Prevalence and risk factors associated with Internet gaming disorder: A cross-sectional study

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**Background:** Internet gaming disorder (IGD) is an entity of clinical attention prominent among schoolgoing students. The reported nature and extent of Internet gaming varies widely, as does the extent of its effects. **Aim:** This study aimed to assess the prevalence of IGD and factors associated with it. **Methods:** After institution ethics approval, individual assent, and parental consent, a cross-sectional study was conducted among 142 students of a school in western Maharashtra. A specially designed sociodemographic pro forma and IGD Scale were administered to the students. Data thus generated were statistically analyzed and compared with published literature. **Results:** The prevalence of IGD was 10.6% among 13–19-year-old students. It was significantly higher among male students (15.3%) than female students (3.5%). Multivariate logistic regression found IGD to be significantly associated with male gender and lower age at first gameplay. **Conclusions:** IGD affects a tenth of our schoolgoing population with a male preponderance. Lower age at first gameplay had an adverse association.

**Keywords:** Internet gaming disorder, prevalence, risk factors

Internet gaming disorder has evolved from the use of pebbles nearly 5000 years ago to present-day modern games that use the Internet and virtual gaming devices.

The gaming experience has evolved with complex reward systems, narratives, characters, sizeable open-world experience, and a platform for socializing with other players. The Internet has given a new dimension to gaming wherein it keeps gamers socially connected. With the help of the Internet, developers frequently change some factors of the games to keep the players “hooked on.” According to the Diagnostic and Statistical Manual of Mental Disorders-5, Internet gaming disorder (IGD) is defined as “Persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress as indicated by five (or more) of the following in 12 months.” The inclusion of IGD in Section III of Diagnostic and Statistical Manual of Mental Disorders (DSM-5), was justified due to the high prevalence rates in Asian countries and the West. More than 60 epidemiological studies of the general population and subgroups have been reported in the international literature. Gaming addiction was
significantly more likely in boys and associated with a longer average gaming time per week.\[8\]

Regardless of whether IGD involves online or offline games or both, efforts to assess this type of behavior have resulted in several measurement tools.\[9\] IGD Scale (IGDS) is one of the tools used to assess IGD.\[10\] An exploration of Indian literature on IGD was done. It revealed few isolated case reports.\[11\] Prevalence studies on IGD are increasingly getting published from various corners of the country, but hardly any has deliberated on phenomenology or associated factors. This study aims to assess the prevalence of IGD and factors associated with it in students of 8–12 in a government school of western Maharashtra.

**METHODS**

Ethical clearance was obtained from the institutional ethical committee before the start of the study. Permission from the school authorities was obtained after explaining the importance of the study. After obtaining the written informed consent from the study participants’ parents and assent from the children, data were collected. This is a cross-sectional study of students in the 8th–12th class from a government-run school in western Maharashtra. Data were collected from November 2018 to June 2019.

Exclusion criteria were students with a family history of psychiatric disorder, a preexisting psychiatric disorder, i.e., Attention Deficit Hyperactivity Disorder (ADHD), depression, mental retardation, autism, and conduct disorder.

The sample size was estimated with a 5% error of margin on either side of truth prevalence with 95% confidence and found to be 82.59. Sociodemographic data were collected by administering the questionnaire, and individuals filled out the IGDS. The IGDS is a short dichotomous 9-item scale. It adapts the 9 diagnostic criteria of DSM-5 wherein the diagnosis threshold is taken as experiencing five or more criteria. Sensitivity was measured to be up to 0.87 and specificity up to 0.99 with a diagnostic accuracy of 0.97. It provides a valid and reliable measure of IGD. It has good diagnostic accuracy for research among gamers of all ages.\[10\] Students who had IGDS scores suggestive of IGD were initially assessed by a psychiatrist and offered essential support. Data were compiled and were assessed by using appropriate statistical methods [Figure 1].

**RESULTS**

In this study, of 142 students, 85 (59.9%) were male participants. Demographic characteristics are given in Table 1. The prevalence of IGD in this study was found to be 10.6% [Table 2]. A significant difference was noted in the prevalence of IGD between male and female students [Table 3].

Having personal Internet connectivity was not significantly associated with IGD. IGD was significantly associated with individuals owning smartphones [Table 3]. Of the various genres of games played, strategy, action, role-playing, and sports games were associated significantly with IGD [Table 4]. The distribution of prevalence of IGD differed significantly across various age groups of first gameplay [Table 5]. On multivariate logistic regression analysis, male sex and lower age at first gameplay are the independent and significant determinants of the prevalence of IGD [Table 6].

**DISCUSSION**

This study found that overall, the 12-month prevalence of IGD among 142 students was 10.6%. The prevalence estimates of IGD varied from a wide range across various previous studies. In a sample of 1931 Spanish secondary school students, the prevalence was as low as 0.6% and as high as 27.5% in a sample of 448 French Massively Multiplayer Online Role-Playing Games (MMORPGs) gamers recruited online.\[13\] This wide range of prevalence was seen due to variation in the population sampled and various tools and methods. Prevalence in our study was similar to

Table 1: Demographic characteristics of students

| Variables       | Category | n (%) |
|-----------------|----------|-------|
| Sex             | Male     | 85 (59.86) |
|                 | Female   | 57 (40.14) |
| Age (years)     | ≤14      | 76 (53.52) |
|                 | 15-16    | 53 (37.32) |
|                 | 17-18    | 11 (7.75)  |
|                 | ≥19      | 2 (1.41)   |
| Class           | 8        | 21 (14.79) |
|                 | 9        | 67 (47.18) |
|                 | 10       | 34 (23.94) |
|                 | 11       | 9 (6.34)   |
|                 | 12       | 12 (7.75)  |
| Handedness      | Right    | 130 (91.55) |
|                 | Left     | 12 (8.45)  |
| Internet connection | Absent | 70 (49.30) |
|                 | Present  | 72 (50.70) |

Table 2: Prevalence of Internet gaming disorder

| IGD status | Number of students, n (%) |
|------------|---------------------------|
| Present    | 15 (10.6)                 |
| Absent     | 127 (89.4)                |
| Total      | 142 (100.0)               |

IGD – Internet gaming disorder
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Table 3: Prevalence of Internet gaming disorder according to various factors

| Factor                  | Present, n (%) | Absent, n (%) | Total, n (%) | P     |
|-------------------------|----------------|---------------|--------------|-------|
| Gender distribution     |                |               |              |       |
| Male                    | 13 (15.3)      | 72 (84.7)     | 85 (59.86)   | 0.027*|
| Female                  | 2 (3.5)        | 55 (96.5)     | 57 (40.14)   |       |
| Handedness              |                |               |              |       |
| Right                   | 14 (10.8)      | 116 (89.2)    | 130 (91.55)  | 0.999 (NS) |
| Left                    | 1 (8.3)        | 11 (91.7)     | 12 (8.45)    |       |
| Internet connection     |                |               |              |       |
| Absent                  | 8 (11.4)       | 62 (88.6)     | 70 (49.30)   | 0.741 (NS) |
| Present                 | 7 (9.7)        | 65 (90.3)     | 72 (50.70)   |       |
| Age (years) at first gameplay |            |               |              |       |
| <6                      | 10 (50.0)      | 10 (50.0)     | 20 (14.08)   | 0.001***|
| 7-18                    | 4 (5.2)        | 73 (94.8)     | 77 (54.23)   |       |
| >18                     | 1 (2.2)        | 44 (97.8)     | 45 (31.69)   |       |
| Total                   | 15 (10.6)      | 127 (89.4)    | 142 (100)    |       |

*P < 0.05 is considered to be statistically significant; ***P < 0.001. P value by Chi-square test. NS – Statistically nonsignificant; IGD – Internet gaming disorder

Table 4: Internet gaming disorder and gaming device

| Gaming device | IGD                  | Total, n (%) | P     |
|---------------|----------------------|--------------|-------|
|               | Present, n (%)       | Absent, n (%)|       |
| Smartphone    |                      |              |       |
| Absent        | 0                    | 27 (100.0)   | 27 (19.0) | 0.047*|
| Present       | 15 (13.0)            | 100 (87.0)   | 115 (81.0) |       |
| Computer      |                      |              |       |
| Absent        | 8 (7.8)              | 95 (92.2)    | 103 (72.5) | 0.078|
| Present       | 7 (17.9)             | 32 (82.1)    | 39 (27.5) | (NS)  |
| Console       |                      |              |       |
| Absent        | 13 (9.9)             | 118 (90.1)   | 131 (92.3) | 0.327|
| Present       | 2 (18.2)             | 9 (81.8)     | 11 (7.7) | (NS)  |
| Other**       |                      |              |       |
| Absent        | 13 (10.0)            | 117 (90.0)   | 130 (91.5) | 0.617|
| Present       | 2 (16.7)             | 10 (83.3)    | 12 (8.5) | (NS)  |

**Other devices such as nintendo switch, playstation portable, Apple iPad, tablet. *P < 0.05 is considered to be statistically significant. P value by Chi-square test. NS – Statistically nonsignificant; IGD – Internet gaming disorder

Gender

A higher prevalence of IGD was observed among male students (15%) than female students (3.5%). This was similar to previous studies.[10,20,21] Males engage in riskier games, such as competitive shooters and massively multiplayer online games, which is possibly one reason for the higher prevalence of IGD. Even though females also engage in gameplay, males report playing games (RPG) more frequently and intensely than females. Games are primarily developed by males with features, modes, and esthetics that are generally more appealing to males, particularly adolescents. Developers also develop games targeting female gamers, including social games, story-driven, and casual games, but these types of games are often less time-consuming and less risky. Females may show better executive control than men when facing gaming cues, which might provide resilience against developing IGD.[22]

Handedness

One of the laterality marker parameters, handedness, was not significantly associated with IGD. In previous studies, left-handedness was associated with substance dependence but not with IGD.[23,24] This may be explained by the relatively small number of individuals within this sample.

Internet connectivity

There was no significant difference in the distribution of prevalence of IGD between group with and without Internet connectivity. Even though the term “Internet” is present to describe the disorder, DSM-5 and ICD-11 both consider offline gaming a valid entity for diagnosing IGD. This suggests that the IGD can be present in an individual even if the gaming is done offline. For IGD that primarily involves offline, story-driven games, the individual may seek a safe, quiet, and/or uncomplicated escape from the...
Table 5: Internet gaming disorder and genre of game played

| Type of game | IGD Present, n (%) | IGD Absent, n (%) | Total, n (%) | P  |
|--------------|--------------------|------------------|--------------|----|
|              |                    |                  |              |    |
| Simulation   |                    |                  |              |    |
| No           | 9 (8.0)            | 103 (92.0)       | 112 (100.0)  | 0.058 (NS) |
| Yes          | 6 (20.0)           | 24 (80.0)        | 30 (100.0)   |    |
| Strategy     |                    |                  |              |    |
| No           | 3 (2.8)            | 104 (97.2)       | 107 (100.0)  | 0.001*** |
| Yes          | 12 (34.3)          | 23 (65.7)        | 35 (100.0)   |    |
| Action       |                    |                  |              |    |
| No           | 5 (5.9)            | 80 (94.1)        | 85 (100.0)   | 0.027*  |
| Yes          | 10 (17.5)          | 47 (82.5)        | 57 (100.0)   |    |
| Role-playing |                    |                  |              |    |
| No           | 4 (3.3)            | 116 (96.7)       | 120 (100.0)  | 0.001*** |
| Yes          | 11 (90.0)          | 11 (10.0)        | 22 (100.0)   |    |
| Casual       |                    |                  |              |    |
| No           | 9 (8.7)            | 94 (91.3)        | 103 (100.0)  | 0.250 (NS) |
| Yes          | 6 (15.4)           | 33 (84.6)        | 39 (100.0)   |    |
| Sports       |                    |                  |              |    |
| No           | 6 (5.6)            | 101 (94.4)       | 107 (100.0)  | 0.001*** |
| Yes          | 9 (25.7)           | 26 (74.3)        | 35 (100.0)   |    |
| Racing       |                    |                  |              |    |
| No           | 10 (8.8)           | 104 (91.2)       | 114 (100.0)  | 0.161 (NS) |
| Yes          | 5 (17.9)           | 23 (82.1)        | 28 (100.0)   |    |
| Others       |                    |                  |              |    |
| No           | 13 (10.2)          | 114 (89.8)       | 127 (100.0)  | 0.660 (NS) |
| Yes          | 2 (13.3)           | 13 (86.7)        | 15 (100.0)   |    |

*P<0.05, P<0.01 is considered to be statistically significant; **P<0.01. Highly significant P value by Chi-square test. NS – Statistically nonsignificant; IGD – Internet gaming disorder

Table 6: Multivariate logistic regression analysis

| Risk factors (variables included in the model) | OR | 95% CI for OR | P  |
|-----------------------------------------------|----|---------------|----|
| Sex                                           |    |               |    |
| Female                                        | 1.00 | -             | - |
| Male                                          | 2.19 | 1.14-4.02     | 0.008*** |
| Age at first gameplay (years)                 |    |               |    |
| >6                                            | 1.00 | -             | - |
| ≤6                                            | 4.23 | 1.96-9.69     | 0.005** |

**Highly significant. OR – Odds ratio; CI – Confidence interval

real world. This may be desirable for those with histories of traumatic experiences, social anxiety, and/or abusive or conflictual relationships.

Gaming devices

IGD did not differ significantly in individuals gaming across various types of devices. However, IGD was significantly associated with gamers using smartphones for gaming. Manni[25] proposed “availability as a law of addiction.” Therefore, it appears reasonable to suggest that smart devices' high availability may be another possible risk for addiction. Recent studies have highlighted that problematic gaming can often occur on portable devices and predict gaming problems.[26] It is possible that smartphone gaming may be an adjunctive activity for problematic gamers at times when they are unable to play on their preferred platform.[24]

Genre of games

Game types such as strategy, role-playing, sports games, and action were associated with IGD. This finding was similar to a previous study among 4744 university students where real-time strategy and RPG were more strongly associated with IGD symptoms.[27] Certain games may be riskier than others for individuals indulging in gaming. A study observed that MMORPGs, a type of RPG game, pose a risk to the gamers in terms of more significant interference in “real-life” socializing and academic work as well as physical and mental well-being.[28] Problem gamers remember a “special” game that they compare against other games. These players report the expectation of replicating that experience in almost the same way as problem gamblers try to relive their first “big win.”[27]

Age at first gameplay

This study found that IGD was more prevalent in individuals who started gameplay before 6 years of age. Several previous studies have reported an association between age at onset of gaming and problematic gaming.[29-31] Initiation of gaming activities at an early age, preceding formal logical reasoning ability, may increase children’s vulnerability to developing IGD. In present times, early gaming experiences have been facilitated by parents, either directly by giving a child a gaming device to own and use or indirectly by enabling play with others in gaming-supported environments. These acts may be harmful, as seen with previous and our studies.

Strengths of the study

This is one of the first studies of IGD among the Indian population. The scale used, IGDS 9-item scale, is validated for adolescents. It is a scale with good sensitivity, specificity, and accuracy, which is easy to use and is brief. The sample size was adequate. The sample was taken from a representative population.

Limitations of the study

The study employed a cross-sectional design, so the causal relationships remain unclear. Exclusion criteria were assessed via questionnaire and not via structured clinical interview, which may have led to bias in the inclusion of individuals with other comorbidities. The sample was restricted to adolescent students in the age group of 12–19 years only, which might be the reason for higher prevalence than previous studies. The data obtained are self-reported and may have been subjected to inaccurate memories and cognitive distortions,
leading to bias (social desirability and recall bias). As the study was classroom based, students absent from school might not have participated, affecting the study's actual prevalence rate and outcome. This study did not include some of the relevant (concerning parental psychopathology) due to which the unmeasured confounding may bias results.

CONCLUSIONS

The prevalence of IGD in our study was 10.6%, with 15 among 142 individuals found to have IGD. The study data suggested that individual and game-related factors are associated with IGD. Male gender was significantly associated with IGD. Owning a smartphone was associated significantly. Strategy games, RPG, sports, and action were significantly associated with IGD. Early onset of gameplay was associated significantly with IGD.

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Conflicts of interest

There are no conflicts of interest.

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