



## **Internet Gaming Addiction in Medical Students, Cross-Sectional Study**

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### **ABSTRACT**

*Exposure to internet gaming is unavoidable for human life which is associated with physical and mental health problems. Prevalence of IGD and comorbidities requires study in MBBS students who are supposed to use internet frequently for academic purpose. To assess the nature and extent of psychiatric morbidities associated with gaming addiction in medical students. Data collected from 385 Medical students of Tertiary care Medical College and Hospital, Ghaziabad, U.P. India with IGDS9 –SF and self-assessment scales for depression and anxiety after taking institutional ethical clearance. Semi-structured pro forma used to collect the sociodemographic data. The prevalence of found to be 3.12%, depression is significantly associated with IGD (66.66%), prevalence of anxiety was 8.31%. Males are at high risk of IGD associated with more comorbid conditions as depression and anxiety.*

**KEYWORDS:** Addiction, Internet, Gaming Disorder, Depression, Anxiety

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### **INTRODUCTION**

Internet use leads to addiction with consequences and new term was coined by Young in 1998 as “Internet Addiction” (IA). This IA was compared with equivalent to impulse control disorder and substance use disorder. The IA described mostly as “behavioural addiction” [1] as people addicted to internet also remain preoccupied with online contents, become irritable or distressed when away from it, more and more time spending for satisfaction of desire previously felt, unable to cut time spent, continued use despite experiencing negative outcomes, using to escape from real life problem, ignoring other pleasurable activity enjoyed earlier, facing problem at work and relationship due to excessive internet use [2].

Thus the use of internet is more common and frequently done activity. The availability of internet games exposes individual to physical and mental health problems. Psychological problem manifestation observed throughout the world with the gaming [3]. The DSM-5 included the internet gaming disorder in section III of psychiatric nomenclature as a condition with further study [4]. The diagnosis required 9 criteria's which are similar to gambling disorder.

Similarly the WHO in year 2014 based on suggestion of experts searched for the syndrome and after the inclusion of Internet Gaming Disorder in DSM-5 in 2013 as condition for further study. The clinical syndrome was recognised as leading to distress or impairment in the social, family, educational and personal functions. The pattern of gaming behavior was identified with preference over other activities and continued or increased use despite having negative outcomes by people engaged in digital games or video games activities. In month of July, 2018 WHO released ICD-11 with inclusion of “Gaming Disorder” coded as 6C51.

Any type of video game which is available online and provide interaction with the other players. It provides fun, release of stress, enjoyment, imagination, teamwork and more socialisation. The computers or laptop and mobiles provides are used as gaming devices. Games are approached by web browser and apps. Games are available for every age group. Flash games are web based games and are free to use and need extra software to start and play them. These have chat functions to communicate with multiple players online. Multiple player games are most popular named multiple role-player games (RPG) which allow player to choose a character to play online. These are non-countable and immersive games available with easy reach.

These online games cause physical and mental health problems. Common physical problems online gamers have strain injuries, wrist, neck and back pains and even serious disorder as game-provoked

seizures, vision problems, obesity and weight gain. Mental health problems associated are depression, poor motivation and emotion regulation, interpersonal conflicts, social anxiety and suicidal thoughts [5-7].

Prolonged and intensive use of internet gaming has been associated with depression and anxiety [8-10]. Other negative outcomes appears social anxiety, poor emotional state, low life satisfaction. The psychopathology in IGD has been associated with depression, ADHD, anxiety, and social phobia [11].

The depression appeared most common symptom among all age groups (adolescents, adults, and the general population). Excessive Internet users and have found a high prevalence of symptoms, including emotional problems, social anxiety, and cognitive deficits [12]. The IGD appear after psychiatric disorder or IGD itself have negative results as mental health problems or lastly both IGD and Psychiatric disorders have similar biological, psychological and sociodeographic pathologies [13]. Depression frequently occurs in person with IA or IGD [14]. There is significant appearance of depressive symptoms with IGD and diminution of symptoms during remission from IGD [15].

A study with in Indian context [16] reported that 6.8% of gamers in the age group of 16–18 years had psychiatric symptoms, and depression, anxiety, and stress were associated with IGD which also supported by Sara Fazeli [17]. The Meta-analytic research by Niko [18] shown high prevalence for depression, anxiety, obsessive–compulsive disorder, and somatization in problematic gaming with In support to this, they also reported elevated levels of state and trait anxiety and social phobia among problematic online gamers [19-20].

In studyfound that a large proportion of the studies on IGD reported significant relationships with psychological symptoms [21]. Specifically, 92% of studies were associated with anxiety, 89% studies with depression, 87% with ADHD or hyperactivity symptoms, and 75% with social anxiety and obsessive–compulsive symptoms.

Various psychiatric disorders such as anxiety, depression, attention-deficit/hyperactivity disorder, obsessive- compulsive disorder [22] and relationships between IGD and psychological distress [23]. Thus research is needed about association of internet gaming with demands rapid reactions and continuous attention over a period of time which impact sleep quality and psychological distress. Thus the uncontrolled, extreme, too much time spent on internet use is damaging individual life's [24]. The pattern of use is maladaptive results in excessive distress or impairment in routine working [25]. Different terms like internet addiction, pathological use, problematic use RA, are equivalent to internet dependence described as IGD criteria in DSM-5 [26-29].

IA prevalence is variable according to gender, age, and ethnicity, and found more commonly among college student [30]. A high association of personality disorders are found in people with IA [31]. Unlimited internet use associated with mood disorders, poor sleep quality, low self-esteem, impulsivity, suicide, lower levels of physical activity and health problems (migraines, back pain, obesity) [32-39]. Internet use is used by students pursuing academic in MBBS course besides its other integral use in daily life as a tool for shopping, communication, social interaction, staying connected with family and relatives, research and study. We hypothesized that IGD could be a major concern in university medical students, and that examining its association with sleep, mood disorders and self-esteem is important so that appropriate measures can be taken to address this issue.

## REVIEW OF LITERATURE

Parameters used by previous scales like GAS – Gaming Addiction Scale enumerates the four pattern types as addicted gamers, problem gamers, engaged gamers and normal gamers based on core criteria and peripheral criteria. The peripheral criteria include cognitive salience, tolerance and euphoria and core criteria are no more applied for internet gaming disorder as for computer based gaming addiction [40]. Among Problem gamer, Addicted gamer, Highly engaged gamer the first two have high risk of feeling low, irritable, bad mood, exhaustion and fear [41]. A group of individuals who have a tendency to act furiously in emotional situation and get highly motivated to play to get totally devoted in gaming have negative consequences in life [42].

The fMRI scan shows area of interest (parts of frontal lobe, caudate nucleus and nucleus accumbens) were activated in response to the cue-induced gaming urge or craving are same as for cue-induced substance craving suggestive of neurological basis of internet gaming [43]. The focus on striatum and gaming disorder behaviour individuals found to have functional heterogeneity between dorsal and ventral striatum. These subjects shows decreased functional connectivity between the left putamen and left insula while the connectivity remain stable in subjects at right nucleus accumbens and left insula. This new information of switch in locus of control inside the striatum help to understand the association of IGD and drug addiction[44]. The neuroimaging marker explored in IGD subjects based on VTA and

bilateral SN resting-state functional connectivity (RFSC) patterns which successfully points them out and may be used for diagnosis [45].

Escape from aversive self-attention and turning focus on to gaming as a means to cope the negative mood condition based on “escape from self” theory by Baumeister explains tendency for internet gaming addiction to escape from reality or [46]. Psychological manifestation like depression, anxiousness, sleep deprivation and behavioural dependence in MMORPGs (Massively Multiplayer online role-playing games) appeared in gamers who mostly participated to escape and the dependents have core components of addiction [47]. There are more mental health adverse outcome in males such as social anxiety, loneliness and depression in mobile game addiction [48]. The alexithymic individuals have problems to identify, express, and communicate emotions tend to use in excess the gaming to overcome deficiency and achieve social goals [49].

Among different types of internet gaming the one with MMORPGs have experience mostly about problematic behaviour, poor self-esteem, and depressive state and were found mostly playing to break away from life problems [50].

The pathological involvement in internet gaming observed as playing action games, binge pattern, excessive amount of time spent [51] with behaviour recognised as loss of control, intra or inter personal conflicts, preoccupation, withdrawal.

The adolescent males have tendency for pathological involvement in comparison to non-pathological. Such distinction give prevalence rate of 3.1% of pathological gaming involvement in IGD [52-53]. The problematic gamer have poor life satisfaction and associated with anxiety and depression [54]. Violent games like PUBG preferred by male gender with high frequent and prolonged duration use found to be consequence of self-therapy [55]. The mental health of gamer have strong association with depressive symptoms and escapism. Preoccupation and continuation were the most common symptoms of internet gaming disorder. The family and peer support protects from the negative mental health outcome [56]. The need to find association of depression among internet gamers is required in the university student [57].

A systemic review findings support the strong association of depression (77%) and ADHD in Pathological Internet Users (PIU) and correlation with hostility (66%), OCD (60%), ADHD (100%), anxiety (57%) and males have higher association with PIU.<sup>58</sup> (V Carli, 2013). The association with other mental health problems being explored in various studies predominantly in Asian continent.

Attempts to understand the cause of internet gaming disorder based on neurobiological, personality trait and defense style showed association with Axis I and Axis II comorbidity appeared after onset of internet gaming disorder in the studied samples [58-59]. The tendency of personality trait named Neuroticism are more related with development of sleep disturbance, anxiety and depression after exposure to internet gaming via computers [60].

The IGD level of severity is directly related to presence of non-suicidal self-injury with neuroticism, depression and anxiety [61]. The involvement of anxious individual in internet gaming in order to escape the stressful life conditions with intense focus on internet gaming found to be associated with depression among them [62]. Positive relation of gaming with insomnia leading to depression and then eventually to suicidal ideation need supervised internet gaming by adolescents [63].

## MATERIAL AND METHODS

This is a cross sectional study with sample collected from the tertiary care hospital in Ghaziabad, U.P. Includes all undergraduates and postgraduate students, data was collected for one year period and the sample size was calculated as follows,

**Sample Size:** prevalence of gaming addiction is between 50%

$$n = \frac{Z^2 \cdot \alpha / 2 \cdot P(1-p)}{d^2}$$

n = sample size

z  $\alpha$  = 1.96 at 5% level of significance

p = prevalence 50%<sup>25</sup>

d = absolute error i.e 5%

e = allowable error taken (5%)

n = 385

Inclusion criteria

1. Undergraduates and postgraduates in tertiary care hospital in Ghaziabad
2. Those who have given written informed consent.

Exclusion criteria:

1. Those who do not give informed consent.

## 2. GHQ score of less than 5.

The IEC provided the ethical clearance for the study in the institute. All the participants provided with written and informed consent form for consent. Those participants who will be giving their consent will be included in the study. Participants were given instructions for filling the semi- structured form and other psychiatric rating scales. Data collected will be entered in Statistical Package for the Social Sciences (SPSS) sheet according to various categories and SPSS version 24 was used to analyze the data.

Following psychiatric rating scales used for collection of data: -

General Health Questionnaire 28

Semi-Structured Proforma For Socio-Demographic Data.

The Zung Self Rating Depression Scale

The Self Rating Anxiety Scale Of Zung

Gaming Disorder Scale - IGDS9 -SF

**Semi-Structured Proforma:** Semi structured proforma will be made to collect socio-demographic details like name, age, gender, year of education, residential background, family and personal history of psychiatric illnesses. General Health Questionnaire [64] 28–GHQ-28 is a 28-item measure of emotional distress in medical settings. Through factor analysis, the GHQ-28 has been divided into four subscales. These are: somatic symptoms (items 1–7); anxiety/insomnia (items 8–14); social dysfunction (items 15–21), and severe depression (items 22–28). Cut off being 5. The Zung Self Rating Depression Scale [65] the Zung Self-Rating Depression Scale is a 20-item self-report questionnaire used as a screening tool, covering affective, psychological and somatic symptoms associated with depression. Each item is scored on a Likert scale ranging from 1 to 4. A total score is derived by summing the individual item scores, and ranges from 20 to 80. Most people with depression score between 50 and 69, while a score of 70 and above indicates severe depression. The scores provide indicative ranges for depression severity that can be useful for clinical and research purposes. The Zung Self Rating Anxiety Scale [66]. The Zung Self Rating Scale for anxiety used in the psychiatric field. The rating scale is scored from 1 to 4 points. Most answers go in order of 1 (a little of the time) to 4 (most of the time). However, questions 5, 9, 13, 17, and 19 are scored in the opposite order, since they represent positive/non-anxiety statements. Scores are then calculated and individuals are given the results as 20-44 Normal Range 45-59 Mild to Moderate Anxiety Levels 60-74 Marked to Severe Anxiety Levels 75-80 Extreme Anxiety Levels. The Internet Gaming Disorder Scale [67] Recently, the American Psychiatric Association included Internet gaming disorder (IGD) in the appendix of the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM–5). Internet Gaming Disorder Scale – Short -Form (IGDS9 -SF) (PONTES & GRIFFITHS, 2019) – it is a short dichotomous scale with 9 items covering the 9 diagnostic criteria. It is a reliable and valid scale to measure the IGD with sensitivity (0.87), specificity (0.99) and diagnostic accuracy (0.97).

## RESULTS AND DISCUSSION

This study represents IGDS9 – SF score < 22 in females (56.70%) and >22 in males (73.40%) with statistical significance (p value 0.00001). Thus males have high prevalence of problematic gaming than females similar to other study [68]. Our study found that depression was significantly more (p value < 0.002) in students having Internet Gaming Disorder (66.66%) while the prevalence of depression in students not having IGD was lower than 10%.

Prevalence of depression among participants age less than 25 years was around 10% while the prevalence of 7% was observed among participants having age more than 25 years. It was found that Depression among unmarried participants is more than married participants. But the difference in prevalence of depression among unmarried (9.04%) and married (11.11%) was not statistically significant among parent study participants. In the current study, among all participants with IGDS9-SF score > 32 majority were male (n=10, 83.33%) whereas, among participants with < 32 IGDS9-SF score equal distribution was found in both genders.

Table 1: Distribution of study subjects according IGDS9-SF Score

IGDS9-SF Score	Grand Total	Percentage
< 32	373	96.8%
≥ 32	12	3.12%

Table 2: Gender wise distribution of patients according to <32 and  $\geq$ 32 IGDS9-SF Score

	IGDS9-SF SCORE				Test
	< 32		$\geq$ 32		Chi Square Test
Gender	n	(%)	n	(%)	5.2934
Male	185	49.60%	10	83.33%	p value: 0.021406
Female	188	50.40%	2	16.67%	
Total	373	100%	12	100.00%	

Table 3: Distribution of patients according to ZUNG Self- Rating Depression scale among <32 and  $\geq$ 32 IGDS9-SF Score

ZUNG Depression	IGDS9-SF SCORE				Test
	< 32		$\geq$ 32		Chi Square Test
	n	(%)	n	(%)	8.8079
Normal	342	91.69%	8	66.67%	p value: 0.002999
Mildly depressed	29	7.77%	4	33.33%	
Moderately depressed	2	0.54%	0	0.00%	
Total	373	100.00%	12	100.00%	

Table 4: Distribution of patients according to ZUNG Self- Rating Anxiety scale among <32 and  $\geq$ 32 IGDS9-SF Score

ZUNG Anxiety	IGDS9-SF SCORE				Test
	< 32		$\geq$ 32		Chi Square Test
	n	(%)	n	(%)	0
Normal	342	91.69%	11	91.67%	p value: 0.997
Mild to Moderate	31	8.31%	1	8.33%	
Total	373	100.00%	12	100.00%	

Table 5: Gender wise distribution of patients according to <22 and  $\geq$ 22 IGDS9-SF Score

	IGDS9-SF SCORE				Test
	< 22	Percentage	$\geq$ 22	Percentage	Chi Square Test
Gender	n	%	n	%	25.762
Male	126	43.30%	69	73.40%	p value: 0.00001
Female	165	56.70%	25	26.60%	
Total	291	100%	94	100.00%	

Table 6: Distribution of patients according to time spent to play game among patients with <32 and  $\geq$ 32 IGDS9-SF Score

Duration of Playing game	IGDS9				Test
	< 32	Percentage	$\geq$ 32	Percentage	Chi Square Test
	No. of Patients		No. of patients		263.93
< 6 Hours	371	99.46%	2	16.7%	p value: 0.00001
> 6 Hours	2	0.54%	10	83.33%	
Total	373	100.00%	12	100.00%	

The study "Internet Gaming Disorder in Medical students" was conducted in tertiary care hospital, Ghaziabad, U.P. over a period of 1 year. The current study aimed to determine the prevalence rate of

internet gaming disorder and correlations between internet gaming disorder and depression and anxiety among medical students.

In this study, it showed that 385 students (100%) were involved in some or the other kind of gaming activity and it was a relatively common activity among medical students. However, when this activity consumed majority of the time of the students and causes difficulties in their personal, professional, academic and social life, it was considered to be a predictor for developing internet gaming addiction.

These developments of excessive playing of internet gaming have led to the recognition of Gaming disorder (sometimes termed “video game addiction”), a disorder characterized by persistent gaming, impaired control, and functional impairment.

### **IGD Prevalence**

In our current study, among total 385 medical students the mean age was 25 years with standard deviation of 3.10 years. It showed that playing internet video games was a relatively common activity among medical students. However, a small proportion of total study sample (3.12%) were found to be having an internet gaming disorder. Most studies have similar results as found prevalence of internet gaming among medical student 3.05% [69], a community based survey 3.64% [70], faculty of Medicine, Germany 3.21% [71] except a survey had lower prevalence of 2.11% [72]. In contrast to present study, the Lithuanian adolescent population have higher prevalence 9% [73], Ludhiana medical students have prevalence 14.71% and other study had 21.76% [74-75]. The prevalence of gaming disorder varies from 0.7% to 27.5% in across studies [76] (evaluated by Satoko Mihara and Susumu Higuchi). This variation appears to be more likely due to methodological difference used, kind of tool used, cut off scores, type of sample and survey methods used.

### **Age, Gender and IGD**

In this study Internet gaming disorder had no association with age of the subjects. The difference between age and IGDS9-SF score was not found to be statistically significant. Present study included almost equal number of male and female subjects so the distribution among gender was not significant and comparison of variables with gender could be done. The percentage of IGD in male students is almost twice as many as that of female students similar to other study reports that male more prone to play internet games than females [77], similarly IGD prevalence of 4.5% in males and 1.7% in females [78].

### **IGD and Depression**

Participants without Depression majority had less than 32 IGDS9-SF score. Even mildly depressed participants were also seen in less than 32 IGDS9-SF score group. In contrast to that none of the moderately depressed participants were found with IGDS9-SF score more than 32

Similarly in studies showed depression as one of the significant co morbidity in patients with internet gaming disorder. The 10 males having internet gaming disorder, 4 were found to be depressed while 2 females none were found to be depressed [79-83]. The rating scale score was statistically significant with  $p$  value  $< 0.05$ . Other Studies have the prevalence of depression in subjects with internet gaming disorder was more in males than females [80- 85].

### **IGD and Anxiety**

In our study, prevalence of anxiety among participants was 8.31% according to Self -Rating ZUNG Anxiety scale. The difference in prevalence of anxiety among age groups was not significant. Out of total 195 male, 93% were normal scale score. Whereas 7% had reported mild to moderate anxiety. Out of total 190 female, 91% were normal and 9% had anxiety. Although anxiety was found 2% higher in female, the difference was not found statistically significant.

But in contrast to our study, various studies show prevalence of anxiety with people having internet gaming disorder. In a systemic review and meta-analysis [86]. Overall, 13% of prevalence of anxiety was seen with higher proportion of female than that of male gender.

Another study documented the prevalence of anxiety in 56.8% (95% confidence interval (CI): 51.9-61.7) of 403 dentistry students [87]. According to the multivariate logistic regression analysis, the type of university was the only variable that demonstrated to have a significant influence on the development of anxiety with an odds ratio (OR = 1.98; CI: 1.29-3.02); whereas the other variables such as age group (OR = 0.77; CI: 0.49-1.20), gender (OR = 1.15; CI: 0.72-1.84), and marital status (OR = 0.75; CI: 0.35-1.60) were not considered factors that influenced the development of anxiety which similar to present study finding.

In our study, marital status was not considered a risk factor for the development of anxiety nor was associated with the presence of anxiety in students that were single, married, or with partner. These results were similar to what was reported by Kang [88]. In contrast, that marital status was significantly associated with the presence of anxiety and reported marriage as a variable of risk factor [89]. Because video game addiction has been linked to depression, sleeplessness and an overall lack of concern for one's

own health, it is not surprising that substance abuse is also a problem for many gamers suffering from this compulsive disorder [90].

### Time Spent

In the study, 12 subjects had > 32 IGDS9-SF score, among them 83% (10) participants spent more than 6 hours per day to play game, whereas only 0.5% participants < 32 score spent more than 6 hours for gaming. The difference is statistically significant with p value >0.00001. The findings are similar to other studies having subjects who spending more time on video gaming are exposed to risk of having IGD.

### Problematic Gamers

On the other hand, subjects having score > 22 are considered to have Problematic Gaming Disorder. In our study, among 385 participants, a total of 94 participants had a score of more than 22 and were considered as Problematic Gamers. It was seen that problematic gamers play more than casual gamers.

### CONCLUSION

Males are at high risk of IGD. IGD subjects are at high risk of comorbid depression and anxiety. Longitudinal studies are further required.

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