item is rated on a 5-point scale ranging from 0 to 5. The maximum score is 100 points. The higher the score is, the higher is the severity of your problem.

Table 1: Classification according to the severity of internet addiction test.

Score	Level of internet usage/addiction
0-30	Normal level of internet usage
31-49	Mild internet addiction
50-79	Moderate internet addiction
80-100	Severe dependence upon internet

For assessing the mental and ocular health problems in students, the mean score was calculated. Students scoring above the mean were considered to have a problem, while those scoring below were considered normal.

The responses of each student were compiled, using Microsoft excel and later imported to Epi-info for the statistical analysis, the distribution of various variables was represented through frequencies and proportions, whereas for continuous variables mean were calculated. Association of various contributing factors with Internet, addiction was established by using odds ratio.

RESULTS

Internet addiction was present in 49% of the study participants

Responses in relation to internet addiction test

The IAT measures the frequency of behaviors and feelings associated with internet use, ranging from "Does Not Apply" to "Always."

The 20 questions address various aspects of internet use, such as time spent online, neglect of personal responsibilities, and emotional impacts of internet use.

The distribution of responses from 368 participants to the internet addiction test (IAT) were mentioned in (Table 2).

Table 2: Distribution of study participants responses to internet addiction test scale (n=368).

S. no.	Question (Score)	Does Not Apply (0)	Rarely (1)	Occasionally (2)	Frequ-ently (3)	Oftenly (4)	Always (5)
1	How often do you find that you stay on-line longer than you intended?	70 (19)	140 (38)	48 (13)	30 (8)	37 (10)	43 (12)
2	How often do you neglect household chores to spend more time on-line?	128 (35)	104 (28)	47 (13)	40 (11)	32 (9)	17 (4)
3	How often do you prefer the excitement of the Internet to intimacy with your partner?	203 (55)	65 (18)	39 (10)	19 (6)	26 (7)	16 (4)
4	How often do you form new relationships with fellow on-line users?	169 (46)	91 (25)	38 (10)	25 (7)	21 (6)	24 (6)
5	How often do others in your life complain to you about the amount of time you spend on-line?	94 (25)	125 (34)	46 (13)	32 (9)	22 (6)	49 (13)
6	How often do your grades or school work suffers because of the amount of time you spend on-line?	103 (28)	122 (33)	47 (13)	44 (12)	32 (9)	20 (5)
7	How often do you check your email before something else that you need to do?	119 (32)	126 (34)	50 (14)	18 (5)	19 (5)	36 (10)
8	How often does your job performance or productivity suffer because of the Internet?	141 (38)	100 (27)	50 (14)	36 (10)	20 (5)	21 (6)
9	How often do you become defensive or secretive when anyone asks you what you do on-line?	128 (35)	103 (28)	44 (12)	39 (10)	18 (5)	36 (10)
10	How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	91 (25)	110 (30)	36 (10)	44 (12)	38 (10)	49 (13)
11	How often do you find yourself anticipating when you will go on-line again?	128 (35)	108 (29)	34 (9)	46 (13)	18 (5)	34 (9)
12	How often do you fear that life without the Internet would be boring, empty, and joyless?	95 (26)	124 (34)	49 (13)	30 (8)	31 (8)	39 (11)
13	How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?	110 (29)	124 (34)	51 (14)	32 (9)	24 (7)	27 (7)
14	How often do you lose sleep due to late-night log-ins?	191 (52)	86 (23)	43 (12)	17 (5)	16 (4)	15 (4)
15	How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line?	135 (37)	127 (35)	39 (10)	28 (8)	16 (4)	23 (6)
16	How often do you find yourself saying “just a few more minutes” when online?	54 (15)	111 (30)	54 (15)	37 (10)	26 (7)	86 (23)
17	How often do you try to cut down the amount of time you spend on-line and fail?	86 (23)	98 (27)	45 (12)	39 (11)	23 (6)	77 (21)
18	How often do you try to hide how long you’ve been on-line?	160 (43)	85 (23)	43 (12)	23 (6)	22 (6)	35 (10)

Continued.

S. no.	Question (Score)	Does Not Apply (0)	Rarely (1)	Occasionally (2)	Frequ-ently (3)	Oftenly (4)	Always (5)
19	How often do you choose to spend more time on-line over going out with others?	157 (43)	117 (32)	34 (9)	24 (7)	7 (2)	27 (7)
20	How often do you feel depressed, moody or nervous when you are off-line, which goes away once you are back on-line?	133 (36)	102 (28)	43 (12)	31 (8)	25 (7)	34 (9)

Severity of internet addiction

35% of the study participants were mildly internet addicted, while moderately addicted to internet were 13% and 1% were severely addicted to the internet (Figure 1).

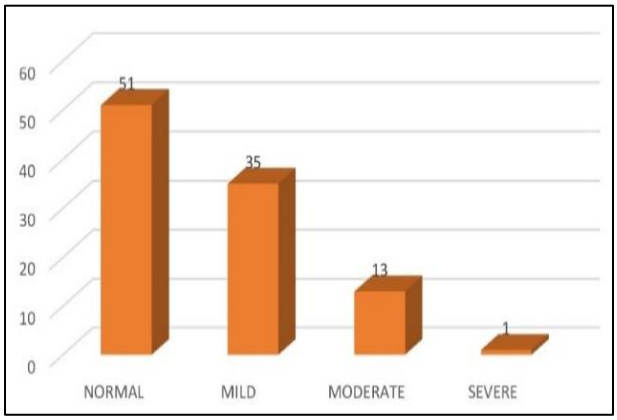

Figure 1: Distribution of study participants according to the severity of internet addiction (n=368).

Morbidities in relation to mental health:

The morbidities related to mental health issues were examined which include difficulties in concentration, tiredness, impatience, and others. For each mental health problem, the table shows the number and percentage of participants who responded "Yes" (indicating the presence of the issue) or "No" (indicating its absence). A significant portion of participants reported difficulties like concentration problems (45%) and negative impacts on education (44%), while conditions like insomnia (19%) and isolation from family and friends (19%) were reported less frequently (Table 3).

Internet addiction and its association with mental health

Among participants with mental health problems, 69% had internet addiction in comparison to those who did not (31%).

The odds ratio indicates that participants with mental health problems were over four times more likely to have internet addiction compared to those without such issues (Table 4).

Table 3: Distribution of study participants according to the morbidities related to their mental health status (n=368).

Mental health problems	Yes	No
Difficulty in concentration	167 (45)	201 (55)
Tiredness	135 (37)	233 (63)
Impatience	124 (34)	244 (66)
Negative impact on education	163 (44)	205 (56)
Uncomfortable in large gatherings	123 (33)	245 (67)
Restlessness	112 (30)	256 (70)
Interrupted sleep	144 (39)	224 (61)
Sleep initiation problem	134 (36)	234 (64)
Isolation from friends & family	71 (19)	297 (81)
Insomnia	69 (19)	299 (81)

Table 4: Associations between mental health problems of study participants with Internet addiction (n=368).

Mental health problems	Internet addiction		OR (95%)
	Present (n=182)	Absent (n=186)	
Present	114 (69)	52 (31)	4.3201 (2.785-6.701)
Absent	68 (34)	134 (66)	

Table 5: Distribution of study participants according to the morbidities related to their ocular health (n=368).

Ocular problems	Yes	No
Headache	125 (34)	243 (66)
Spectacles	92 (25)	276 (75)
Eye Fatigue	136 (37)	232 (63)
Blink eyes frequently	83 (23)	185 (77)
Pain/Discomfort in eyes	84 (23)	284 (77)
Itching in eyes	95 (26)	273 (74)
Blurring of vision	74 (20)	294 (80)
Excessive lacrimation	75 (20)	293 (80)
Burning in eyes	65 (18)	303 (82)
Dryness in eyes	42 (11)	326 (89)
Does the number change frequently	30 (8)	338 (92)

Morbidities in relation to mental health

Various eye-related issues, such as headaches, eye fatigue, and visual discomfort, are categorized with the number and percentage of participants reporting each condition. Common problems include eye fatigue (37%) and headaches (34%), while fewer participants reported issues like frequent changes in prescription (8%) and dryness in the eyes (11%) (Table 5).

Table 6: Associations between ocular problems of study participants with Internet addiction (n=368).

Ocular problems	Internet addiction		OR (95%)
	Present (n=182)	Absent (n=186)	
Present	93 (64)	53 (36)	2.6222
Absent	89 (40)	133 (60)	(1.7039- 4.0354)

Internet addiction and its association with ocular health

Among participants with ocular problems, 64% had internet addiction in comparison to those who did not (40%). The odds ratio indicates that participants with ocular problems were more than twice as likely to have internet addiction compared to those without such problems.

DISCUSSION

The high prevalence of internet addiction (49%) among 9th to 12th-grade students in the present study is alarming and warrants serious attention. This rate significantly exceeds those reported in similar demographics in other regions, such as 34.3% among higher secondary students in Kathmandu, Nepal (2019).[5] These disparities suggest potentially unique local factors or methodological differences.

The rise in internet addiction stems from a combination of technological and societal factors. Increased accessibility through smartphones and high-speed internet, coupled with the growth of engaging social media platforms and immersive online games, has made constant connectivity. The COVID-19 pandemic accelerated this trend, as people relied more heavily on digital communication.

Psychological factors, including using the internet as an escape mechanism and the fear of missing out, contribute to compulsive online behavior. Additionally, the increasing integration of the Internet into work and education has blurred the lines between necessary and excessive use. A lack of awareness about healthy digital habits further exacerbates the problem, making internet addiction a growing concern in modern society. The findings of the present study reveal a concerning prevalence of internet addiction among 9th to 12th-grade students, with 49% affected overall. The severity breakdown, showing 1% severe addiction, 12-14% moderate addiction and 35-36% mild addiction, highlights mild addiction as a critical yet often overlooked issue. These findings align with Hamza et al.'s (2019) study suggesting potential variations in internet use patterns between these settings.[6]

These results underscore the urgent need for comprehensive intervention programs within educational settings, addressing not only severe cases but also the large group of mildly addicted students. Such interventions should promote healthy internet habits, offer alternative activities, and address factors like academic pressure and social anxiety. This approach is crucial to mitigate the potential long-term consequences of internet addiction on adolescent development and overall societal well-being.

The present study revealed a strong association between internet addiction and mental health problems, with 69% of participants experiencing mental health issues being internet-addicted compared to 34% with no mental health problems. These findings are consistent with several previous studies in this field. For instance, Younes et al. (2016) in their study found that the majority of students classified as internet addicts also showed symptoms of anxiety or depression.[7]

Similarly, Sara Ali et al reported mobile phone usage was a significant positive predictor of mental health problems among secondary school students, with female students scoring significantly higher on mental health problems compared to males.[8]

The consistency across these studies underscores the significant comorbidity between internet addiction and mental health problems, suggesting that individuals with mental health problems are at a substantially higher risk of experiencing Internet Addiction. This highlights the importance of considering mental health screening and support in the treatment of internet addiction, and vice versa.

This study found a strong association between internet addiction and eye problems, with 64% of participants with eye problems reported internet addiction compared to 40% of participants with no eye problems. These findings are consistent with several other studies in the field. For instance, Sanjeev Kumar Mittal et al concluded that internet use on mobile phones impacts tear fluid dynamics and corneal thickness, indicating that radiation or thermal effects from mobile phones can affect the eye and its structures.[9] Similarly, Nayak R et al in their study found that the total eye strain symptom score significantly increased post-experiment compared to pre-experiment.

Symptoms such as tired eyes, sore eyes, and sleepy eyes significantly worsened after 60 minutes of smartphone use. The study concluded that closer viewing distances and eye strain symptoms are evident after smartphone use.[10] The consistency across these studies underscores the strong relationship between excessive internet use and

ophthalmological issues. A larger-scale, geographically diverse study with a longitudinal approach is needed to comprehensively understand the patterns, development, progression, and fluctuations of mobile and internet addiction over time.

CONCLUSION

The study underscores the critical link between internet addiction and significant health issues. A compelling association is identified between internet addiction and both mental and ocular health problems, indicating that those with mental health issues or ocular complaints are more likely to experience addiction. These findings highlight an urgent need for targeted interventions to address the varying impacts of internet addiction on students.

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