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# Internet gaming disorder, loneliness, and insomnia among Indians during the COVID-19 pandemic

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**Abstract. Introduction:** The lockdown and stay at home orders implemented by the Indian government to inhibit the spread of COVID-19 disrupted the lifestyle of most individuals in the country. This appeared to result in behavioral changes such as increased internet usage, feelings of loneliness, and disturbance of sleeping patterns. **Objectives:** The objective of the present study was to examine IGD prevalence and its association with loneliness and insomnia among the Indian population during the COVID-19 pandemic. Based on the previous literature, it was hypothesized that IGD would be positively associated with both loneliness and severity of insomnia. **Materials and Methods:** Utilizing a cross-sectional design, a total of 372 participants (54% males, 42.4% females; 3.5% other; mean age 23.26 years [SD=9.07]) completed an anonymous self-report survey. The three key variables were assessed using the Internet Gaming Disorder Scale-Short Form (IGDS9-SF), the UCLA Loneliness Scale (Version 3), and the Insomnia Severity Index (ISI). **Results:** The prevalence of IGD among Indians during the COVID-19 pandemic was 0.8% in the total sample and 2.02% among gamers. Regression analysis indicated that IGD was associated with average hours spent online gaming per day ( $\beta=0.164$ ;  $p=0.02$ ), loneliness ( $\beta=0.177$ ;  $p=0.01$ ), and severity of insomnia ( $\beta=0.483$ ;  $p<0.001$ ). **Conclusion:** The study indicated average hours spent online gaming, loneliness, and severity of insomnia as predictors of IGD. Future research is required to develop a comprehensive understanding of internet gaming behaviors during unprecedented times such as COVID-19.

**Keywords:** Internet Gaming Disorder, Loneliness, Insomnia, COVID-19, India

## Introduction

The most recent (fifth) edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) defines Internet Gaming Disorder (IGD) 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 5 (or more) criteria in 12 months period*” (American Psychiatric Association, 2013, p.795). Moreover, in the 11<sup>th</sup> revision of the *International Classification of Diseases* (ICD-11), the World Health Organization (WHO) formally recognized gaming disorder as a mental health disorder (Pontes, et al., 2021). Neuroimaging studies show that internet gaming addiction shares similarities with other types of addiction (Kuss et al., 2018).

Research into online addictions among the Indian population has been growing. Although there is research on internet addiction and its correlates (e.g., Shrivastava et al., 2017; Yadav et al., 2013), there is limited research assessing the prevalence of IGD and associated correlates in developing countries such as India (Naskar et al., 2016). The extant literature shows that the prevalence of IGD in India ranges from 1.96% to 3.6% (Singh et al., 2019; Undavalli et al., 2020). In extreme circumstances, excessive engagement in online gaming by Indian gamers has resulted in exam failure, hospitalization, suicide attempt, suicide, and death (Mamun & Griffiths, 2019). Previous literature indicates that as in other countries, Indian males experience greater levels of IGD compared to females (e.g., Kalva & Jogsan, 2019; Kaur, 2020). Furthermore, there is sufficient evidence to conclude that among Indian gamers, problematic online gaming can result in psychological problems including depressive symptomology, loneliness, disturbance in sleeping patterns, and panic episodes (Sachdeva & Verma, 2015; Sundaray & Galimotu, 2020). A case study of two Indian brothers diagnosed with IGD reported that they spent 14-18 hours per day on online games. This resulted in interference with both their sleep and daily routines (Sachdeva & Verma, 2015).

### *Internet gaming during the COVID-19 pandemic*

Lockdowns and other measures (e.g., spatial distancing, quarantines, home schooling, working from home) imposed by national governments to inhibit the spread of the coronavirus disease 2019 (COVID-19) have altered the lifestyles of billions of individuals worldwide. There is evidence of increased use of the internet during the COVID-19 pandemic. For example, a recent survey among the Chinese population showed that almost half of the participants reported increased dependence on internet use, and one in six reported longer hours of internet use during the pandemic (Sun, et al., 2020). Another Chinese study found a significant association between internet addiction, depression, and stress among children and adolescents (Dong, Yang, Lu, & Hao, 2020). Previous studies have demonstrated that the COVID-19 pandemic has resulted in increased depression, anxiety, stress, fear, loneliness, and sleep disturbances (e.g.,

Alimoradi et al., 2021; Huang & Zhao, 2020; Li & Wang, 2020; Verma & Mishra, 2020; Şimşir et al., 2021).

To cope with the stress of the lockdown and abide by stay-at-home orders, many individuals have resorted to using entertainment games (Kriz, 2020). Moreover, to cope with loneliness during the lockdown, some individuals may have resorted to online gaming which for those playing a lot may have led to higher risk of insomnia. Fernandes et al. (2020) reported that gaming addiction among adolescents was associated with both loneliness and poor sleep quality during the COVID-19 pandemic. Similarly, other studies have reported gaming addiction to be associated with increased levels of loneliness and insomnia during the pandemic (Pallavicini et al., 2022; Zaman et al, 2022). The gaming industry saw three times more user engagement and 30% higher traffic in online mobile gaming at the start of the pandemic (Amin et al., 2022). Almost half of Indian college students reported that their gaming behavior increased during the COVID-19 lockdown (Balhara et al., 2020). Pahayahayand and Khalili-Mahani (2020) reported that younger individuals in Canada and the United States were more than two times likely to use computer games to cope with quarantine conditions. There are reports that during the initial period of lockdown, in India approximately 2.2 million people played *PUBG* (before its ban in India), and more than 800,000 played *Minecraft* and *Fortnite* (D'Cruze, 2020). Although these coping mechanisms appear as healthy strategies during crisis such as the COVID-19 pandemic, long-term involvement in such activities can also pose risks (King et al., 2020). Such behavioral changes can result in IGD for a minority of individuals which has a further impact on other psychological outcomes and can prove challenging in developing a healthy daily routine (Amin et al., 2020). However, studies on the internet gaming and its association with other psychological outcomes during the pandemic are still relatively scarce. To fill this literature gap, the objective of the present study was to examine IGD prevalence and its association with loneliness and insomnia among the Indian population during the COVID-19 pandemic. Based on the previous literature, it was hypothesized that IGD would be positively associated with both loneliness and severity of insomnia.

## **Materials and methods**

### ***Participants, procedure, and ethics***

A cross-sectional online survey was conducted that employed convenience sampling. Data were collected using an English language online survey because English is widely spoken in India (i.e., among Indians, English is the second language of 83 million and the third language of 46 million) (Rukmini, 2019). Online data collection has several advantages regarding accessibility to a large group of hard-to-reach samples, the ability to reach a diverse population with cost-effectiveness, and practicality for studying behavioral addictions (Griffiths, 2012; Wood & Griffiths, 2007). A link to the online survey was advertised widely

through various social media platforms, authors' social networks, instant messaging applications, and via emails. This study was conducted in accordance with the Declaration of Helsinki and was approved by the O.P. Jindal Global University Research Ethics Review Board.

The participants were informed about the nature of the study being conducted. All the participants were aged above 18 years. Electronic informed consent was obtained from all the participants prior to participation in the study. All the participants were informed that their data would be confidential and completely anonymous. Participants had the right to refuse or withdraw from the research at any time without any reason.

A total of 396 participants took part in the survey. Of these, 13 participants (3.3%) did not provide their informed consent, therefore their data were removed from the analysis. In addition, responses were checked and invalid data was removed (e.g., those who reported the number of gaming hours more than 24 hours a day). Furthermore, four participants were aged lower than 18 years and were excluded from the data set for analysis. The data were also explored for any outliers and four responses were excluded from the dataset. The final dataset comprised of 372 participants. The average time to answer all the survey questions was 20 minutes.

### **Measures**

*Socio-demographics:* The first section of the survey consisted of demographic questions related to age, gender, profession (student, employed, unemployed, retired), current relationship status (single, married, dating, divorced, other), and current living arrangements (living alone or with parents/guardians/friends/others). This section also included internet-related variables of average hours of internet use per day for any use (i.e., both work and leisure), number of years of internet usage, and whether the participants played online videogames or not (yes/no). Participants who answered "yes" to this question also completed another section on internet gaming behavior.

*Internet gaming disorder:* IGD was assessed using the nine-item Internet Gaming Disorder Scale–Short Form (IGDS9-SF; Pontes & Griffiths, 2015) which has been previously used in India (Pontes et al., 2017). The nine items in the IGDS9-SF are based on the nine DSM-5 IGD criteria (Pontes & Griffiths, 2015; Poon et al., 2021). Items (for example, "Do you systematically fail when trying to control or cease your gaming activity?") are rated on a five-point scale ranging from 1 (*never*) to 5 (*very often*) with scores ranging from 9 to 45. Higher scores indicate a higher risk of internet gaming disorder. Participants were asked to respond to questions over the past six months (rather than the normal 12 months) to fulfill the study objective. Those who endorsed five or more items of IGDS9-SF as 'very often' were operationally defined as having IGD. The IGDS9-SF has shown good validity and has demonstrated a single factor structure among

Indians similar to other cultural contexts (Pontes et al., 2017). The Cronbach's  $\alpha$  for the IGDS9-SF in the present study was 0.878.

*Loneliness:* Loneliness was assessed using the 20-item UCLA Loneliness Scale (Version 3; Russell, 1996) comprising eleven negative items and nine positive items. Items (for example, "How often do you feel alone?") are rated on a four-point scale ranging from 1 (*never*) to 4 (*always*) with nine items reverse coded and scores ranging from 20 to 80. Higher scores indicate a higher degree of loneliness. This scale has previously demonstrated good psychometric properties including validity in various cultures (Durak & Senol-Durak, 2010; Lasgaard, 2007; Zarei et al., 2016). The Cronbach's  $\alpha$  for UCLA Loneliness Scale (Version 3) in the present study was 0.862.

*Severity of insomnia:* Severity of insomnia was assessed by using the seven-item Insomnia Severity Index (ISI). Items (for example, "How worried/distressed are you about your current sleep problem?") are rated on a five-point scale ranging from 0 (*no problem*) to 4 (*severe problem*) with scores ranging from 0 to 28. Higher scores indicate a higher degree of insomnia. Scores of 0–7=no clinically significant insomnia present; 8–14=sub-threshold insomnia; 15–21=clinical insomnia (moderate severity); and 22–28=clinical insomnia (severe). The ISI has previously demonstrated excellent internal consistency, test-retest reliability, and validity among Indian population (Veqar & Hussain, 2017). The Cronbach's  $\alpha$  for ISI in the present study was 0.878.

### **Data analysis**

Data were analyzed using SPSS 23.0. A preliminary analysis was performed to check the assumptions of normality, linearity, multicollinearity, autocorrelation, and homoscedasticity. The normality of data was tested visually using the P-P plot (probability-probability plot) and Q-Q plot (quantile-quantile plot) (Ghasemi & Zahediasl, 2012). Data were found to be normally distributed. Consequently, parametric statistical tests were performed. Linearity was tested using the ANOVA test and the data were found to be linear. For multicollinearity, tolerance value and variable inflation factor (VIF) were calculated (Mansfield & Helms, 1982). Tolerance value and VIF for each independent variable ranged between 0.795-0.872 and 1.146-1.257 respectively. Correlation between two successive observations was determined using the Durbin Watson test. The value of the Durbin Watson coefficient was 2.013 and no autocorrelation was found (Durbin & Watson, 1950). Homoscedasticity was determined by using the Breusch-Pagan test (Breusch & Pagan, 1979). Pearson correlations were used to evaluate relationships between the study variables (Siegel, 1957). Finally, linear regression was performed to predict the outcome variable. The level of significance for all the statistical tests was set at an alpha of 0.05.

## Results

### *Descriptive statistics*

Of the 372 participants, 54% were males, 42.4% females, and 3.5% other. The average age of all the participants was 23.26 years (SD=9.07 years). The majority of the participants were students (78%), 14.3% were employed, 7.3% were unemployed, and two participants were retired (0.5%). More than half of the participants were single (57%), 28.8% were in a relationship, 11.6% were married, and 2.7% were divorced. Four-fifths of participants (83.1%) reported living with family members or guardians while 16.9% reported living alone. The average number of hours of daily internet use per day for all participants was 6.72 hours (SD=3.96 hours). Of the 372 participants, 39.8% (n=148) reported that they played internet games and identified as online gamers. The average number of hours spent online gaming per day was 2.7 hours (SD=2.29 hours). All the descriptive statistics are presented in Table 1.

**Table 1: Socio-demographic characteristics of the study participants (n=372)**

	n (%)	Mean score of IGDS9-S (n)	Mean score of UCLA Loneliness Scale	Mean score of ISI
<i>Gender</i>				
Male	201 (45%)	22.12 (107)	47.73	12.0
Female	158 (42.5%)	23.22 (41)	49.47	12.59
Other	12 (3.5%)	-	49.69	12.85
<i>Profession</i>				
Students	290 (78%)	22.22 (134)	48.01	10.91
Working	53 (14.3%)	22 (10)	49.62	15.75
Unemployed	27 (7.3%)	30.5 (4)	51.59	19.52
Retired	2 (0.5%)	-	54.5	21.50
<i>Current relationship status</i>				
Single	212 (57%)	22.29 (104)	48.4	10.98
Dating	107 (28.8%)	22.38 (39)	47.47	12.42
Married	43 (11.6%)	25.6 (5)	50.81	16.58
Divorced	10 (2.7%)	-	53.1	19.8
<i>Current living arrangements</i>				
Living alone	63 (16.9%)	24.9 (10)	50.22	13.4
Living with family/guardians/friends/others	309 (83.1%)	22.25 (138)	48.19	12.05
<i>Play online videogames</i>				
Yes	148 (39.8%)	22.43 (148)	46.46	10.88
No	224 (60.2%)	-	49.91	13.21

### ***Prevalence of IGD, loneliness and insomnia severity during the pandemic***

The mean score of the IGDS-SF9 for the participants who played online games was 22.43 (SD=7.87). Out of 148 online gamers, only three endorsed 'very often' on five or more items of the IGDS9-SF. Therefore, the prevalence of IGD during the COVID-19 was 0.8% in the total sample and 2.02% among gamers. All three participants classed as having IGD

were males, students, and single. The mean scores of the UCLA Loneliness Scale and ISI for all the study participants were 48.53 (SD=7.87) and 12.28 (SD=7.40) respectively. The prevalence of severe clinical insomnia, moderate severity clinical insomnia, sub-threshold insomnia and no clinically significant insomnia during COVID-19 was 12.9% (n=48), 26.1% (n=97), 32% (n=119) and 29% (n=108) respectively.

#### ***Association between the study variables***

Bivariate correlation analysis showed statistically significant positive association between the average number of hours spent on the internet per day, and average number of hours spent online gaming per day ( $r=0.371, p<0.001$ ), IGD ( $r=0.307, p<0.001$ ), loneliness ( $r=0.143, p<0.01$ ), and insomnia severity ( $r=0.248, p<0.001$ ). There was a significant positive correlation between the average number of hours spent online gaming per day and IGD ( $r=0.281, p<0.01$ ), and loneliness ( $r=0.166, p<0.05$ ). Moreover, significant positive associations were found between IGD and loneliness ( $r=0.382, p<0.001$ ), and IGD and insomnia severity ( $r=0.554, p<0.001$ ). Finally, there was a significant positive association between loneliness and insomnia severity ( $r=0.38, p<0.001$ ). Correlation coefficients among all the study variables are shown in Table 2.

**Table 2: Bivariate analysis of the study variables (n=372)**

Study variables	1	2	3	4	5
1. Average hours spent on internet per day	-				
2. Average hours spent online gaming per day	0.371***	-			
3. Internet gaming disorder <sup>#</sup>	0.307***	0.281**	-		
4. Loneliness	0.143**	0.166*	0.382***	-	
5. Insomnia severity	0.248***	0.053	0.554***	0.380***	-

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$ , <sup>#</sup>n=148

In the linear regression analysis, IGD ( $R=0.651$ ;  $R^2=0.424$ ;  $p<0.001$ ) was related with average number of hours spent online gaming per day ( $\beta=0.164$ ;  $p=0.022$ ), loneliness ( $\beta=0.177$ ;  $p=0.011$ ) and severity of insomnia ( $\beta=0.483$ ;  $p<0.001$ ). Results of linear regression are shown in Table 3.

**Table 3: Linear regression of the relationships between IGD and the study variables**

Study Variables	Standardized coefficient $\beta$	$p$ -value
1. Average hours spent on the internet per day	0.116	0.107
2. Average hours spent online gaming per day	0.164	0.022
3. Loneliness	0.177	0.011
4. Insomnia severity	0.483	<0.001

## Discussion

To the best of the present authors' knowledge, the present study is the first to estimate the prevalence of IGD and its association with loneliness and the severity of insomnia during the COVID-19 pandemic in India. The findings indicated that 0.8% of the total sample and 2.02% of the online gamers had IGD and it was significantly and positively associated with loneliness and severity of insomnia, findings which supported the study's hypothesis. The prevalence of IGD was low, but consistent with some other studies (e.g., Festl et al. 2013; Singh et al., 2019; Undavalli et al., 2020; Wittek, et al., 2016).

The prevalence of IGD in these studies was found to be between 1.4% and 3.7%. However, the sample populations in these studies were different. For example, Wittek and colleagues (2016) study comprised a representative sample of gamers while Undavalli and authors (2020) study comprised adolescents. The prevalence of IGD in the present study is lower than that a recent systematic review and meta-analysis of gaming disorder across 17 different countries which reported a worldwide prevalence of gaming disorder of 3.05% and 1.96% among studies with representative samples (Stevens et al., 2020). This is much lower than IGD reported in some studies. For example, Na et al. (2017) found that 16.9% of the South Korean participants in their study met IGD criteria (Na, et al., 2017). Similarly, Aggarwal and Pandian (2019) reported that 9% of the Indian medical and dentistry students met IGD criteria.

The lower prevalence of IGD in this study could be attributed to the lower sample size of online gamers (n=148). However, a smaller sample size could have also inflated the true prevalence rate (Biau et al., 2008). Secondly, although majority of the participants in the present study were students (78%), the sample also comprised a mixed group rather than a specific cohort (i.e., adolescents, employed, unemployed, students). The studies that report the highest prevalence rates have mostly been conducted on a particular cohort of a population such as adolescents (Kochuchakkalackal & Reyes, 2019), students (Archana et al., 2019), and office workers (Shrivastava et al., 2017). Moreover, a recent systematic review and meta-analysis demonstrated that the prevalence of gaming disorder is higher when the sampling is selective (for example, convenience or purposive sampling and gamers only) compared with representative sampling (Stevens et al., 2020). Thirdly, the criterion used to assess IGD was based on DSM-5 criteria. In the DSM-5, five of the nine diagnostic criteria (e.g., preoccupation or obsession, withdrawal, tolerance, loss of control, loss of interest, continued overuse, deceiving, escape of negative feelings, functional impairment) must be met to be diagnosed as IGD (Jo et al., 2019). In the present study, many participants endorsed several items on IGDS9-SF as 'often' rather than 'very often'. Due to the strict diagnostic approach, they did not meet the IGD criteria set by DSM-5.

Linear regression indicated that internet gaming addiction was positively and significantly associated with average number of hours spent

online gaming per day, loneliness, and severity of insomnia. However, in the linear regression model, IGD was not found to be significantly correlated with the number of average hours spent on the internet per day. A possible explanation for this could be that during the COVID-19 pandemic, individuals had higher internet use on other activities that displaced gaming. Due to the pandemic, school and college classes were conducted through online platforms (Kapasia et al., 2020), employees started working from their homes (Roy et al., 2020), and individuals were highly engaged in internet activities such as social media (Chaturvedi & Sharma, 2020), therefore less time may have been spent online gaming. According to the Telecom Ministry data, the consumption of the internet rose by around 13% among the Indian population during the COVID-19 pandemic (Madhukalya, 2020). The increase in internet use does not necessarily mean that individuals spent more time gaming online. Internet use was not only limited to online gaming but also associated with other internet activities such as online learning and leisure activities.

It is evident from the present study that there was a positive association between the average number of hours spent online gaming and IGD scores. These results are consistent with the extant research (e.g., Balhara et al., 2020; Wang et al., 2014; Wei et al., 2012). The demand for online gaming significantly increased during COVID-19. For example, *Ludo King*, an Indian-based gaming company reported an almost 100% increase in the user base during the initial months of pandemic, with 1.52 million registered users (Sharma, 2020). The findings of this study indicate that more hours spent on internet gaming might result in increased hours of online gaming eventually leading to IGD among a small minority of individuals.

The present study also found a positive correlation between IGD and loneliness. These findings are also consistent with the extant literature (e.g., T'ng et al., 2020; Tras, 2019). Individuals with the feelings of loneliness may spend time gaming on the internet as a coping mechanism to escape from loneliness (Myrseth et al., 2017). During the pandemic and due to the nationwide lockdown, working or being educated from home, social and physical isolation, the reduction of outdoor activities, change in lifestyle, limited interactions with friends, peer, family members, relatives, professionals, an individual might feel the perceived sense of loneliness which, in turn, might lead to increased used of online gaming and resulting in IGD for a small minority of individuals.

In line with the previous studies (e.g., Aggarwal & Pandian, 2019; Satghare et al., 2016; Yu et al., 2020), the present study also found a positive association between IGD and severity of insomnia. The possible reasons for this could be the changes in lifestyle and daily routines of individuals due to the strict lockdown imposed by Indian government. The tough conditions of social isolation and quarantine can act as stressors for the general population (Basu et al., 2020). As a result of this, an individual might engage in behaviors such as internet gaming leaving less time for sleep. As

suggested by Achab et al. (2011), individuals with IGD are more likely to experience insomnia or impaired sleep quality compared to non-IGD users. Individuals highly engaged in online gaming are likely to sleep much less than those not highly engaged in online gaming. However, the severity of insomnia may also be attributable to the stress associated with COVID-19 pandemic itself (Abdulah & Musa, 2020; Alimoradi et al., 2021; Fazeli, et al., 2020).

### **Limitations**

This study has some limitations which can be acknowledged when interpreting the findings. First, the sample size of online gamers in the studied population was very small (n=148) which could have biased the findings. Second, the design of the study carried out was cross-sectional, which limits the ability to interpret the direction of causality between the variables. The present authors posit that due to the loneliness and insomnia experiences during the COVID-19 pandemic, IGD is more likely to occur. However, there are possibilities that loneliness and insomnia might occur due to IGD (or a combination of both). Third, a convenience sample was recruited for the present study. Therefore, findings of the study cannot be generalized to a larger population. Fourth, the data were collected utilizing a web-based survey. This could result in selection biases which may also bias the study outcomes (Bethlehem, Selection bias in web surveys, 2010). Fifth, the data were all self-report. Although no identifying information was asked from the study participants, there is a possibility of biases such as social desirability and memory recall. Finally, although based on the DSM-5 IGD criteria, the IGDS9-SF is not a diagnostic tool. It can only identify those who might be at risk of IGD. The present study used a six-month period rather than the 12-month period so that gaming activity examined in our study covered the pandemic period. Given that the study did not use the 12-month period, the prevalence of those who might be at risk of IGD may have been higher as a consequence. However, it is acknowledged elsewhere that gaming disorder may still be present if all the requirements for diagnosis are met even if the 12-month condition is not (World Health Organization, 2019).

### **Conclusion**

The findings of this study address an important gap in the extant literature in India. This study found an association between IGD, loneliness, and severity of insomnia during the COVID-19 pandemic and is a concern among the Indian population. This association indicates that changes in lifestyle, disruption in work-life balance, and coping mechanisms may be problematic and have serious consequences for a minority of individuals. Persistent engagement in gaming during the lockdown may result in IGD once the pandemic is over. Future research is required to develop a comprehensive understanding of internet gaming behaviors during crisis

situations such as the COVID-19 pandemic and its association with other detrimental psychological outcomes. Early identification is required to formulate preventive strategies.

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No funding was received for the present study

### **Availability of data and material**

The data of the present study are available from the corresponding author upon reasonable request.

### **Author's contributions**

All authors significantly contributed to the research and preparation of manuscript.

### **Conflict of Interest**

The authors declare no conflict of interest apart from MDG. MDG regularly undertakes consultancy for various gaming companies in the area of social responsibility in gambling and player protection.

### **Informed Consent**

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participants for being included in the study.

### **Ethics Approval**

The Research Ethics and Review Board of the O.P. Jindal Global University provided ethical approval for the present study.

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