

**Prevalence of Internet Addiction and its Association with Depression, Anxiety, Stress and Self Esteem in Undergraduate Medical Students**Nikitha Reddy Beeram<sup>1</sup>, Gunturu Anuhya Guyton<sup>2</sup>, Ponnada Swathi<sup>3</sup>, Kiran Kumar Singuru<sup>4</sup><sup>1</sup>Junior Resident, Department of Psychiatry, Andhra Medical College, Visakhapatnam<sup>2</sup>Assistant Professor, Department of Psychiatry, Government hospital for mental care, Visakhapatnam<sup>3</sup>Assistant Professor, Department of Psychiatry, Andhra Medical College, Visakhapatnam<sup>4</sup>Associate Professor, Department of Psychiatry, Andhra Medical College, Visakhapatnam

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**Abstract:**

**Introduction:** The increasing popularity of the use of the internet has led to the emergence of Internet addiction (IA) especially in younger age group. This addiction as well as its association with mood disorders and self-esteem can impede their studies, impact their long-term career goals and might have wide, detrimental consequences for society as a whole

**Aim:** To study the prevalence of Internet addiction and its association with Depression, Anxiety, stress and Self-esteem.

**Materials and Methods:** A cross-sectional study was done among 407 Undergraduate medical students of Andhra Medical College, Visakhapatnam. 3 reliable and validated questionnaires were Used. Internet Addiction Test, the Depression Anxiety Stress Scales (DASS 21), and the Rosenberg Self-Esteem Scale (RSES). The prevalence of IA and then its association with Depression, anxiety, stress and self-esteem was assessed.

**Results:** Internet Addiction prevalence rate was 82.1%. There was significant difference between males and females ( $p=0.01$ ) with a higher prevalence rate in males (88.7% vs 77.6%). There was significant association between Internet Addiction and Depression, Anxiety, stress. ( $p<0.001$ ). However, there was no significant association between IA and self-esteem.

**Conclusion:** With a progressively increasing use of the internet and a corresponding internet-related psychopathology the world over, it is imperative that an attempt should be made to identify students with potential IA, treat internet-related problems, address and treat the coexisting psychological problems like depression, anxiety, stress, and also prevent internet related problems to a possible extent. Awareness is important at higher level to address the issue and implement measures for its prevention and treatment. As an emerging problem affecting student education, rehabilitation programs may be useful in the future.

**Keywords:** Internet Addiction, Depression, Anxiety, Stress, Self-Esteem, Medical Students.

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**Introduction**

As internet is the pivotal technology of the current information age, there has been an explosive growth in the use of internet not only in India but also worldwide to more than 5.4 billion active users. [1]

With rapid growth in internet access there is a rise in internet addiction, especially among adolescents and young people gaining increased attention from the popular media, government authorities, and researchers [2]

Excessive internet use is defined as when internet use has become excessive, uncontrolled, and time-consuming to the point of timelessness and severely disrupting people's lives [3]. Internet addiction is characterized by a maladaptive pattern

of internet use leading to clinically significant impairment or distress [4]

The terms "problematic internet use" [5], pathological internet use [6-8] and "internet addiction" [9,10] are usually considered synonyms of internet dependence [11]. Young et al proposed diagnostic criteria for internet addiction (IA) in which withdrawal, poor planning abilities, tolerance, preoccupation, impairment of control, and excessive online time were defined as core symptoms. [12-14]

Tao et al.(2010) proposed the following set of criteria: (a) symptom criteria (both must be present): preoccupation and withdrawal symptoms; (b) one or more of these criteria: (1) tolerance, (2)

persistent desire and/or unsuccessful efforts to control use, (3) continued use despite problems, (4) loss of other interests, (5) use of the Internet to escape or relieve dysphoric mood; (c) clinically significant impairment criterion: functional impairments (reduced social, academic, working ability), including loss of a significant relationship, job, educational or career opportunities. The criteria also include a course criterion (d): Duration of IA must have lasted for an excess of three months, with at least six hours of Internet usage (non-business/non-academic) per day.[15]

Worldwide prevalence of IA ranged from 1.6%-18%[16]. A meta-analysis of the prevalence rates across the global continents including 31 countries noted that the prevalence of IA is on the rise.[17] The Middle East (10.9%), North America (8.0%), and Asia (7.1%) are among the regions with highest prevalence of IA[18].

IA prevalence may vary according to age, gender, ethnicity, psychological, familial and social factors [19].

The prevalence of Internet addiction is on the rise in India, not sparing even school going students [20]. Being male, younger age at first use of Internet, staying alone, spending more time on the Internet (>3hrs/day), using Internet for online friendships, and an always online status were significant risk factors IA among Indian adolescents.[21-24].

IA is also reported to be associated with psychological problems like anxiety disorders, depressive disorders, stress [25], sleep disorders [25,26]; low self-esteem [27], impulsivity[28], suicide [29,30], lower levels of physical activity[26], and health problems (migraines, back pain, obesity)[31] Studies conducted among junior doctors of India found that most of them, especially from urban domicile, had mild-moderate severity of IA [22,32].

IA could be a major concern in university medical students, and its association with mood disorders and self-esteem is important, so that appropriate measures can be taken to address this issue.

For medical students aiming to develop into health professionals, the implications of this addiction can hinder their studies and impact their long-term career goals and can have wide and detrimental consequences on society as a whole,

In India there are only few studies on Internet addiction in undergraduate medical students and its association with psychological comorbidities. So, purpose of this study is to find out the prevalence of the Internet Addiction and its association with Depression, Anxiety, Stress and Self-esteem in Undergraduate Medical students.

Depression manifests as loss of interest or pleasure, sadness, feelings of guilt or low self-worth, disturbed sleep or appetite, extreme tiredness, and poor concentration [33]. It affects performance of job, quality of sleep, routine activities, and productivity of the affected individual.[34]

Anxiety is a response of body to a perceived threat which is triggered by an individual's beliefs, feelings, and thoughts and is characterized by worried thoughts, tension, increased blood pressure, respiratory rate, pulse rate, sweating, and difficulty of swallowing, dizziness, and chest pain.[35]

Stress is a feeling that is initiated when a person perceives that demands exceed resources mobilized by the individual.[36]

Self-esteem is described as the evaluation one has of his/herself, how one feels about his/herself in almost all situations.[37]

**Aim:** To find out the prevalence of Internet addiction in undergraduate medical students and its association with depression, anxiety, stress and self-esteem.

#### **Objectives:**

- To estimate the prevalence of Internet addiction in MBBS undergraduate students.
- To study the association between Internet addiction and Depression, Anxiety and Stress.
- To study the association between Internet addiction and self-esteem.

#### **Methodology:**

The study was conducted in Undergraduate medical students of 18 – 25 years of age studying in Andhra Medical college, Visakhapatnam after obtaining clearance and approval from institutional ethics committee, Andhra Medical College. After explaining the purpose of the study and obtaining written informed consent in the local language, 412 students participated in the study out of which 5 were excluded due to h/o psychiatric illness.

These 407 students were then asked to fill the questionnaire containing Sociodemographic data and self-reported questionnaires.

#### **1. Semi-structured interviewer questionnaire for sociodemographic**

**2. Internet Addiction Test (IAT):** It is a 20-item questionnaire to screen for the presence of various degrees of IA. Cronbach's alpha for internal consistency has been reported as 0.889.[38] It has been validated in various countries including Asian countries and has been used in some studies in India. Participants respond to the 20 IAT items on a 5-point Likert measure (“does not apply” to “always”), which produced an overall score

between 0 and 100. The following cut-off points to the total YIAT score were applied: (1) normal internet use: scores 0–30 and (2) 31–49: mild level of IA, (3) 50–79: moderate level of IA (4) 80–100: severe level of IA

**3. Depression, Anxiety and Stress Scale-21 items (DASS-21):** The DASS 21 is a short version of the 42-item original scale. It has been shown to have a high-internal consistency with Cronbach's alpha of 0.94[39]. It is a 21-item scale measured on a 4-point Likert scale (0–3), “0” denoting “did not apply to me at all” and “3” denoting “applied to me very much, or most of the time”. The following cut-off scores are used for each subscale: depression: normal 0–4, mild 5–6, moderate 7–10, severe 11–13 and extremely severe 14+; anxiety: normal 0–3, mild 4–5, moderate 7–10, severe 11–13 and extremely severe 10+; stress: normal 0–7, mild 8–9, moderate 10–12, severe 13–16 and extremely severe 17+

**4. Rosenberg Self-esteem scale (RSES):** is commonly used and its internal consistency and reliability were confirmed in many previous studies [37]. It comprises 10 statements. Participants rate

the extent to which they agree with each statement on a four-point Likert scale, (0) strongly disagree to (3) strongly agree for items 1, 2, 4, 6 and 7 and opposite rating for items 3, 5, 8, 9 and 10. A total score is obtained by summing all responses and may range from 0 to 30, with higher scores indicating higher self-esteem After collecting the data prevalence of IA was calculated and then its association with Depression, Anxiety and stress was observed using chi-square test.

Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk, NY: IBM Corp. was used to perform statistical analyses.

### Results

**Sociodemographic Profile:** A total of 407 undergraduate medical students participated in the study. This study comprised of 34.6% (141) males and 65.4% (266) females within the age range of 17–24 years with mean age of 19.65 yrs. Out of total study population 44.5% (181) of students were from 1st year of MBBS, 24.8% (101) from 2nd year, 18.9 % (77) from 3rd year and 11.8 % (48) from 4th year of MBBS.

**Table 1: summarizes the sociodemographic details of the participants.**

Distribution of Sociodemographic characteristics among study subjects			
Variable	Category	n	%
Age	17-20 yrs.	287	70.5%
	21-24 yrs.	120	29.5%
		<b>Mean</b>	<b>SD</b>
	Mean	19.65	1.54
	SD	17 – 24	
Gender	Males	141	34.6%
	Females	266	65.4%
Study Year	I year	181	44.5%
	II year	101	24.8%
	III year	77	18.9%
	IV year	48	11.8%
Religion	Hindu	353	86.7%
	Muslim	14	3.4%
	Christian	40	9.8%
Domicile	Urban	253	62.2%
	Rural	154	37.8%
Living status	Alone	178	43.7%
	Not Alone	229	56.3%

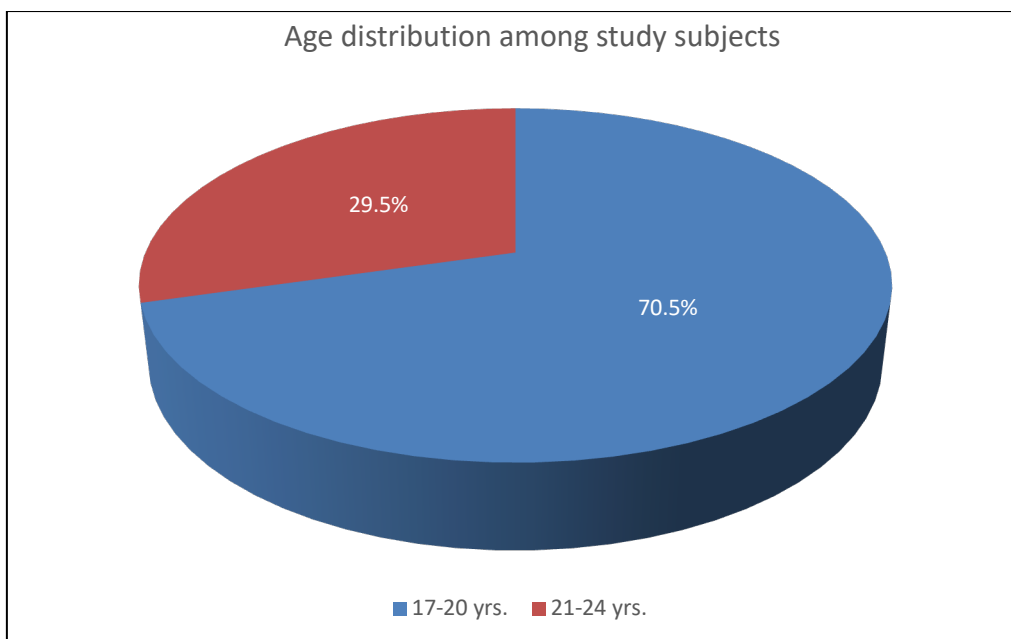


Figure 1: Age distribution among study subjects

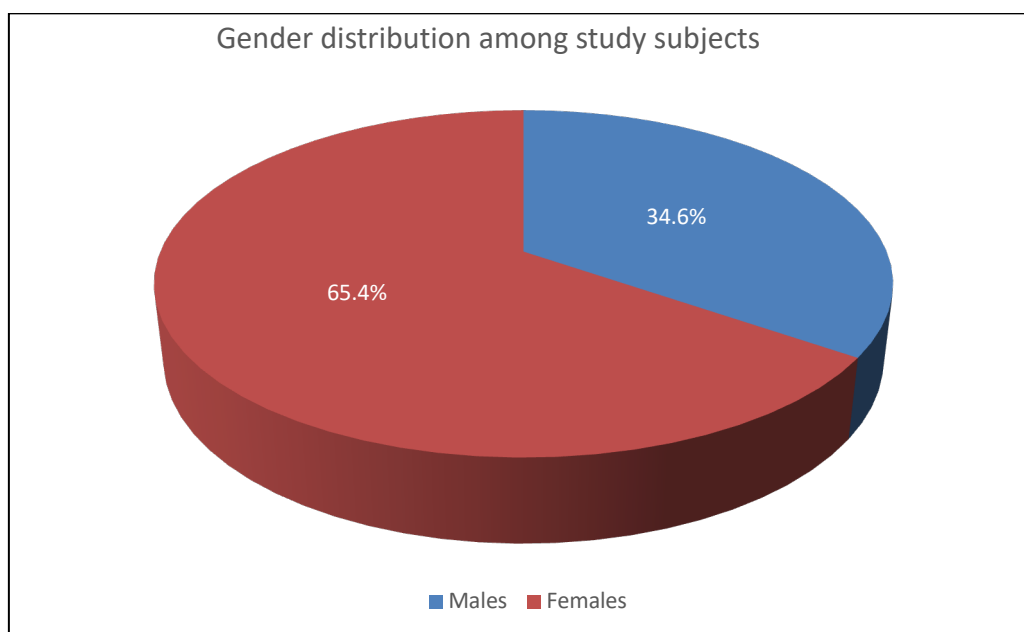
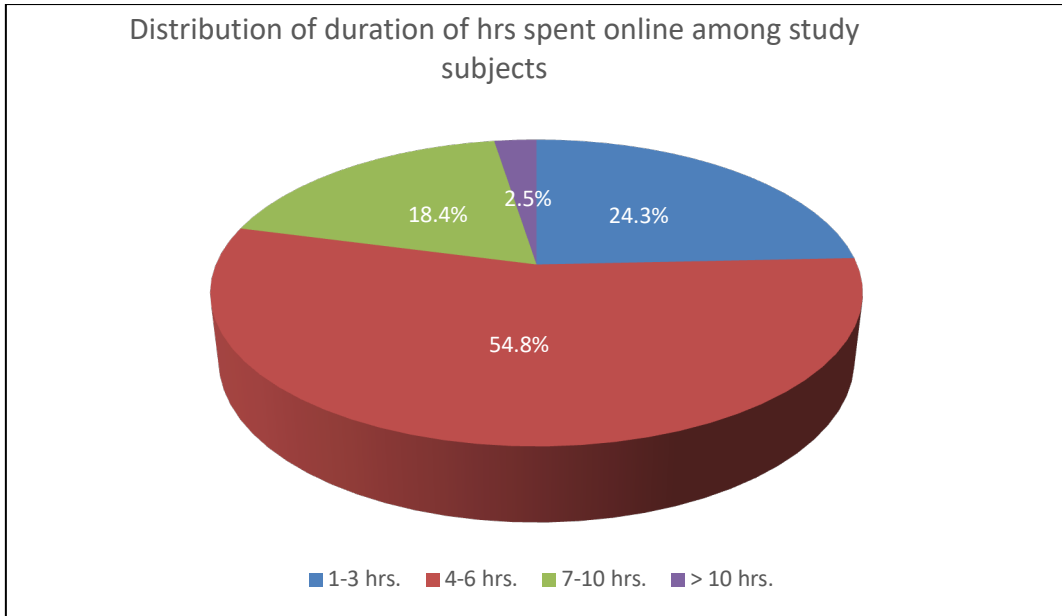


Figure 2: Gender distribution among study subjects

Mean time duration (no. of hrs.) spent online was **5.18 hrs. per day**

Table 2: Distribution of duration of hrs spent online among study subjects

Variable	Category	n	%
No. of hrs spent online	1-3 hrs.	99	24.3%
	4-6 hrs.	223	54.8%
	7-10 hrs.	75	18.4%
	> 10 hrs.	10	2.5%
		Mean	SD
	Mean	5.18	2.43
	SD	01 – 15	

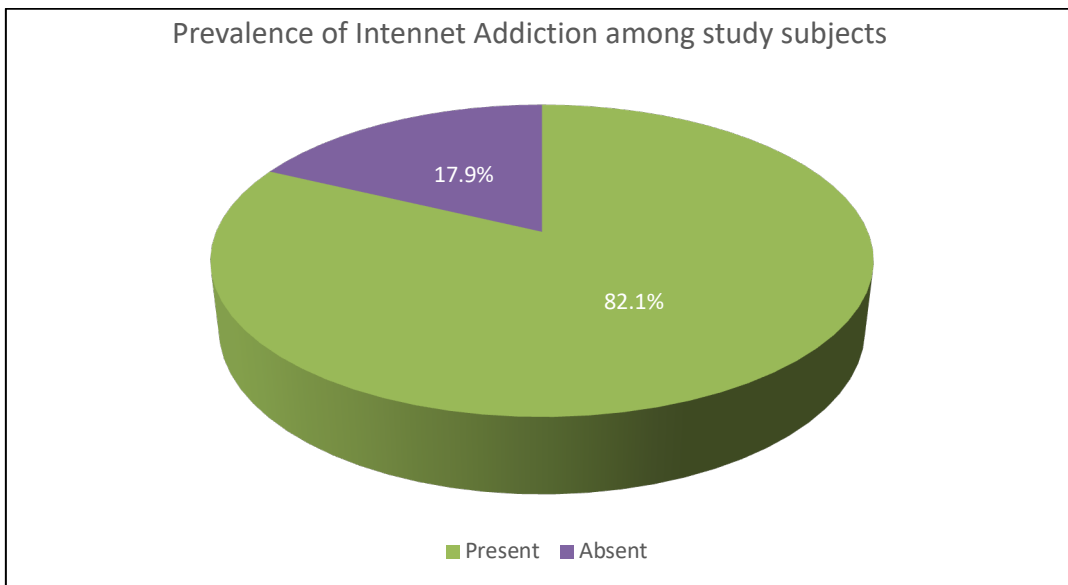


**Figure 3: Distribution of duration of hrs spent online among study subjects**

**Prevalence of Internet addiction:** Prevalence of Internet Addiction was found out to be 82.1% i.e, out of 407 students 334 were found to have Internet addiction, out of which 37.3% (152) had mild level of addiction,44.2% (180) had moderate level of addiction,0.5% (2) had severe addiction.

**Table 3: Prevalence of Addiction to Internet among study subjects**

Variable	Category	n	%
Addiction to Internet	Present	334	82.1%
	Absent	73	17.9%



**Figure 4: Prevalence of Internet Addiction among study subjects**

**Table 4: Distribution of Internet dependence among study subjects**

Variable	Category	n	%
Internet Dependence	Normal	73	17.9%
	Mild dependence	152	37.3%
	Moderate dependence	180	44.2%
	Severe dependence	2	0.5%

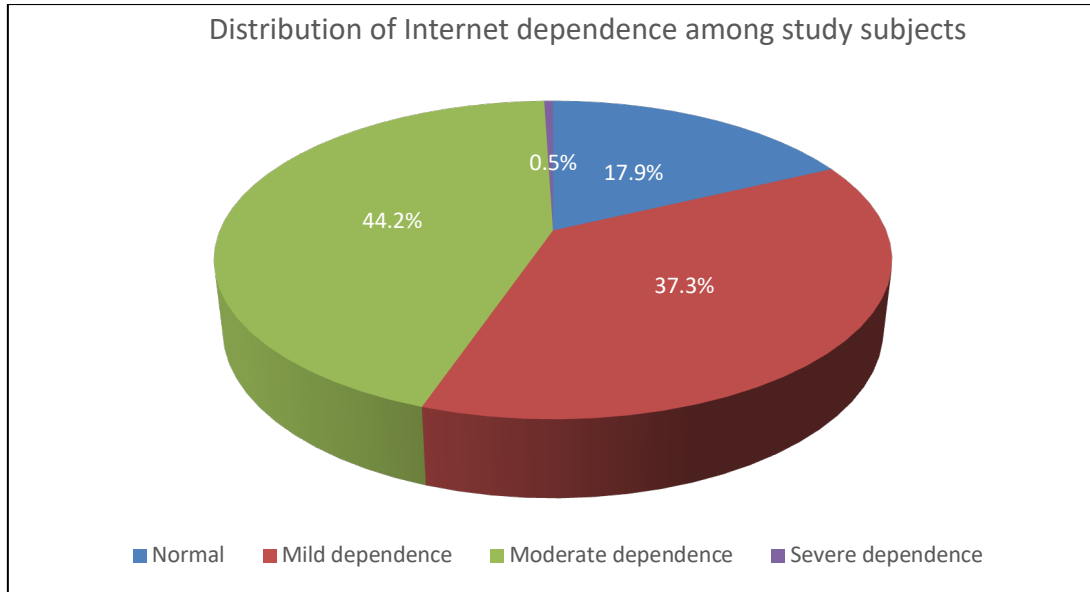


Figure 5: Distribution of Internet dependence among study subjects

Table 5: Association between prevalence of Internet addiction and socio-demographic characteristics using Chi Square Test

Variable	Category	Present		Absent		p-value
		n	%	n	%	
Age	17-20 yrs.	240	83.6%	47	16.4%	0.21
	21-24 yrs.	94	78.3%	26	21.7%	
Gender	Males	125	88.7%	16	11.3%	0.01*
	Females	209	78.6%	57	21.4%	
Domicile	Urban	211	83.4%	42	16.6%	0.37
	Rural	123	79.9%	31	20.1%	
Living status	Alone	149	83.7%	29	16.3%	0.45
	Not Alone	185	80.8%	44	19.2%	

A Significant proportion of males were addicted to Internet use [88.7%] as compared to female subjects [78.6%] and this difference in the prevalence of addiction to internet usage based on the gender of the study subjects was statistically significant at p=0.01. However, no significant differences were observed in the prevalence of addiction to internet use based on the age, domicile & living status of the study subjects.

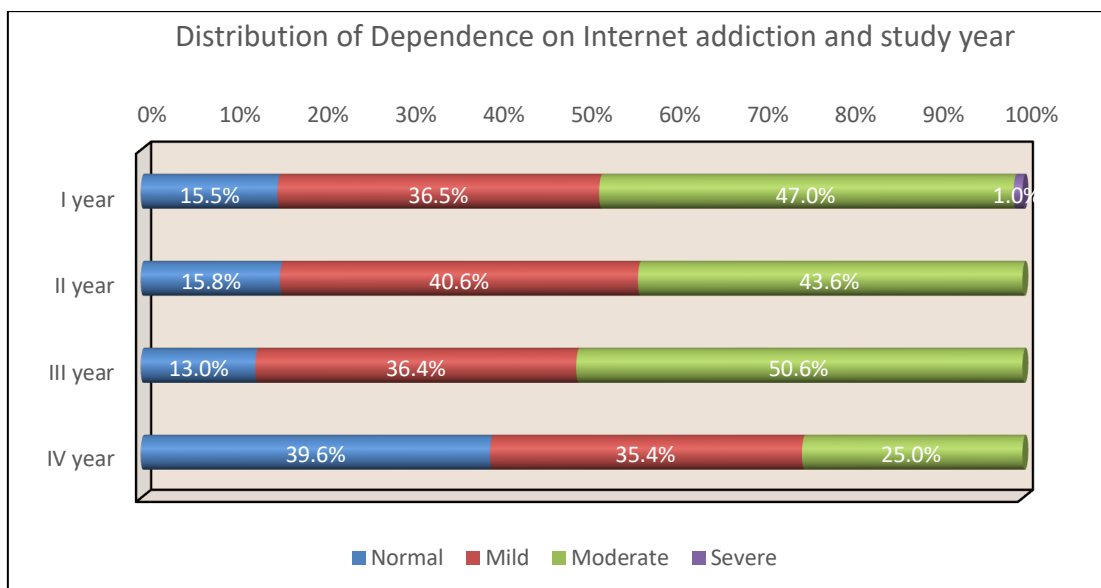


Figure 6: Distribution of Dependence on Internet addiction and study year

**Table 6: Association between prevalence of Internet addiction and study year using Chi Square Test**

Variable	Category	Present		Absent		p-value
		n	%	n	%	
Study Year	I year	153	84.5%	28	15.5%	0.001*
	II year	85	84.2%	16	15.8%	
	III year	67	87.0%	10	13.0%	
	IV year	29	60.4%	19	39.6%	

The test revealed that a significant proportion of IV year students showed lesser addiction to internet use [60.4%] as compared to I, II & III study year students which varied between 84 to 87% and this difference in the prevalence of addiction to internet based on the study year of the students was statistically significant at p=0.001.

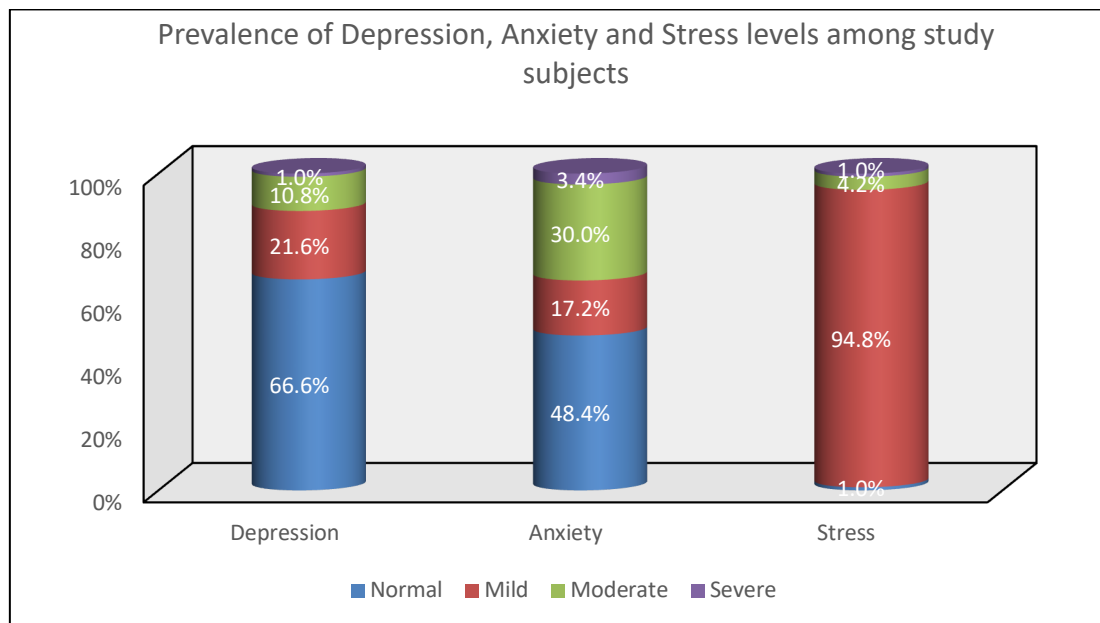
**Depression, Anxiety and Stress:**

Estimated using DASS-21 scale.

Out of 407 students 136 students(33.4%) has varied levels of Depression, 210 students (51.6%) has varied levels of Anxiety, and only 5.2% (21) had mild and moderate levels of stress.

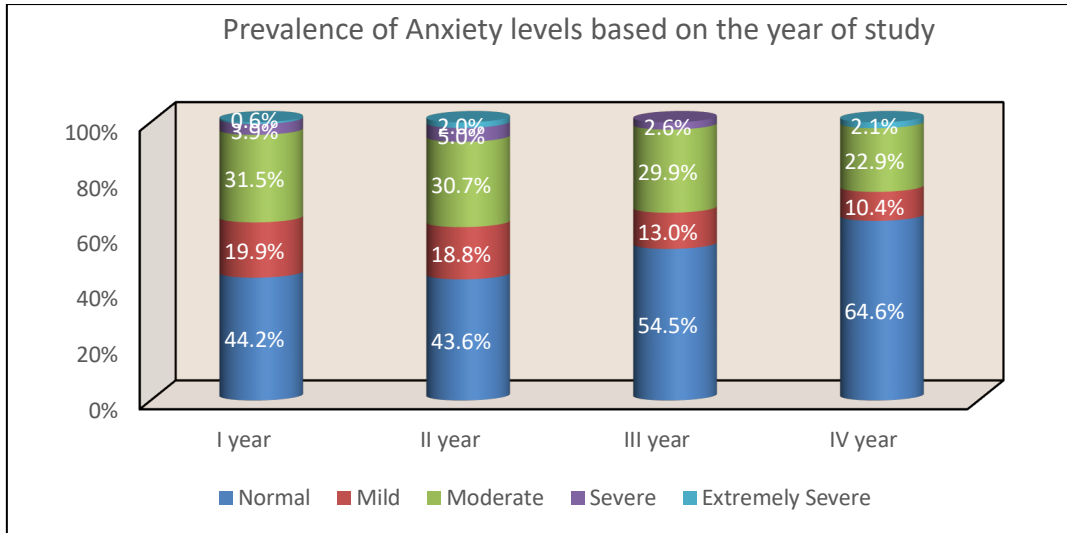
**Table 7: Prevalence of Depression, Anxiety and Stress levels among study subjects**

Variable	Category	n	%
Depression	Normal	271	66.6%
	Mild	88	21.6%
	Moderate	44	10.8%
	Severe	4	1.0%
Anxiety	Normal	197	48.4%
	Mild	70	17.2%
	Moderate	122	30.0%
	Severe	14	3.4%
	Extremely Severe	4	1.0%
Stress	Normal	386	94.8%
	Mild	17	4.2%
	Moderate	4	1.0%

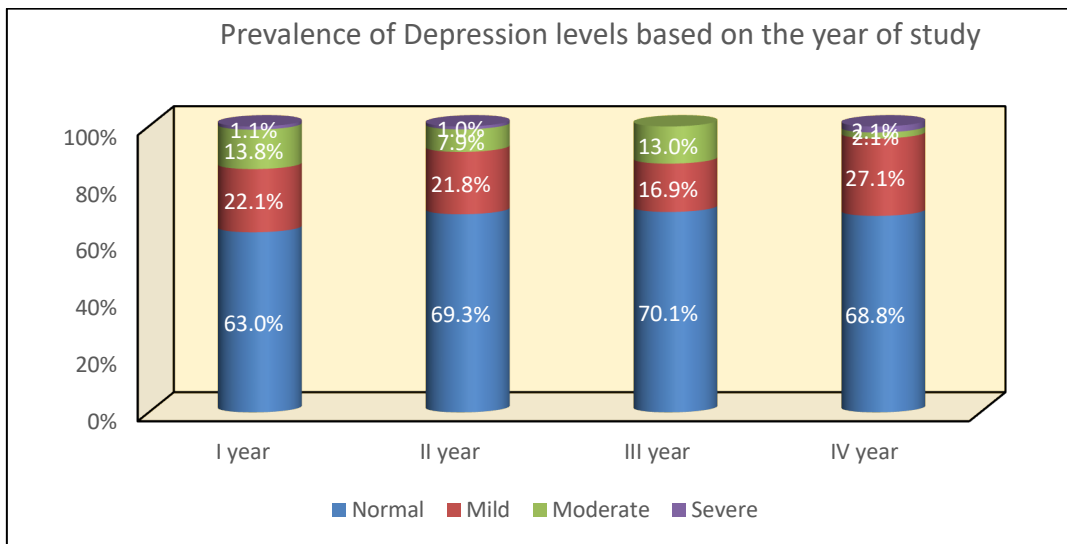


**Figure 7: Prevalence of Depression, Anxiety and Stress levels among study subjects**

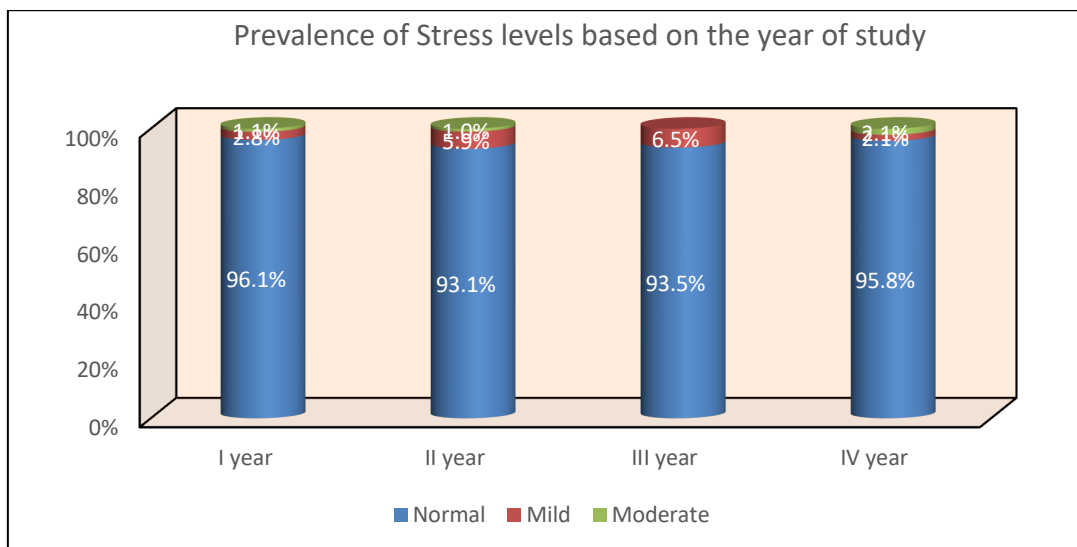
According to our study, though the difference is very subtle, when compared with others, 1<sup>st</sup> year students has high prevalence of depression; whereas anxiety and stress was higher in 2<sup>nd</sup> year students.



**Figure 8: Prevalence of Anxiety levels based on the year of study**



**Figure 9: Prevalence of Depression levels based on the year of study**



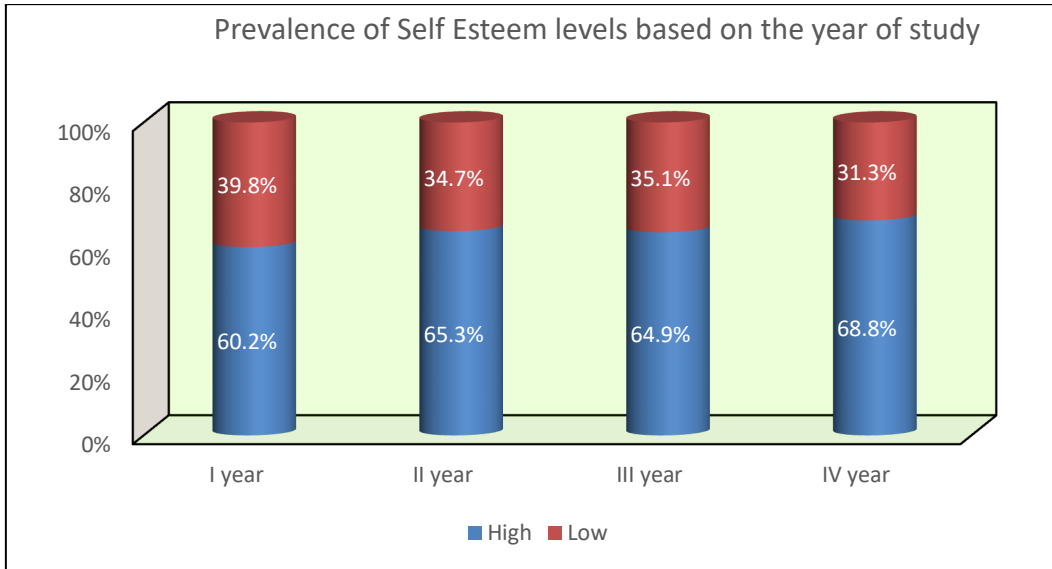
**Figure 10: Prevalence of Stress levels based on the year of study**



**Self-esteem:** Self-esteem was estimated using Rosenberg Self-esteem Scale. Out of total study population 36.6% has lower self-esteem. 1<sup>st</sup> year students had comparatively lesser self-esteem than other students

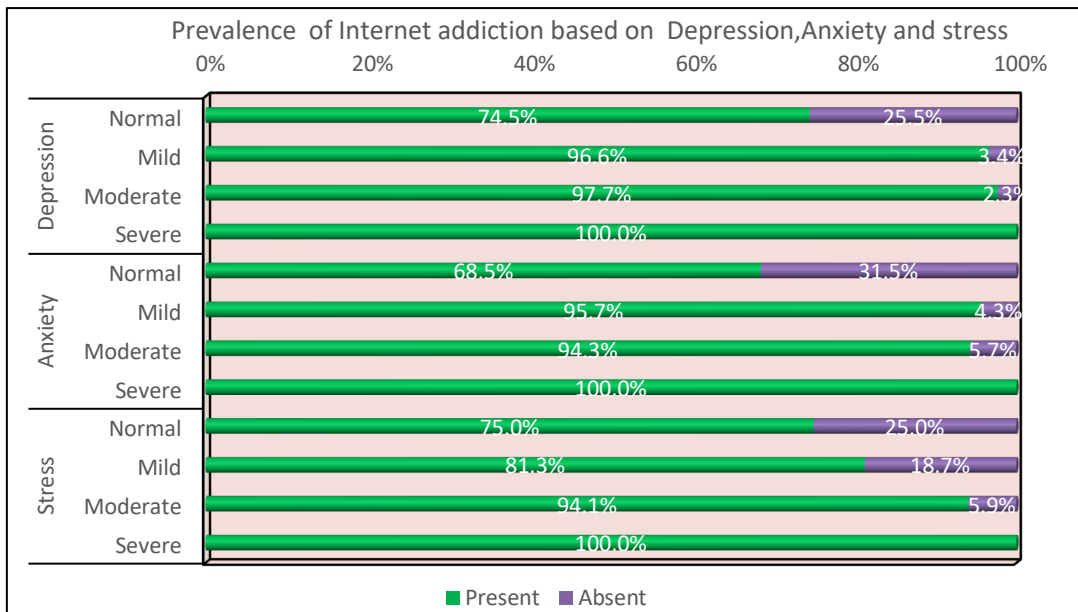
**Table 8: Prevalence of Self Esteem Status among study subjects**

Variable	Category	n	%
Self Esteem	High	258	63.4%
	Low	149	36.6%

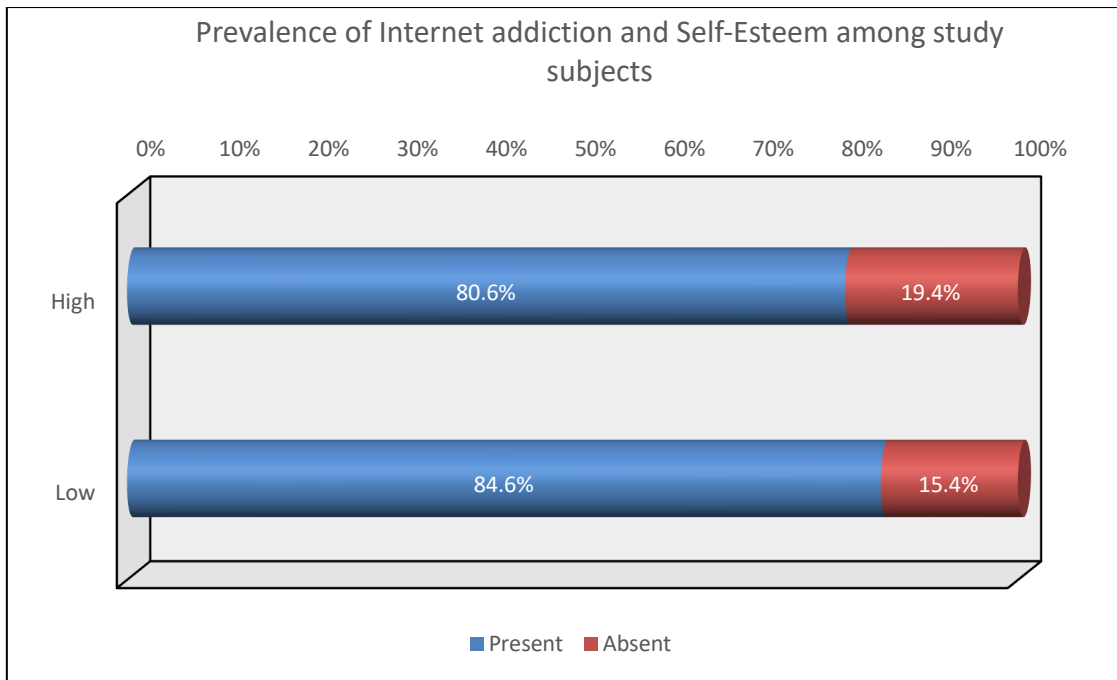


**Figure 11: Prevalence of Self Esteem levels based on the year of study**

**Prevalence of Internet addiction based on Depression, Anxiety, Stress and Self-esteem:**



**Figure 12: Prevalence of Internet addiction based on Depression, Anxiety and stress**



**Figure 13: Prevalence of Internet addiction and Self-Esteem among study subjects**

**Association between prevalence of Internet addiction and Depression, Anxiety &, stress:**

**Table 9: Association between prevalence of Internet addiction and Depression, Anxiety & Stress levels among study subjects using Chi Square Test**

Variable	Category	Present		Absent		p-value
		n	%	n	%	
Depression	Normal	202	74.5%	69	25.5%	<0.001*
	Mild	85	96.6%	3	3.4%	
	Moderate	43	97.7%	1	2.3%	
	Severe	4	100.0%	0	0.0%	
Anxiety	Normal	135	68.5%	62	31.5%	<0.001*
	Mild	67	95.7%	3	4.3%	
	Moderate	115	94.3%	7	5.7%	
	Severe	14	100.0%	0	0.0%	
	Extremely Severe	3	75.0%	1	25.0%	
Stress	Normal	314	81.3%	72	18.7%	0.03*
	Mild	16	94.1%	1	5.9%	
	Moderate	4	100.0%	0	0.0%	

\* - Statistically Significant

The prevalence of addiction to internet was significantly lesser in normal subjects [74.5%] as compared to those with varying degree of depression [96.6 -100%] and this difference in the prevalence based on the depression levels of the study subjects was statistically significant at p<0.001.

Similarly, the normal subjects showed lesser prevalence of addiction of internet [68.5%] as compared to subjects with varying degree of anxiety levels [94.3 – 100%] and the difference in the prevalence based on the anxiety levels of the

study subjects was statistically significant at p<0.001.

The prevalence of Internet addiction in normal subjects was significantly lesser [81.3%] as compared to those subjects with mild to moderate stress levels [94.1% & 100%] and the difference in the prevalence based on the stress levels of the study subjects was statistically significant at p<0.001.

**Association between prevalence of Internet addiction and Self-esteem:**

**Table 10: Association between prevalence of Internet addiction and Self-Esteem among study subjects using Chi Square Test**

Variable	Category	Present		Absent		p-value
		n	%	n	%	
Self Esteem	High	208	80.6%	50	19.4%	0.32
	Low	126	84.6%	23	15.4%	

The test revealed no significant association between internet addiction and self-esteem. In this study, internet addiction prevalence was almost equal in both group of students (high self-esteem and low self-esteem).

### Discussion

In this study we aimed to find out the prevalence of internet addiction and its association with Depression, anxiety, stress and self-esteem in 407 undergraduate medical students. Prevalence of Internet addiction was found out to be 82.1%. Prevalence rate was higher when compared to previous studies done among medical students. A study done in India among medical students reported a prevalence of 61.4% [40].

A study done in Malaysia among medical students in 2016 reported incidence as 36.9% [41]. Studies done in China and Iran, in 2010 and 2011 had reported internet addiction as 16.2% and 10.8% respectively which is much lower compared to this study.[42,43] The increased incidence over few years may be due to the advances in technology making it easily accessible and cheaper for students, thus making them more dependent on it.

Most students were found to have moderate addiction to internet, and most of them belong to first 3 years of MBBS with mean age being 19.65 yrs. This study revealed that IA was significantly related to gender and higher among males. However, some studies reported that IA prevalence was higher in males[44], while others did not report any difference between genders regarding prevalence of IA[45].

Numerous studies have found that there is a significant association between Internet addiction and such psychological morbidities as depression, stress. These studies corroborate our findings of significant association between depression, stress, and anxiety and Internet addiction ( $P < 0.001$ )[46,47]. The cause and effect relationship between Internet addiction and depression, stress, and anxiety could not be established considering the cross-sectional design of the study.

In this study, 63.8% students had higher self-esteem and there was no significant association between IA and self-esteem. IA was noted in people with both higher and lower self-esteem. However, many of the older studies showed a significant association between IA and self-esteem

with higher prevalence of IA reported in people with low self-esteem.[48]

### Conclusion

With a progressively increasing use of the internet and a corresponding internet related psychopathology the world over, it is imperative that an attempt should be made not only to treat internet-related problems but also to address and treat the coexisting psychological problems like depression, anxiety, stress, and also to prevent internet related problems to a possible extent.

Awareness is important at higher level to address the issue and implement measures for its prevention and treatment. As an emerging problem affecting student education, rehabilitation programs may be useful in the future.

### Strengths & Limitations

Self-reported questionnaires as they remain the most widely used tools in community surveys for physical and mental health evaluation

The study did not examine the repercussion of internet addiction on achievements, in terms of grades, failure or success, which could have been interesting.

In this study, it was not possible to establish whether this addiction was the cause or the result of various psychological morbidities.

Major limitation is this study was conducted in a single center and hence the results cannot be generalized to the student population. Hence a multi centric study is recommended among medical students across various colleges to confirm the association between internet addiction and academic performance

### Future Recommendations

Need for more longitudinal studies and studies analysing existing birth cohorts to be able to disentangle both the antecedents and consequences of IA.

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