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The COVID-19 Psychological Distress Scale (CPDS-16): Development and initial validation

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Abstract. The outbreak of COVID-19 has caused psychological distress among the Indian population. There are several scales that assess fear and distress related to COVID-19 among individuals. However, these scales are context-specific and lack multi-cultural environment applicability in countries such as India. Therefore, the present study developed a psychometric instrument to assess psychological responses to COVID-19 among the Indian population. A total of 420 participants (60.5% females, $M_{age}=25.89$ years) were recruited online using a convenience sampling technique. The 16-item COVID-19 Psychological Distress Scale (CPDS-16) was developed based on the extensive review of the existing scales on psychological constructs related to COVID-19 (yielding four scales with a total of 37 items) and independent review by two external experts. Internal consistency and reliability of the scale was established by using corrected item-total correlations, Cronbach's alpha, and McDonald's omega. Factor structure of the scale was determined by using exploratory factor analysis (EFA). Convergent validity of the scale was established by correlating CPDS-16 scores with the three subscales of the Depression, Anxiety, and Stress Scale (DASS-21). Corrected item-total correlations (range = 0.43 to 0.70), Cronbach's alpha ($\alpha = 0.90$), and McDonald's omega ($\omega = 0.89$) provided evidence for very good internal consistency and reliability of the scale. EFA of the CPDS-16 demonstrated a two-factor structure identified as 'individual level distress' (10 items) and 'community level distress' (6 items). Convergent validity of the scale was established using the DASS-21 with statistically significant and positive correlations between CPDS-16 and the three DASS-21 subscales (i.e., depression, anxiety, and stress). The CPDS-16 is a reliable and valid instrument in assessing psychological distress caused due to COVID-19 with robust psychometric properties. The scale can be administered rapidly and is useful in screening psychological distress caused due to COVID-19.

Keywords: Psychological distress, COVID-19, Depression, Anxiety, Stress, India

Introduction

The novel coronavirus disease 2019 (COVID-19) is the one the deadliest viruses that the world has experienced (Sabat, et al., 2020). As of December 22, 2022, there had been more than 659 million cases and over 6.67 million deaths worldwide (Worldometer, 2022). With such a high prevalence of virus infections and mortality rates, it is not surprising that there has been a sharp international increase in psychological distress among individuals (e.g., Ahorsu, Lin, Imani, Saffari, Griffiths, & Pakpour, 2020; Mertens, Gerritsen, Duijndam, Salemink, & Engelhard, 2020). The psychological distress associated with getting infected from COVID-19 tends to make individuals fearful, anxious, worried, and angry, as well as blaming others for spreading the virus (Ahorsu, et al. 2020; Ren, Gao & Chen 2020).

There has been growing attention paid to the psychosocial aspects of COVID-19. Research has demonstrated that the psychosocial impact of COVID-19 has resulted in anxiety, depression, stress (Verma & Mishra, 2020), fear (Doshi, Karunakar, Sukhabogi, Prasanna, & Mahajan, 2020), self-harm (Sahoo, et al., 2020), poor sleep quality (Lahiri, Jha, Acharya, Dey, & Chakraborty, 2021), post-traumatic stress disorder (Singh & Khokhar, 2021), and suicide risk (Dsouza, Quadros, Hyderabadwala, & Mamun, 2020) among general Indian population. Despite such evidence, there is a lack of appropriate psychometric instrument to assess general psychological distress arising from the COVID-19 pandemic. A few authors have developed and validated instruments to assess psychological responses associated with COVID-19 such as Fear of COVID-19 Scale (FCV-19S; Ahorsu, Lin, Imani, Saffari, Griffiths, & Pakpour, 2020), Coronavirus Pandemic Anxiety Scale (CPAS-11; Bernardo, et al., 2020), and COVID Stress Scales (CSS; Taylor, Landry, Paluszek, Fergus, McKay, & Asmundson, 2020). However, these instruments were limited given that they only assessed specific aspects of psychological distress. For example, FCV-19S only assessed fear of COVID-19 while the CPAS-11 only assessed anxiety associated with COVID-19. Moreover, these instruments were developed in different cultural settings. Compared with other countries, India is the second most affected country by the outbreak of the fatal COVID-19. As of December 22, 2022, the total number of cases of COVID-19 in India was more than 44.6 million and over 530,000 individuals had died from it (Worldometer, 2022).

In the Indian context, Chandu et al. (2020) developed the seven-item COVID-19 Anxiety Scale (CAS) that demonstrated a two-factor structure with good reliability and validity. However, the study participants were geographically restricted. More specifically, all the study participants belonged to the southern Indian state of Andhra Pradesh. Moreover, only two items loaded on the 'illness anxiety' factor of CAS (Chandu, Pachava, Vadapalli, & Marella, 2020). Additionally, Nasir, Adil and Kumar (2021)

developed and validated the 12-item Phobic COVID-19 Disorder Scale (Phobic-19 Scale) assessing fear, depression, and anxiety associated with COVID-19. Although the virus affected the whole of India, the infection rates and mortality rates were different across different Indian states. The worst infected state is Maharashtra followed by Kerala, Karnataka, and Andhra Pradesh (Ministry of Health and Family Welfare, 2021). Furthermore, with daily new cases peaking at more than 400,000 and the daily death toll at more than 4,500 at the time of writing (Worldometer, 2021), psychological distress among the Indian population was inevitably increasing. Given this scenario, assessing the psychological distress of Indian individuals is necessary in determining their mental well-being. Additionally, the existing instruments are context specific and lack applicability in multi-cultural, multi-ethnic, and multi-religious countries such as India. Considering the paucity of empirical studies in the Indian context, it is important to develop a reliable and valid instrument to assess individual's psychological responses to COVID-19. Therefore, the present study developed and evaluated the psychometric properties of the 16-item COVID-19 Psychological Distress Scale (CPDS-16) among the Indian population during the outbreak of COVID-19 in India.

Methods

Development of the initial scale

To initiate scale development, the research team searched for and reviewed various psychometric instruments related to the fear, stress, anxiety, and depression due to COVID-19. The search yielded a total of five instruments. These were: FCV-19S, CPAS-11, CSS, CAS, and Phobic-19 Scale. Permissions to use existing instruments for the development of a new instrument were obtained from the respective authors. One author did not provide the permission to use the instrument and hence was excluded. A total of four instruments with 37 items assessing any psychological distress relating to COVID-19 were examined. Relevant items were then pooled from these measures. A total of 18 items were pooled together after removing items with similar content or meaning. Extraction and examination of item were performed by the first and second author. After this, the 18 items were then presented to a panel of two experts, including two faculty members with an experience of at least 10 years in psychology, for independent review to establish the content validity and face validity of the items. Wordings and sequencing of some items were then modified based on the recommendations of the external experts. All the authors conducted additional discussions to reach upon the final agreement. Items for the newly developed scale were rated on a five-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Measures

Socio-demographics: Socio-demographic questions included current age, gender, current living arrangements (living with family/guardians or living alone), and education (undergraduate, postgraduate, integrated, doctoral studies, or other) of the respondents.

Depression, anxiety, and stress: Depression, anxiety, and stress were assessed using the 21-item Depression Anxiety Stress Scale (DASS-21). The DASS-21 is a modified version of the original 42-item DASS developed by Lovibond and Lovibond (1995a). The DASS-21 comprises three subscales that assess depression, anxiety and stress (seven items each). Responses range from 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*). The scale asks the participants to respond to items in relation to how they felt over the past week. Example items include “*I felt I wasn’t worth much as a person*” (depression), “*I felt I was close to panic*” (anxiety), and “*I found myself getting agitated*” (stress) (Lovibond & Lovibond, 1995b). The Cronbach’s alpha for depression, anxiety, and stress subscales for the present study were 0.93, 0.87, and 0.92 respectively which are considered as very good to excellent (Cronbach, 1951).

Participants and procedure

The present study comprised a cross-sectional online study among the general Indian population and utilized a convenience sampling technique. Inclusion criteria were: (a) being an Indian citizen, (b) being aged 18 years or above, (c) having knowledge on English language, and (d) having access to the internet. *Google Forms* was used to collect the survey data. The link to the online survey was circulated widely through various social media platforms, instant messaging applications, and via emails. The duration of the data collection period was from February to May 2021. The survey language was English.

Ethics

The participants were informed about the nature and objective of the study being conducted. The survey was entirely anonymous and participants were assured that all data would be treated confidentially. All the participants were aged 18 years or above. Participants provided electronic informed consent prior to participation in this study. Participation in the study was completely voluntary. Participants had the right to refuse or withdraw from the research at any time without any reason. At the end of the survey, the participants were provided a list of the mental health counsellors. Additionally, the *Instagram* and *Twitter* handle of support services were also provided to the participants. Participants received no reward/compensation for participating in the study. The Institutional Review Board of the first author’s institution provided ethical clearance for conducting the study.

Data analysis

Data were analyzed using IBM SPSS 23.0. Descriptive statistics were performed in relation to the participants' characteristics. To establish the internal consistency of the scale, inter-item correlations, corrected item-total correlations (ITC), Cronbach's alpha, and McDonald's omega were calculated. Factor structure of the scale was established using the exploratory factor analysis (EFA). Factors were extracted using Principal Component Analysis method based on the Eigen values ≥ 1 criterion and Varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure was used to establish sample adequacy, and Bartlett's test of sphericity was conducted to check if variables were suitable for factor structure. Convergent validity was assessed using Pearson's correlation between the CPDS-16 and all three sub-scales of the DASS-21 (i.e., depression, anxiety, and stress).

Results

Descriptive statistics

Out of 461 participants who filled the survey, 445 provided informed and voluntary consent. Responses of seven were recorded as missing and excluded from the analysis. In the remaining 438 sample, 18 responses were outliers and not considered in the analysis. Therefore, the final sample for this study was 420 which is more than adequate since psychometricians recommend there should be at least 10 to 20 participants per scale item (Hair, Babin, Anderson & Black, 2018). The mean age of the study participants was 25.89 years (S.D. = 7.65 years). Most study participants comprised a larger percentage of females ($n=254$; 60.5%). Almost all the study participants were living with their families or guardians at the time of filling the survey. The descriptive statistics of the study participants are presented in Table 1.

Table 1: Demographic characteristics of the study participants (n=420)

	N (%)
<i>Gender</i>	
Female	254 (60.5)
Male	166 (39.5)
<i>Mean age</i>	25.89 years (SD=7.65)
<i>Current education enrolled in</i>	
Undergraduate	188 (44.8)
Postgraduate	141 (33.6)
Integrated	23 (5.5)
Doctoral studies	47 (11.2)
Others	21 (5)
<i>Current living arrangements</i>	
Living with family/guardians	387 (92.1)
Living alone	33 (7.9)

Internal consistency and reliability

Corrected item-total correlations (ITCs) for the 18 items suggested deletion of two items having an ITC < 0.3 (Ferketich, 1991). In the first step, the corrected ITC for Item 12 was 0.11 and was deleted. In the second step, the corrected ITC for Item 8 was 0.29 and was deleted. The remaining 16 items demonstrated corrected ITCs ranging between 0.43 and 0.70 and were therefore retained. The values of Cronbach's alpha if item deleted ranged from 0.89 to 0.90 (Table 2). The Cronbach's alpha for overall scale was 0.899 demonstrating very good reliability (Cronbach, 1951). Additionally, McDonald's omega for 16 items was calculated. The value of McDonald's omega was 0.89 indicating high reliability (Hayes & Coutts, 2020). Taken together, all these indicators of reliability are above the suggested cutoff by Clark and Watson (1995) and Field (2005) indicating very good internal consistency reliability.

Table 2: Item level descriptive statistics, item-total correlation, and reliability estimates of CPDS-16 (n=420)

S. No.	Item	Mean (standard deviation)	Corrected item-total correlation [§]	Corrected item-total correlation [*]	Corrected item-total correlation ^{**}	Cronbach's alpha if item deleted
1	I am scared of being infected with COVID-19	3.17 (1.20)	0.56	0.56	0.56	0.89
2	Thinking about COVID-19 makes me panicky, anxious, and stressed	2.69 (1.20)	0.693	0.70	0.71	0.89
3	My body tends to get sweaty whenever I think of COVID-19	1.84 (0.89)	0.62	0.63	0.63	0.89
4	My fear of COVID-19 is pushing me over the edge such that I am afraid of losing my life to it	1.79 (0.95)	0.57	0.59	0.59	0.89
5	Reading about the ongoing pandemic on digital media platforms stresses me out	2.96 (1.33)	0.67	0.68	0.67	0.89
6	I am unable to sleep peacefully due to the fear of getting COVID-19	1.67 (0.84)	0.57	0.59	0.58	0.893
7	My pulse races and I am flooded with negativity when I think about potentially getting COVID-19	1.97 (1.12)	0.62	0.63	0.63	0.89
8	I have a coping mechanism in place whenever fears about COVID-19 take an emotional toll on me	2.71 (1.26)	0.32	0.29	Eliminated	Eliminated
9	I have lost my appetite as a result of being anxious about COVID-19	1.63 (0.80)	0.46	0.47	0.47	0.90
10	In order to stay informed, I have started to obsessively check the news, which often feeds into fear	2.21 (1.19)	0.54	0.54	0.55	0.89
11	I have become mindful of how social media is making me feel with regards to the ongoing pandemic	3.14 (1.24)	0.46	0.44	0.42	0.90
12	Even though there is a lack of physical socialization, I make sure to stay connected and interact with friends and family virtually	3.66 (1.14)	0.10	Eliminated	Eliminated	Eliminated
13	I feel the need to obtain professional help for my mental wellbeing as I am not able to cope with the growing panic surrounding COVID-19	2.23 (1.22)	0.51	0.52	0.53	0.89
14	I worry about the long drawn economic consequences that the pandemic is going to have, such as, mass unemployment and a global recession	3.71 (1.22)	0.45	0.43	0.43	0.90

15	I am conscious of the psychological impact that quarantine period is going to have on my mind	3.44 (1.22)	0.55	0.54	0.54	0.89
16	I often feel a deep sense of confusion due to inadequate quality of information from public health authorities	3.13 (1.25)	0.57	0.57	0.58	0.89
17	I tend to get frustrated because of the constant uncertainty surrounding all aspects of life, namely my personal, social, professional and relational life	3.34 (1.36)	0.58	0.59	0.60	0.89
18	COVID-19 has exposed me to experience fear of contagion, feelings of isolation, and sense of losses in terms of motivation, meaning, and self-worth	3.02 (1.37)	0.64	0.65	0.66	0.89

§ Denotes corrected item-total correlations for 18-item scale

* Denotes corrected item-total correlations for 17-item scale after eliminating Item 12

** Demotes corrected item-total correlations for 16-item scale after eliminating Item 8

Exploratory factor analysis

The KMO measure of sample adequacy for 16 items was found to be 0.91 indicating a sufficiently large sample size for factor analysis (Field, 2005). Bartlett's test of sphericity indicated variables were related and suitable for structure detection ($\chi^2=3341$; $df=120$; $p<0.0001$) and factor analysis may be useful (Bartlett, 1950). For EFA, a value of 0.40 was set as the minimum loading value for an item to be a part of a factor (Hair et al., 2018). The rotation was set at Varimax with Kaiser normalization. A two-factor structure was obtained using Principal Component Analysis method based on Eigen value ≥ 1 (see Figure 1 for scree plot). These two factors were named 'individual level distress' and 'community level distress'. The 16 items of the CPDS-16 explained 55.32% of the total variance. More specifically, Factor 1 explained 41.22% of the total variance and Factor 2 explained 14.10% of the total variance. Factor loadings, communalities, and total variance explained by the EFA are presented in Table 3.

Table 3: Factor loadings and communalities for the CPDS-16 as obtained from Exploratory Factor Analysis

Item No.	Item	Factor 1 ($\alpha=0.888$ $\omega=0.887$)	Factor 2 ($\alpha=0.832$ $\omega=0.839$)	Communality
1	I am scared of being infected with COVID-19.	0.45		0.39
2	Thinking about COVID-19 makes me panicky, anxious, and stressed.	0.66		0.61
3	My body tends to get sweaty whenever I think of COVID-19.	0.83		0.71
4	My fear of COVID-19 is pushing me over the edge such that I am afraid of losing my life to it	0.82		0.69
5	Reading about the ongoing pandemic on digital media platforms stresses me out.	0.52		0.53

6	I am unable to sleep peacefully due to the fear of getting COVID-19.	0.85	0.72
7	My pulse races and I am flooded with negativity when I think about potentially getting COVID-19	0.80	0.68
9	I have lost my appetite as a result of being anxious about COVID-19	0.71	0.51
10	In order to stay informed, I have started to obsessively check the news, which often feeds into fear	0.59	0.42
13	I feel the need to obtain professional help for my mental wellbeing as I am not able to cope with the growing panic surrounding COVID-19.	0.46	0.36
11	I have become mindful of how social media is making me feel with regards to the ongoing pandemic	0.50	0.29
14	I worry about the long drawn economic consequences that the pandemic is going to have, such as, mass unemployment and a global recession	0.67	0.45
15	I am conscious of the psychological impact that quarantine period is going to have on my mind	0.78	0.61
16	I often feel a deep sense of confusion due to inadequate quality of information from public health authorities.	0.74	0.58
17	I tend to get frustrated because of the constant uncertainty surrounding all aspects of life, namely my personal, social, professional and relational life	0.81	0.68
18	COVID-19 has exposed me to experience fear of contagion, feelings of isolation, and sense of losses in terms of motivation, meaning, and self-worth	0.75	0.63
Eigen Values		6.60	2.26
Percentage of total variance explained		41.22	14.10

α =Cronbach's alpha

ω =McDonald's omega

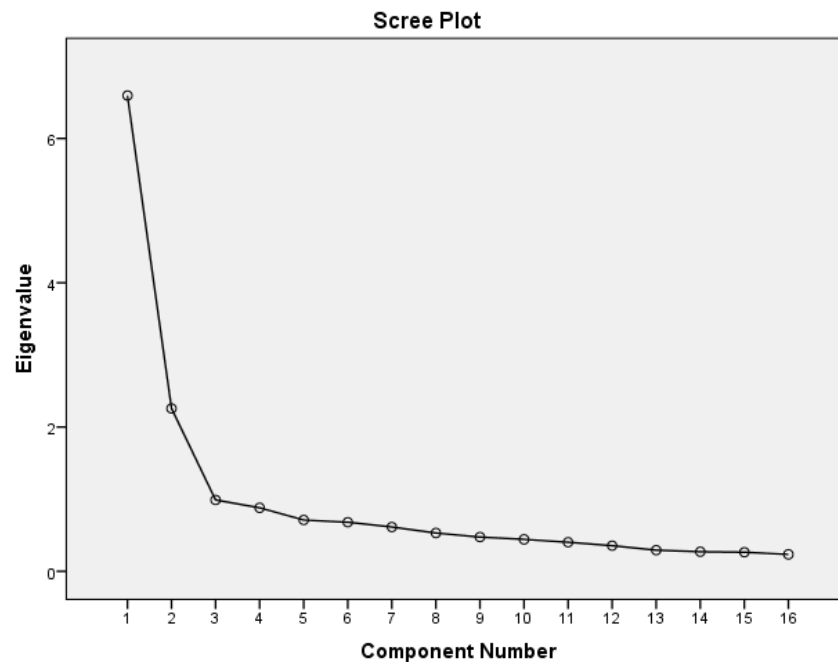


Figure 1: Scree plot for exploratory factor analysis of CPDS-16

Convergent validity

Convergent validity of the scale was assessed by correlating the total score of the CPDS-16 and two factors obtained with the three sub-scales of DASS-21 (i.e., depression, anxiety, and stress). Bivariate Pearson's correlations demonstrated statistically significant correlations among all the indicators. More specifically, the total score of the CPDS-16 showed the highest correlation with stress sub-scale ($r=0.45$; $p<0.0001$) followed by anxiety sub-scale ($r=0.44$; $p<0.001$) and depression sub-scale ($r=0.40$; $p<0.0001$). The total score of 'individual level distress' factor of CPDS-16 showed statistically significant correlations with stress sub-scale ($r=0.34$; $p<0.001$), anxiety sub-scale ($r=0.37$; $p<0.001$), and depression sub-scale ($r=0.28$; $p<0.001$). Similarly, the total score of 'community level distress' factor of the CPDS-16 showed statistically significant correlation with stress sub-scale ($r=0.48$; $p<0.001$), anxiety sub-scale ($r=0.40$; $p<0.001$), and depression sub-scale ($r=0.45$; $p<0.001$). Values of the all the correlations are presented in Table 4.

Table 4: Convergent validity of the CPDS-16 and correlations with DASS-21 subscales

	1	2	3	4	5
1. CPDS-16					
2. CPDS-16 Individual level distress	0.91**				
3. CPDS-16 Community level distress	0.83**	0.54**			
4. DASS-21 Stress sub-scale	0.45**	0.34**	0.48**		
5. DASS-21 Anxiety sub-scale	0.44**	0.37**	0.40**	0.83**	
6. DASS-21 Depression sub-scale	0.40**	0.28**	0.45**	0.87**	0.76**

Note: **= $p < .001$

CPDS-16 = COVID-19 Psychological Distress Scale (16 items)

DASS-21 = Depression, Anxiety and Stress Scale (21 items).

Discussion

The present study described the development and psychometric evaluation of the self-report instrument, the COVID-19 Psychological Distress Scale (CPDS-16) among an Indian sample. The findings demonstrated the CPDS-16 had a two-factor structure with robust psychometric properties. More specifically, the scale indicated good internal consistency reliability, structural validity, and convergent validity. Additionally, the sum scores of items present in the scale indicate the severity of the psychological responses to COVID-19 with higher scores indicating greater psychological distress. More specifically, the higher the score on CPDS-16, the higher the scores were on the depression, anxiety, and stress subscales of DASS-21. The convergent validity of the CPDS-16 utilizing the three sub-scales of DASS-21 ascertained that CPDS-16 is a valid scale for determining psychological responses to COVID-19. Therefore, it can be inferred that CPDS-16 assesses anxiety, stress, and depressive symptomatology associated with COVID-19. Most participants in the present study were young and well-educated adults (mean age 25.89 years). Therefore, the CPDS-16 is likely to be useful in assessing psychological distress of this group among cohorts of university students, employees of various organizations, and other populations (such as frontline healthcare workers).

There are some limitations to the present study that must be addressed. First, the mode of data collection was an online survey. Due to stringent lockdown in place and sharp increase in COVID-19 infections, the safety of research participants and researchers was of paramount importance. Therefore, to eliminate the risk of infection, participants were recruited online. This recruitment procedure may result in selection bias (Bethlehem, 2010). This meant that individuals in the population without internet access could not participate. Second, participants were recruited through convenience sampling and therefore the sample was not representative of the entire Indian population. Future psychometric studies evaluating the CPDS-16 should be conducted using more representative samples. Third, responses to the survey were self-reported which may result in potential bias due to factors such as social desirability. Fourth, the instrument was developed and tested in the English language only which means non-English speaking participants could not participate. Future

studies should translate the CPDS-16 into respective country's languages and test its psychometric properties. Fifth, the two-factor structure obtained for the scale was based on EFA. Future studies should examine the factor structure of CPDS-16 found in the present study to provide additional scientific rigor. Notwithstanding these limitations, the present provided evidence for the utility and psychometric robustness of CPDS-16 among the Indian population.

Overall, the present study provided evidence that CPDS-16 has a two-factor structure yielding good psychometric properties. The scale takes 4 to 6 minutes to complete, can be administered rapidly, and is a valid and reliable instrument in assessing psychological responses to COVID-19 among the Indian population. The scale will be useful in providing valuable information about psychological distress associated with COVID-19 in India. Government organizations, public health agencies, and educational institutions can use the scale to devise appropriate initiatives and ensure the physical and mental well-being of the citizens. With the third wave of COVID-19 inevitable in India, psychological well-being of its citizens should also be a focal point of the government's preparedness to help overcome the psychosocial impact of COVID-19. The CPDS-16 may prove to be of great utility in understanding the psychological impact of COVID-19.

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Availability of data and material

The data that support the findings 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.

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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