

Internet Addiction and Its Correlates among College Students of Surat City: A Cross Sectional StudyAbhishek Mukherjee¹, Mohua Moitra², Vipul Chaudhari³, Avantika Gupta¹, Geeta Patel¹, J.K. Kosambiya⁴¹Senior Resident, ³Associate Professor, ⁴Professor and Head, Department of Community Medicine, Government Medical College, Surat²Professor, Department of Community Medicine, Medical College Baroda, Vadodara**Correspondence :** Dr. Abhishek Mukherjee, Email: abhishekmkhrj1212@gmail.com**Abstract:**


Introduction: The number of internet users in 2018 was 4.021 billion, increased 7 percent year-on-year. More than nine-tenths of Indian teens use Internet. Due to social distancing norms put forward due to COVID-19 dependency and availability of Internet usage has increased. **Objective:** To assess the extent of Internet addiction and determine its predictors among college students of Surat city. **Method:** A cross sectional study was conducted from March-September 2021 among 400 first- and second-year students selected by systematic random sampling from four colleges selected purposively. Outcome variables were Young's Internet addiction Test and Duke Health Profile Score which were assessed in terms of mean score. Univariate analysis was done, followed by t-test, ANOVA and Pearson Correlation to establish associations. Predictors were determined by Binary Logistic Regression. **Results:** Around one-tenth (12.8%) participants were seen with no Internet addiction, with majority being mild (44.8%) and moderately (36.5%) addicted. Severe addiction was seen in around one out of twenty participants (6.1%). Social networking (32%) and education (34.5%) were the major reasons for use of Internet. Higher pocket money (aOR=4.3), greater monthly internet expenditure (aOR=2.8), ownership of internet enabled mobile phone (aOR=3.9), lying down posture while accessing internet (aOR=4.8) and evening (aOR=2.2) or night time (aOR=8.7) of internet access were significant predictors for Internet addicts. **Conclusion:** In this study more than four fifth of the college students had Internet Addiction even at young age. Physical, Mental, Social and General health were significantly negatively correlated with internet addiction.

Key words : College students, Duke Health Profile, Young's Internet Addiction,**Introduction:**

Internet is a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols.^[1] A survey of 26 countries conducted by British Broadcasting Corporation in March 2010 found that nearly 4 out of 5 people (79%, to be exact) believe that access to the Internet is a "fundamental human right".^[2] In 2020, India had nearly 700 million internet users across the country. In 2019, India ranked second next to China, for being the largest online market.^[3] 95% of Indian teens were found to be using

internet. 70% youth use Internet for >5 hours/week and 52% access social media at school.^[4]

Internet Addiction is any online-related, compulsive behavior which interferes with normal living and causes severe stress on family, friends, loved ones, and one's work environment.^[5] Young linked excessive Internet use most closely to pathological gambling which has been marked as a disorder of impulse control in Diagnostic Statistical Manual (DSM IV). Young then adapted the DSM IV criteria to relate to internet use in the Internet addiction test.^[5]

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Multiple studies over the time have documented internet addiction, where a rise of addiction prevalence was seen as years pass. Study done by Krishnamurthy et al.^[6] documented Internet addiction prevalence as 43% which has risen to 97.8% in study done by Jaiswal et al.^[7] over a period of five years.

COVID-19 pandemic has disrupted normal pattern of daily activities. As of April 2020, approximately 3 billion people worldwide were required to stay at home and colleges had implemented online education as mode of teaching.^[8] Staying physically away from colleges, dependency on technology and internet for daily life, vulnerability of addiction among adolescence would have put the population under observation at risk for mental health affliction like Internet addiction. In India 2nd wave of COVID-19 pandemic continued roughly for a period of March 2021 to October 2021 affecting about 1.7 crore people.^[9] Physical classes were postponed indefinitely and classes were held over online portals. Therefore, it is important to understand how the COVID-19 pandemic has influenced the use of technology during this unique period and whether there is any change in Internet addiction prevalence. Based on the quarantines of the COVID-19 pandemic and stay at home mandates, this study explores the extent of Internet addiction, factors affecting it and psychosocial domains correlated with it.

This study was conducted because data on Internet addiction is sparse in South Gujarat especially at inter-college level. More importantly this study examines the prevalence rate of Internet addiction during COVID-19 pandemic and its psychosocial risk factors among the population under study. The results obtained from this research may provide useful information for parents, schools, colleges and policy makers to promote prevention of Internet addiction by maintaining a proper balance of availability of Internet educational resources and dependency towards them.

Method:

A cross sectional study from March 2021 to September 2021 was conducted among college students of Surat city. Permission was sought from Institutional Scientific Review and Human research Ethics Board. (Ref no. GMCS / STU / ETHICS / Approval / 29832 / 19). Permission was taken from Principals of the respective colleges. Informed written consent of the participants was obtained after explaining the contents of the participant information sheet to them in a language they understand and comprehend. The participants were ensured about maintenance of confidentiality by not taking any identifiers and cumulatively presenting the data.

Sample Size:

Taking a prevalence rate of 38.2% for Internet addiction,^[10] absolute precision at 5% and 95% Confidence level and 80% power, a sample size of 363 was obtained. Applying a 10% rate for non-responsiveness, the sample size was 399. This was rounded off to a final sample size of 400 for the ease of uniform data collection from the 4 purposively selected colleges.

Sampling:

Out of 31 colleges in Surat city, four were chosen purposively of different streams of Medical, Engineering, Physiotherapy and Humanities. Total number of students in first and second year for the four colleges were similar in strength according to the data provided by school principals. Thus, according to probability proportionate to size, 100 eligible participants were selected from each college. Systemic random sampling was done after calculating sampling interval for each college till the sample size was reached. First and second year students more or equal to eighteen years of age were included and those were sick or absent on day of data collection were excluded.

Study tools:

A pretested, predesigned, structured questionnaire consisting of four sections was used (Demographic data survey tool, Pattern of Internet usage, Young's Internet Addiction Test and The Duke Health Profile). Pretesting was done by a pilot study conducted on sample size of 20. Face value was established by expert analysis. Young's Internet Addiction Test has a very good Internal Consistency, with a Cronbach alpha coefficient of 0.93. It has twenty questions that are graded from Rarely (1), Occasionally (2), Frequently (3), Often (4) and Always (5). A total score that does not exceed 30 indicates a normal level of internet consumption, whereas total scores between 31-49 indicates mild level addiction, 50-79 designates moderate level addiction and score of 80 or above reflect a severe internet dependency.

Duke Health Profile is copyrighted by The Department of Community and Family Medicine, Duke University Medical Centre, Durham, N.C., USA. Permission to use the study tool in this dissertation has been granted by the concerned authorities. It consists of 17 items covering physical health, mental health, social health, self-esteem, anxiety, depression, pain and disability. Score ranges from minimum of 0 to maximum of 100. These questions are responded by three options which are attached to a raw score pre-fixed in the test. This raw score is further used to calculate Final score of different psychopathologies - Physical Health Score, Mental Health Score, Social Health Score, General Health Score, Perceived Health Score, Self Esteem Score, Anxiety Score, Depression score, Anxiety-Depression (Duke-AD) Score, Pain score and Disability Score.

Data analysis:

Questionnaire was self-administered in hard copies after explaining about the study ensuring voluntary participation. Researcher also dictated the questions during the data collection period for higher reliability and ease of understanding of participants.

Data analysis:

After checking for completeness and consistency, data was entered in SPSS 26 for windows (IBM Corp. Chicago, U.S). It was then summarized using the descriptive statistics of mean, standard deviation, frequency and percentage. Associations were analyzed using Unpaired t-test, ANOVA with post hoc Tukey test and Pearson Correlation. Binary logistic and Multiple Linear Regression model were used to identify the predictors. For binary logistic regression, participants with Moderate and Severe Internet addiction scores were grouped as 'Internet Addicts' while those with Mild or No Internet addiction were grouped as 'Not addicts'. P-Value < 0.05 was considered as statistically significant.

Results:

From four colleges of different streams 400 participants, 100 first- and second-year college students from each, were recruited in this study. Mean age was 18.7 + 0.8 years with majority being females (62.5%). Majority, 358 (89.7%) possessed 'Personal' internet enabled mobile phone. Around 13.4% participants were Overweight and 1.6% participants were Class I Obese. Mean Screen Time during weekdays was 1.8 + 0.7 hours while on weekends it significantly increased to 2.8 + 1.1 hours (p<0.01).

Young's level of Internet Addiction:

Mean Internet addiction Score was found to be 49.6 + 14.9 with a maximum score of 88 and a minimum score of 21. Majority of participants were having Mild (181, 45.2%) or Moderate Internet addiction (144, 36.0%). Severe Internet addiction was seen in 24 (6.1%) participants. No Internet addiction was observed in 51 (12.7%) participants.

There was no significant association between Internet addiction Score and sociodemographic factors of stream, age, sex, parental education and occupation. High degree of correlation was seen with Amount of pocket money (r=0.68, p<0.01) and Monthly expenditure on Internet (r=0.63, p<0.01). Notable associations between pattern of Internet usage and Internet addiction score have been

Table 1 : Difference between Internet Addiction Scores among Students According to their Characteristics

Characteristics of students	n (%)	Internet Addiction Score (Mean \pm Standard Deviation)	p-Value
Stream of college			
Medical	100 (25.0)	51.2 \pm 13.4	0.29 [#]
Engineering	100 (25.0)	50.8 \pm 15.1	
Physiotherapy	100 (25.0)	47.8 \pm 15.9	
Humanities	100 (25.0)	48.5 \pm 15.2	
Gender			
Male	150 (37.5)	50.0 \pm 14.9	0.93 [#]
Female	250 (62.5)	49.3 \pm 15.0	
Main purpose of Internet Usage			
Education	142 (35.5)	43.5 \pm 14.1	<0.01 [*]
Social Networking	132 (33.0)	54.1 \pm 15.6	
Gaming	96 (24.0)	54.8 \pm 13.5	
Listen to songs	20 (5.0)	36.5 \pm 8.3	
Downloading Media	10 (2.5)	50.1 \pm 9.7	
Usual Posture of Internet Usage			
Sitting	281 (70.3)	45.6 \pm 12.4	<0.05 [#]
Lying down	119 (29.7)	58.9 \pm 16.2	
Most Frequent Time of Usage			
Morning	203 (50.7)	52.1 \pm 12.4	0.03 [*]
Noon	78 (19.4)	48.1 \pm 12.3	
Evening	52 (13.1)	44.7 \pm 12.7	
Night	67 (16.8)	64.1 \pm 16.9	
Usual place of Internet Usage			
House/ Hostel	198 (49.8)	50.4 \pm 15.2	0.38 [*]
College	189 (47.3)	49.5 \pm 14.8	
Internet Café	13 (2.9)	44.6 \pm 7.1	
Personal Ownership of Internet Enabled Mobile Phone			
Yes	358 (89.7)	50.9 \pm 14.8	<0.01 [#]
No	42 (10.3)	37.9 \pm 11.1	

[#]Anova followed with Post-Hoc Tukey Test

^{*}Independent t-test

mentioned in Table 1. Participants who used Internet mainly for Social media usage or Gaming purposes, at night (p=0.03) were found to have statistically significantly higher Internet addiction Scores than other uses as established by Post-hoc Tukey analysis. Participants whose posture of internet usage was 'lying down', those with frequent usage at night time and who owned internet enabled mobile phone had significantly higher Internet addiction Scores.

Duke Health Profile:

Internet addiction Score was significantly negatively correlated with Mental (r=-0.33, p<0.01), Social (r=-0.43, p<0.01) and General health (r=-0.40, p=0.01) scores but significantly positively correlated with Anxiety (r=0.44, p<0.01), Depression (r=0.19, p<0.01) and Duke-AD (Anxiety-Depression combined) score (r=0.36, p<0.01). There was negative correlation between internet addiction scores and physical health (r=-0.09, p=0.06),

Table 2 : Binary Logistic Regression for association between variables of Interest and 'Internet Addicts' (N=400)

Risk factor of internet addicts	cOR (95% Confidence Interval)*	aOR (95% Confidence Interval)#
Amount of pocket Money		
Below Rs. 2,910	1	1
Above Rs. 2,910	1.8 (1.5 - 2.1)	4.3 (2.4 - 7.4)
Monthly Internet Expenditure		
Below Rs. 203	1	1
Above Rs. 203	2.1 (1.5 - 2.7)	2.8 (1.6 - 4.7)
Ownership of Internet Enabled Mobile Phone		
No	1	1
Yes	3.8 (1.7 - 8.9)	3.9 (1.4 - 11.1)
Posture while accessing Internet		
Sitting	1	
Lying Down	2.2 (1.7 - 2.9)	4.85 (3.06-7.69)
Usual time of Internet Access		
Morning	1	1
Noon	2.6 (0.3-10.1)	1.4 (0.8 - 2.7)
Evening	6.2 (1.0-37.8)	2.2 (1.1 - 4.5)
Night	34.2 (7.6-152.8)	8.7 (4.1 - 18.6)

* Crude Odds Ratio

Adjusted Odds Ratio

perceived health (r=-0.06, p=0.2), self esteem (r=-0.05, p=0.4) and positive correlation with pain (r=0.03, p=0.5) and disability (r=0.05, p=0.4) but these findings were not significant.

Table 2 showed that higher than mean pocket money, higher than mean monthly Internet expenditure, ownership of internet enabled mobile phone, 'lying down' posture while internet usage and evening or night time internet usage were significant predictors for 'Internet addicts.'

Multiple Linear Regression Prediction Model:

A multiple linear regression was calculated to predict Internet addiction Score based on Monthly Pocket Money, Monthly Internet Expenditure, Screen time during weekends, Duke AD score and Social Health Score. A significant regression equation was found (F(n₁-1, n₂-1)=117.96, p <0.001), with an R² of 0.62. Participants' predicted Internet addiction Score was equal to 28.56 - 0.14 (Social Health Score) + 0.004 (Monthly pocket money) + 0.05 (Monthly Internet Expenditure) + 0.15 (Duke AD Score) + 3.38 (Screen time during weekends) where Indian Rupees

was measuring unit for monetary variables. All these variables were significant predictors of Internet addiction Score.

Discussion:

In this study, IA criterion was fulfilled in 87.3% participants which is similar to study done by Jaiswal et al. (93.8%).^[7] Upon seeing different levels of IA, Mild IA prevalence was similar to studies done by Christian et al.^[11], Damor et al.,^[12] however Moderate Internet addict category has seen a marked increase (17.4%, 17.2% respectively). In this study Mean IA Score was found to be 49.6 ± 14.9. In a study done by Singh et al.^[13] mean IA Score was found to be 32 ± 16.42. IA rate was found to be much higher than similar studies conducted during COVID-19 pandemic by Lin et al. (24.4%)^[14], Siste et al. (19.9%)^[15] and Khubchandani et al. (55.0%)^[16]. This difference can be attributed to demographic differences and also difference in scales used. Increased reliability on Internet for education, reduced outdoor time, cheap and faster availability of Internet specially during COVID-19 pandemic might have a significant role in this regard.

In current study, participants spending more than mean Monthly Internet Expenditure had 2.8 (1.6-4.7) times higher odds of becoming an Internet addict. Similar results were seen in studies done by Veena et al. ($\chi^2 = 42.59, p=0.0007$)^[17] and Krishnamurthy (OR=2.31, $p=0.002$)^[6]. There was also a high degree of correlation ($r=0.68$) of Internet addiction score with Monthly pocket money received by the participants. These relations show us the importance of self-restraint and increment of IA when financially sound.

In present study Ownership of Internet enabled mobile phone was found to be significantly associated with IA. In his study Sharma et al.^[18] showed that IA was higher among participants who have their own Internet enabled mobile phone. Similar results were seen in this study. Previous studies done by Anand et al.^[10] and Krishnamurthy et al.^[6] revealed male preponderance among Internet Addicts. However, in this study results were contrary as there was no significant difference across both genders. This may be due to Internet usage has been generalized across all genders and time variation across different studies.

Christian et al.^[11] conducted a similar study across five colleges of different streams. In his study he found that students of Science College were least addicted and Commerce students were the most affected by IA. However, the difference was not significant. In this study all the colleges had similar IA Scores. Online education is being used as a tool by all streams. Easy learning slope of Internet usage for education purposes has made Internet a very reliable and popular tool. Also, Internet is used for entertainment by all streams equally causing a similar outcome for different streams.

Screen time is a direct factor for IA screening. It is the time spent in front of any device which may or may not have Internet Access. However, accurate calculation is difficult as general use includes multiple apps and devices. In this study, significant association was found between Screen time and IA. Similar results were seen in studies done by Anand et al. (OR=3.7, $p<0.001$)^[10], Krishnamurthy et al. (OR=2.4, $p<0.001$)^[6], Veena et al. ($\chi^2 = 42.5936, p<0.001$)^[17] and Durkee et al. ($F(2, 11566) = 480.11;$

$P < 0.001$)^[19]. There was also a significant increase in screen time usage during weekdays and weekends. Participants get free time during weekends which allows them to use Internet at will which contributes to the growth of IA.

Internet has been used for multiple purposes by participants. In this study, educational purposes were reported as the most common purpose of usage. Damor et al.^[12] reported social media usage (65.2%) as the most common use. Durkee et al.^[19] reported social media and gaming usage as the most common use. This may be due to the fact that data collection of this study was done before and after 2nd wave of COVID-19 pandemic in India, in which period online classes and assignment were focused upon. However, IA was found to be significantly higher in participants who usually internet for gaming and social media purposes. This sub group analysis result was similar to findings of Durkee et al.^[19]

In this study, IA Score was significantly correlated with Mental Health Score ($r=-0.33$), Anxiety Score ($r= 0.44$), Duke AD Score ($r=0.36$), Social Health Score ($r= -0.43$). Goel et al.^[20] and Veena et al.^[17] reported similar findings. Jaiswal et al.^[7] conducted a study on Social anxiety by using Social interaction anxiety scale (SIAS) and found high correlation with IA ($r= 0.994, p< 0.001$). People with poor mental health tend to find solace in their virtual life and tend to escape from social interactions creating a vicious cycle.

Conclusion:

In this study, almost nine of every ten participants were found to have some level of internet addiction. Higher pocket money, Greater monthly internet expenditure, ownership of internet enabled mobile phone, evening or night time usage, and 'lying down' posture while internet usage were significant predictors of internet addiction.

Recommendation:

College administration and department of Health can collaborate for screening of addiction using similar tools followed by diagnosis and management of addiction cases discovered during the process. Monitoring of student's monthly expenditure by parents can be helpful in

discouraging excess internet usage. Evening or night time usage needs to be controlled. Parents and teachers should also be educated to recognize early signs of deteriorating general and mental health due to internet addiction.

Strength and Limitations:

Being a cross-sectional study, temporality of COVID-19 pandemic on IA cannot be established. However detailed comparison with similar studies across different time frame was done to minimize the limitation. A self-reported questionnaire was used hence there is a chance of participants giving socially acceptable answers. Also, the four colleges were chosen purposively which limits generalizability of the results. Use of validated questionnaires and participant's willingness to participate were some of the strengths of this study.

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