Mental health issues assessment using tools during COVID-19 pandemic

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Abstract

COVID-19 has brought distress among people as pandemic has impacted the globe not only economically or physically, but also psychologically by degrading their mental health. Several research were done in the past which tried to capture these issues but post-covid situation needs to be critically handled and analyzed so that corrective measures for cure and support can be taken. The current work is an attempt to observe the mental health issues (anxiety and depression) that occurred during the lockdown by combining a few pre-designed questionnaires. The online survey included 244 respondents (females = 126, males = 118) and when we thoroughly examined gender, age group, and occupational activity as three main factors, the results showed that female students aged 21–35 were affected more than male students of the same age group. In this study, we used a 4-item Geriatric Depression Scale (GDS-4) as a depression screening instrument and discovered that 225 out of total respondents were depressed. Using the Generalized Anxiety Disorder (GAD-7), a self-administered anxiety tool, we found 103 responders with mild, 87 with moderate, 12 with severe, and 42 with no anxiety symptoms. Patient Health Questionnaire (PHQ-9) showed the symptoms of mental disorders where 68 individuals had mild, 85 had moderate, 37 had moderately severe, 12 had severe, and 42 had no symptoms. With the help of multiple linear regression analysis, demographic data were evaluated, and later results were compared between GDS-4, GAD-7, and PHQ-9 using correlation coefficients. This will help practitioners and individuals to focus on their physiological health and adopt diagnostic measures.

Keywords Anxiety · Depression · Mental health · Mental disorders · Psychological tools

1 Introduction

CoronaVirus that emerged in the late 2019 from Wuhan, China, has become a global epidemic which is an infectious disease caused by the SARS-COV-2 virus [1], although the initial source of viral transmission to human remains unknown [2]. As it rapidly sweeps across the world, people were shut like prisoners in their houses during lockdown causing an enormous degree of fear, worry and anxiety [3].

Livelihood affected in every possible manner; on one side, people's usual activities and routines were disturbed, and on the other side, the productivity was paused, and businesses were closed causing severe impact on global economy [4]. While the work-from-home policy and online education mode [5] were implemented in the upper classes, tens of millions of people were still living in poverty and fighting to meet their fundamental necessities.

Health care was also one of the key aspects affected by COVID-19 and people become lazier due to fewer physical activities, which has a detrimental influence on one's physical health. The major psychological impact on public mental health was seen as an increased level of anxiety, stress, and depression [6]. Loneliness, sadness, harmful alcohol and drug use, self-harm, or suicide conduct, and sleeping issues are also likely to grow [7]. Mental illness is rarely addressed seriously, which has resulted in major issues and many tragic scenarios. It can make you feel miserable and be harmful to your everyday life at your job, school, or in managing decent relationships [8]. In most cases, symptoms can be managed

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with a combination of medications and talk therapy called psychotherapy [9].

Detecting mental health issues by finding the difference in behavior is not an easy task as there is no direct test to find one's mental and emotional health [10]. You can do it by daily analyzing the person closely or checking his changed behavior in actions and thoughts [11]. Our work will give you some idea about mental illness, but you must know that every illness has a specific combination of symptoms. Some signs which are commonly seen in people with mental illness are given below:

- Unnecessarily worrying.
- Mood swings (mostly negative).
- Feeling sad all the time.
- Power of learning and concentration is lost.
- Avoid being social and participating in social activities.
- Anger issues are raised.
- Sleeping and eating disorders.
- In some cases, increased use of drugs and alcohol.
- Always lost in the imaginary world away from reality.
- Stressed in performing daily basic activities.
- Avoid talking about their problem (believing it is not a problem).

Anxiety is defined by the World Health Organization as the fear of a future threat, feelings of tension, anxious thoughts, and physical changes such as elevated blood pressure and heart rate [12]. Depression is a severe kind of anxiety characterized by persistent sadness and a lack of interest in one's favorite activities. People suffering from depression are frequently fatigued, as well as disruptions in sleeping and eating patterns have been monitored [13].

The global population is already vulnerable to depression, anxiety, and a variety of other mental health issues, which have been proved to be stressful in pre-covid phase. Over 264 million people are depressed all over the world, and due to fear of the disease, many cases of suicidal attempts were reported by 'The Hindustan Times' (2020) [14]. This paper aims to make people understand that talking about mental health and its issues is normal and that mental illness is as common as a fever [15].

1.1 Major contribution

- This research sheds light on significant components for public mental health and mental health care management systems. To demonstrate the need for growth in mental health awareness, assessment tools have utilized.
- This study identifies the evaluation of scores and the importance of psychological tools; hence, GDS-4, GAD-7, and PHQ-9 helped us in analyzing the levels of depression, anxiety, and other common mental health disorders.

- Prospective research is investigated using various statistical methods, such as mean, standard deviation, linear multiple regression analysis, and correlation coefficients, based on the stated parameters.
- For future work, it is recommended to evaluate different parameters to find more realistic results.

1.2 Organization of the paper

Open discussion on mental health awareness specially post-covid phase will help people take necessary actions if needed based on their physiological health. Section 2 contains the literature review which helps the researcher to know earlier work done on this topic and used for better understanding and gathering data for future references. Methodology is discussed in Sect. 3 which has been subdivided into few headings explaining the data sets and tools used in questionnaire for the data collection.

Section 4 contains experimental result analysis which has subgroups evaluating the result tables based on different tools GDS-4, GAD-7, and PHQ-9. Discussion on the results is shown in Sect. 5 where the results on the mean, standard deviation, linear multiple regression analysis, and correlation coefficients using statistical tools were defined. Summary and future scope of the research are concluded in Sect. 6.

2 Literature review

Some relatable papers have been reviewed to know the work done on mental health, and a small description is written that helps in future reference A better understanding of the topic and gathering all the informative knowledge help to know the research questions and gaps more accurately as shown in Table 1.

During the COVID-19 epidemic, [23] found related variables in physicians' anxiety, stress, and depression levels in both clinical and general settings. SPSS-v25, Pearson's correlation, descriptive statistics, t test, ANOVA, and multiple linear regression were used to evaluate the data. In the USA, [24] researchers tried to uncover variables linked to depression, anxiety, and PTSD symptomatology. These criteria offer preliminary advice on how to treat COVID-19-related mental health issues in the clinic. PHQ-8 was used to measure depression, GAD-7 was used to measure anxiety, and PCL-C was used to measure PTSD symptoms.

In the study, [25] investigated the consequences of loneliness and behavior on mental health, as well as the moderating and mediating effects of biopsychosocial factors. Loneliness

Table 1 Literature Review

S no.	References	Methodology used	Result analysis
1	[14]	Reading and collecting newspaper report about suicide during COVID, purposive sampling is used method	This study is based on media articles and explains why there were so many suicide incidents during COVID-19. There is a demand for a nationwide tele-mental health service
2	[16]	A descriptive analysis was performed using the data from Depression Anxiety Stress Scale (DASS-42) and a questionnaire for coping techniques tool	Analysis of the DASS-42 indicated male and female individuals varied considerably in mental health and quality of life, but no significant differences in coping mechanisms were detected
3	[17]	To make inferences, data were analyzed using SPSS v21, and t test, ANOVA test, and correlational analysis were used	According to research, because of their greater levels of psychological discomfort, students and health professionals require specific care. Find out how people in India experienced sadness, anxiety, tension, and familial impact during the lockdown
4	[18]	Data analysis and data visualization techniques, bar graphs, and methodology diagrams were employed in the analysis and statistical format	Describes the psychological status of people in Bangladesh who have been affected by COVID-19 in their daily lives. Based on the depression scale, Internet use, and psychological change, male and female scores were compared
5	[19]	Variable descriptive statistics, correlation coefficients, and regression analysis were performed on the data	In a report published during the new coronavirus outbreak, the importance of individual characteristics as predictors of quality of life and the influence of group-related variables are discussed. Individual and group characteristics both had a substantial impact on QoL, according to the findings
6	[20]	In the cross-sectional investigation, the DASS-21 and IES scales were employed. The data were analyzed using Cronbach's alpha, GLM, and the R statistical software package	The study's goal was to look at the psychological effects of COVID-19 on university students. The findings show that preventative action should be taken, as well as the provision of a psychological specialist to the institution in the situation of a future epidemic. Students outperform university personnel on every metric
7	[21]	The data were analyzed using median-absolute detection, descriptive statistics, Pearson's correlation, t test, and ANOVA	The association between personality traits, mental health, and creativity was investigated in this study. The propensity for isolation, as well as personality factors from the Big Five, was significantly predicted the same
8	[22]	They calculated descriptive statistics and logistic regression	The goal of this study was to find the occurrence of psychological health problems before and during the COVID-19 pandemic. This research highlights the urgent need to increase global mental health promotion and preventive efforts

and fear were significant factors tinning mentality and behavioral issues during the COVID-19 lockdown, according to the research.

In [26], researchers talked about the mental health issues that came up because of the disease's morbidity, mortality, and mitigation actions during the pandemic. According to the findings on mental health, substance abuse, and suicide thoughts, a few strategies were proposed.

In [27], researchers discovered the GPS symptoms score, GAD median score, PHQ total median score, ISI median score, and PSS total score median in the Italian population. And they concluded that Italy needed to keep a close watch on mental health measures to reduce the outbreak's impact on mental health. The researchers in [28] conducted a research to look at the mental health of Greek university students. According to the findings, students are at a greater risk of developing depression and suicidality because of the COVID-19 pandemic. In [29], COVID-19 has been linked to an increase in risk factors such as social isolation, child abuse, intimate partner violence, unemployment, housing and economic stress, workplace trauma, and sorrow and loss, according to the researchers. To 'flatten the curve' and avoid a spike in mental illness, an emphasis on primary prevention is particularly vital. In [30], the authors investigated the relationship between COVID-19 fear and social vulnerabilities as well as mental health effects in individuals in the USA. They witnessed a people that areas concerned, afraid, and unsure about COVID-19 and the implications it would have for themselves, their families, their communities, and their country. The researchers in [31] employed a longitudinal dataset that linked biometric and survey data from multiple cohorts of young individuals before and during the COVID-19 pandemic to demonstrate significant changes in physical activity, sleep, time usage, and mental health. They use the Center for Epidemiologic Studies Depression Scale (CES-D) and the GAD-7 to examine data for depression and anxiety symptoms.

In [32], they stated from the point of view of military medical planners to present information about the prevalence of mental health issues and conditions from the last few pandemics including COVID-19. Psychological needs of people affected and the harmful impacts of isolation, especially anxiety and distress, and post-traumatic stress symptoms. The researchers in [33] examined how job loss affected the mental health of people in South Africa during an epidemic. Adults who kept paid jobs throughout the lockdown had much lower depression levels than those who lost their jobs; according to the research in [34], they examined the economic costs, as well as the effects on everyday life and delays in academic pursuits, most of which were correlated to anxiety symptoms. Social support, on the other hand, was shown to be adversely connected to anxiety. [35] focused on primarily tele-mental health services, to see if they were feasible

and acceptable for patients, relatives, and health practitioners during the epidemic. Psychological therapy and support may help to alleviate the burden of chronic mental health issues and to ensure the well-being of people who are harmed.

The researchers in [36] demonstrate the prevalence and related risk factors of mental health problems among Bangladeshi students, mainly anxiety, depression, and stress. The DASS-21, GAD-7, PHQ-9, HADS, and CES-D-R-10 scales were adopted in seven cross-sectional online survey-based investigations. A study by [37] looked at the influence of a recent mental disorder—such as attention deficit hyperactivity disorder (ADHD), bipolar disorders, depression, and schizophrenia—on the probability of COVID-19 infection, as well as related mortality and hospitalization rates. The researchers in [38] evaluated the reported mental health effect and coping, as well as changes in depressive symptoms, anxiety, concern, and loneliness before and during the COVID-19 epidemic between those with and without lifelong depression, anxiety, or obsessive–compulsive disorders. The researchers in [39] wanted to see how the pandemic affected individuals with diverse psychiatric problems who were hospitalized for treatment. More than half of those surveyed said their symptoms had worsened, and 40% said they needed more therapeutic help.

The study [40] focuses on the prevalence as well as predictors of general mental illnesses as evaluated by the questionnaire GHQ-12 and the occurrence of loneliness in the United Kingdom during COVID-19. This study examines the psychological impact of broader members of society during COVID-19, including general mental problems and loneliness, as well as the underlying socioeconomic inequalities. [41] conducted a comprehensive review to synthesize existing evidence of the impact of COVID-19 on psychosocial symptoms in the overall population and related risk factors. The COVID-19 pandemic is linked to extremely high levels of psychological discomfort, which, in many cases, would fulfill the clinical relevance criteria.

The researchers [42] wanted to see how isolation affected sufferers in Residential Rehab Communities when compared with healthy controls. On the variables of anxiety, stress, worry, and risk perception, there were substantial differences between mental patients and controls. When compared to healthy controls, mentally ill patients ranked lower on stress but higher on anxiety, estimated risk of COVID-19 infection, and worry about an emergency scenario.

A few algorithms on brain signal activity [43] were conducted to improve the precision of stress and other mental health concerns utilizing the EEG signals [44, 45]. Researchers suggest a fuzzy contrast-based approach that categorizes text written by mentally ill patients into different symptoms by using an attention network for positionally weighted words [46]. To address the ambiguity and imprecision inherent in the input data and for calculating the

Table 2 Characteristics of participants ($N = 244$)

Variables	Level	Frequency (n)	N (%)
Age Groups	Below 20	62	25.41
	21–35	124	50.82
	36–50	43	17.62
	Above 50	15	6.15
Gender	Female	126	51.64
	Male	118	48.36
Occupational activity	Student	114	46.72
	Employed	84	34.43
	Unemployed	46	18.85

relationships between psychological variables, they applied fuzzy logic modeling to data [47].

3 Methodology

3.1 Data set

Online survey has been circulated among people on social networking sites like WhatsApp, Facebook, Instagram, and e-mails from 15 November to 15 December 2021. A survey was sent to further connections of different people to find mental health problems faced by them; the questionnaire contains a total of 24 questions and four sections in which all questions were compulsory and three pre-designed tools were used. Section one contains basic information reading the demographic factors such as gender, age group and occupational activities as described in Table 2.

3.2 Tools used in the questionnaire

Section 2 has a 4-item Geriatric Depression Scale (GDS), a depression assessment tool, simple and quick to perform, with high specificity and sensitivity, and has limited clinical value used in primary care [48]. It is a short version of the original GDS which contains 30 questions. 2-point scale is used to find if you have depression (2–4 = Depression, 1-Uncertain, 0 = Not depression) [49] As shown in Table 3, questions are also attached.

Section 3 GAD-7 (Generalized Anxiety Disorder Assessment) is a simple self-administered patient questionnaire used as a screening tool to measure anxiety disorder scores from 0 to 3 that are assigned to categories 'not at all,' 'several days,' 'more than half the days,' 'nearly every day,' respectively. These results for seven questions were added, and cutoff thresholds for mild, moderate, and severe anxiety were 5, 10, and 15, respectively [50]. Questions based on the GDS-4 are also included in the Table 4.
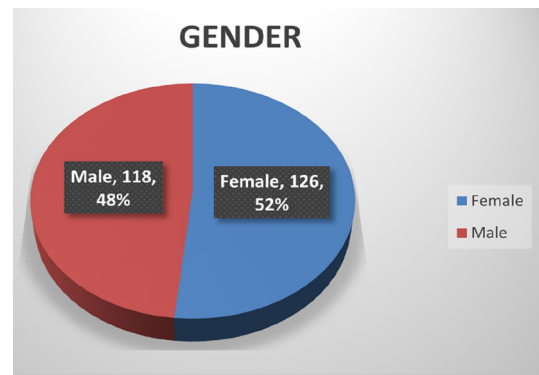
Fig. 1 Gender distribution in data
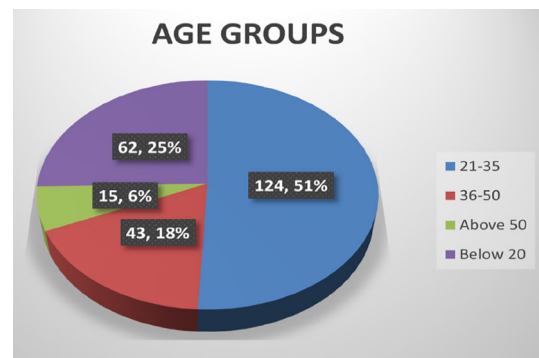
Fig. 2 Age group division in data

Section 4 contains PHQ-9 (Patient Health Questionnaire) which is a self-administered version of the PRIME-MD diagnostic tool for common mental disorders. Scores ranging from 0 to 3 correspond to the categories 'not at all,' 'several days,' 'more than half the days,' 'and nearly every day,' respectively. Hence, when nine questions are added together, we get scores as 0–4 for none, 5–9 for mild, 10–14 for moderate, 15–19 for moderately severe and 20–27 for severe mental disorders [51] as shown in Table 5.

4 Experimental results analysis

A total of 244 responses are recorded and shown in Table 2, and pie charts are shown to explain the distribution of data based on gender, age group, and occupational activities. From total of 244 respondents, 126(51.64%) were female and 118(48.36%) were male recorded in Fig. 1.

Furthermore, when distribution is calculated, 62(25.41%) of the respondents were below 20 years, 124(50.82%) were between 21 and 35 years, 43(17.62%) were between 36 and 50 years and 15(6.15%) were above 50 years when davidite in age groups recorded in Fig. 2.

When seen by occupational activities, 114(46.72%) respondents were students, 84(34.43%) were employed, i.e.,

Table 3 Results of questions based on the 4-item Geriatric Depression Scale (GDS)

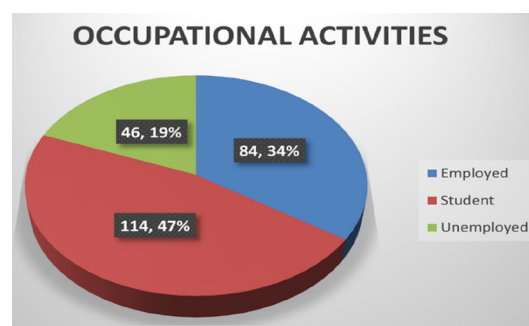| GDS-4 N = 244	YES	(%)	NO	(%)
Q1	139	(57)	105	(43)
Q2	175	(72)	69	(28)
Q3	162	(66)	82	(34)
Q4	179	(73)	65	(27)
Q1	Are you satisfied with your life after covid hit globally?			
Q2	Do you feel that your life is empty during covid lockdowns?			
Q3	Are you afraid that something bad is going to happen to you like fear to getting infection during this pandemic?			
Q4	Do you feel happy most of the time before and after COVID-19?			

Table 4 Results of questions based on Generalized Anxiety Disorder Assessment GAD-7

GAD-7 N = 244	NOT AT ALL = 0	%	SEVERAL DAYS = 1	%	MORE THAN HALF DAYS = 2	%	NEARLY EVERY DAY = 3	%
Q1	54	22	117	48	40	16	33	14
Q2	73	30	93	38	48	20	30	12
Q3	69	28	101	41	43	18	31	13
Q4	67	27	99	41	43	18	35	14
Q5	74	30	88	36	52	21	30	12
Q6	59	24	84	34	52	21	49	20
Q7	56	23	98	40	57	23	33	14
Q1	Feeling nervous, anxious or on edge due to covid and its negative impact?							
Q2	Not being able to stop or control worrying about covid infection?							
Q3	Worrying too much about different things related to virus?							
Q4	Trouble relaxing?							
Q5	Being so restless that it is hard to sit still?							
Q6	Becoming easily annoyed or irritable?							
Q7	Feeling afraid as if something awful might happen?							

working remotely from their homes and 46(18.85%) were unemployed during the days of COVID-19 lockdown due to lack of facilities and work which cannot be done remotely like workers from manufacturing industries and many others which is recorded in Fig. 3.

Fig. 3 Occupational activities in data

4.1 4-item geriatric depression scale

Analysis of the GDS-4 item tool revealed that on average, 163 people from 244 answered "Yes," and on an average, 80.25 answered "No." We found out that 119 females and 106 males were "Depressed." And 7 females and 12 males were found in ca condition which was "Uncertain" according to the GDS-4 item scale. Surprisingly, not even a single person was "Not Depressed as" shown in Fig. 4. Their mean and standard deviation are also seen in Table 6.

4.2 Generalized anxiety disorder assessment

Analysis of the GAD-7 tool revealed that on average, 64.57 people answered, "Not at All," 97.14 answered "Several days," 47.86 answered "More Than Half Days," and 34.43

Table 5 Results of questions based on Patient Health Questionnaire PHQ-9

| PHQ-9 N = 244	NOT AT ALL = 0	%	SEVERAL DAYS = 1	%	MORE THAN HALF DAYS = 2	%	NEARLY EVERYDAY = 3	%
Q1	59	24	96	39	58	24	31	13
Q2	86	35	88	36	32	13	38	16
Q3	65	27	99	41	49	20	31	13
Q4	55	23	92	38	65	27	32	13
Q5	68	28	91	37	58	24	27	11
Q6	89	36	79	32	43	18	33	14
Q7	82	34	79	32	48	20	35	14
Q8	102	42	83	34	38	16	21	9
Q9	106	43	72	30	41	17	25	10
Q1	Little interest or pleasure in doing things?							
Q2	Feeling down, depressed, or hopeless?							
Q3	Trouble falling or staying asleep, or sleeping too much?							
Q4	Feeling tired or having little energy?							
Q5	Poor appetite or overeating?							
Q6	Feeling bad about yourself—or that you are a failure or have let yourself or your family down?							
Q7	Trouble concentrating on things, such as reading the newspaper or watching television?							
Q8	Moving or speaking so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual?							
Q9	Thoughts that you would be better off dead, or of hurting yourself in some way?							

Fig. 4 Identifying depression
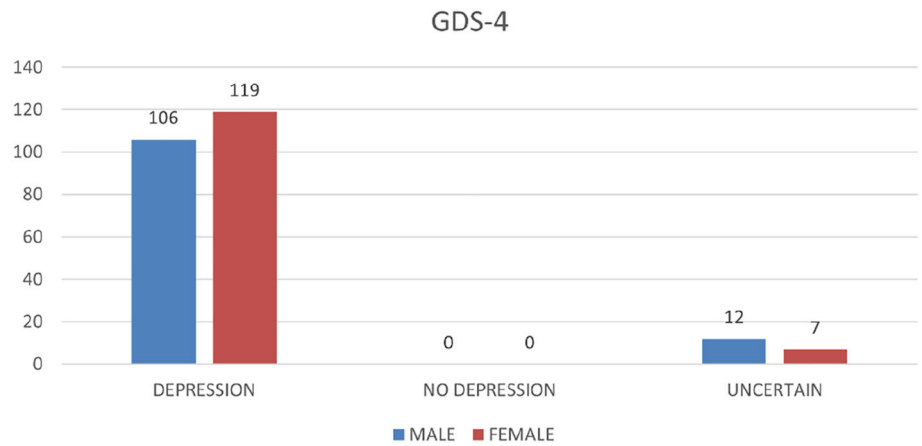
Table 6 Description of participants based on gender of GDS-4 item scale with their mean and standard deviation

Variables	Gender	N	Mean	SD
Depression	Male	106	2.9	0.74
	Female	119	2.8	0.72
No depression	Male	0	–	–
	Female	0	–	–
Uncertain	Male	12	1	–
	Female	7	1	–

Fig. 5 Identifying anxiety
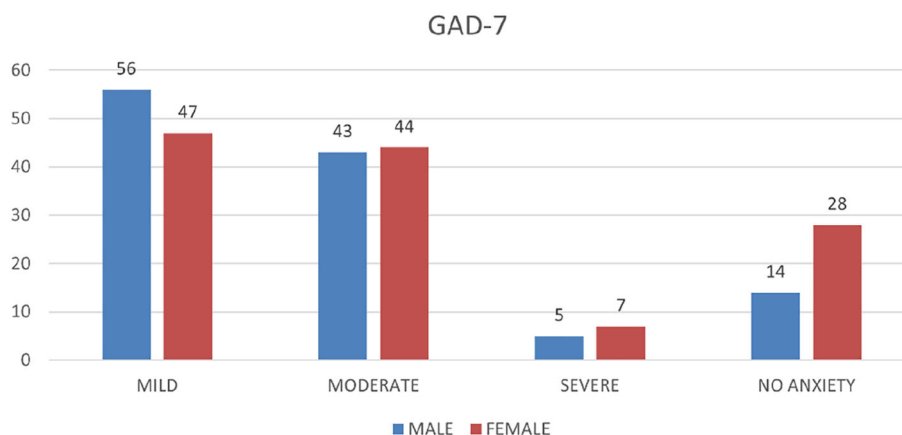
Table 7 Description of participants based on gender of GAD-7 scale with their mean and standard deviation

Variables	Gender	N	Mean	SD
Mild	Male	56	7.69	1.23
	Female	47	6.91	1.23
Moderate	Male	43	11.51	1.6
	Female	44	11.9	1.54
Severe	Male	5	17.2	2.17
	Female	7	17.14	1.35
No anxiety	Male	14	1.64	1.55
	Female	28	2.57	1.26

answered "Nearly Every day" from a total of 244 respondents. By adding the scores of each question, we found that 56 males and 47 females have "Mild Anxiety," 53 males and 44 females have "Moderate Anxiety," and five males and seven females have "Severe Anxiety" and only 14 males and 28 females were there who have "no anxiety" shown in Fig. 5. Mean and standard deviation are also calculated from their scores shown in Table 7.

4.3 Patient health questionnaire

Analysis of the PHQ-9 tool revealed that on average, 79.11 people answered, "Not at All," 86.55 answered "Several days," 48.0 answered "More Than Half Da and ys," 30.33 answered "Nearly Every day" from 244 respondents. By adding the scores of each question, we found that 33 males and 35 females have "Mild mental disorders," 50 males and 29 females have "Moderate," and 10 males and 26 females have "Moderately Severe" and only five males and six females have "severe mental disorders" but only 12 males and 30 females were there who have fewer scores and hence no mental disorders shown in Fig. 6. Mean and the standard deviation are also calculated of the scores shown in Table 8.

Table 9 shows us the results of the t test performed based on gender difference and scores of the tools; mean and the standard deviation are calculated, and we found out that males

and female are not significantly different with GDS-4 ($t = 0.256$, $p = 0.99 > 0.05$) but significantly different with GAD-7 and PHQ-9 ($t = 0.92$, $p = 0.02 < 0.05$ and $t = 1.178$, $p = 0.0001 < 0.05$, respectively).

Multiple linear regression analysis was performed from data using the demographic data gender (male, female), age groups (below 20, 21–35, 36–50, above 50), occupation activities (students, employed, unemployed) on the total scores of the standardized tools (Table 10). Additionally, R which tells simple correlation and R square(R^2) which tells total variation in dependent variables (scores of tools) given by independent variables (demographic variables) are 0.40 and 0.002 for GDS-4 with a significance of 0.943, R and R^2 are 0.140 and 0.20 for GAD-7 with the significance of 0.192, R and R^2 are 0.112 and 0.012 for PHQ-9 with the significance of 0.388, respectively.

Table 11 indicates the correlation coefficients between GDS-4, GAD-7, and PHQ-9, and hence, negative correlation between GDS with GAD and PHQ is 0.055 and 0.131, respectively, implying that as one variable's value increases, the value of the other variable drops or vice versa. GAD and PHQ have a positive correlation of 0.623; hence, the values of both the variables will change together which means either value will increase for both or decrease.
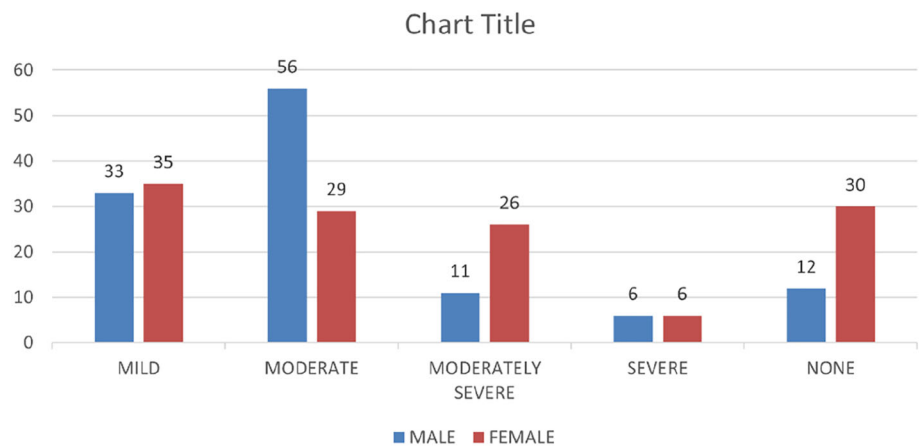
Fig. 6 Identifying mental disorder

Table 8 Description of participants based on gender of PHQ-9 scale with their mean and standard deviation

Variables	Gender	N	Mean	SD
Mild	Male	33	8.03	1.16
	Female	35	6.77	1.37
Moderate	Male	56	11.5	1.34
	Female	29	11.86	1.48
Moderately severe	Male	11	16.1	1.29
	Female	26	16.92	1.44
Severe	Male	6	23.25	3.36
	Female	6	23.4	1.97
None	Male	12	1.17	1.53
	Female	30	2.17	1.34

Table 9 Gender differences

Tools	Gender	N	Mean	SD	T	Sig
GDS-4	Male	118	2.67	.943	0.256	0.99
	Female	126	2.70	.813	–	–
GAD-7	Male	118	8.75	3.846	0.920	0.02
	Female	126	8.26	4.340	–	–
PHQ-9	Male	118	10.53	4.930	1.178	0.00
	Female	126	9.68	6.133	–	–

5 Discussion

As the world came to a pause during the pandemic, and the infection's rapid spread, along with its high severity, prompted widespread terror [52]. But thing that had never stopped was human brains, which never stopped thinking, although some minds were healthy and productive, others were unhappy and depressed, thinking negatively [53].

This research was started to tell the psychological distress using the standardize tools in different gender, age group, and occupational activities. By calculating the score, we find out that more than 80% people are suffering from mental health issues. As a greater number of females responded on our survey in comparison with males, females were likely to have more distress [54].

GDS-4 item tool tells there was not even one who came under the category of no depression and over 90% were having symptoms of depression. More than 50% people lie in the category of mild and moderate anxiety and mental disorders when seen the severity according to GAD-7 scores and PHQ-9 scores, respectively. We found the mean and standard deviation by the formulas shown in Eqs. (1) and (2), respectively.

$$\overline{x} = \frac{\text{sum of observations}}{\text{no. of observations}} \tag{1}$$

Table 10 Multiple Regression Analysis on GDS-4 ITEM, GAD-7, PHQ-9 total cores in the overall sample

Model		B	SE	Beta (β)	t	Sig	95% CI	
							Lower Bound	Upper Bound
GDS-4	Gender	− 0.042	.115	− 0.024	− 0.363	.717	− 0.269	.186
	Age Group	.002	.005	.023	.313	.754	− 0.008	.011
	Occupational activities	.024	.083	.021	.292	.770	− 0.139	.187
GAD-7	Gender	.291	.536	.035	.542	.588	− 0.766	1.347
	Age Group	.017	.023	.056	.771	.441	− 0.027	.062
	Occupational activities	.508	.384	.094	1.323	.187	− 0.248	1.264
PHQ-9	Gender	.710	.732	.064	.970	.333	− 0.732	2.153
	Age Group	.004	.031	.008	.117	.907	− 0.057	.064
	Occupational activities	.580	.524	.079	1.107	.270	− 0.453	1.613

B Unstandardized Coefficients, *SE* Standard Error, *Beta(β)* Standardized Coefficients, *CI* Confidence Interval

Table 11 Correlation coefficients

		GDS	GAD	PHQ
GDS	Pearson Correlation			
	Sig. (2-tailed)			
GAD	Pearson Correlation	− 0.055		
	Sig. (2-tailed)	0.395		
PHQ	Pearson Correlation	− 0.131[*]	0.623[**]	
	Sig. (2-tailed)	.041	0.000	

[*]Correlation is significant at the 0.05 level (2-tailed)
[**]Correlation is significant at the 0.01 level (2-tailed)

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{n-1}} \qquad (2)$$

We performed independent *t* test to find the significance difference means of male and female which is related by score of the tools. The value of t is found as 0.256, 0.920, 1.178, and the significance value is 0.99, 0.02, 0.0001 for the tools as GDS-4, GAD-7, PHQ-9, respectively. Hence, GAD-7 and PHQ-9 are significantly different when seen the means of males and females.

The evaluated scores offer a way for theoretical and empirical social media-based mental health investigations [55]. Utilizing this work can help specialists to find people who needs awareness regarding the issue which will increase the standards and quality of life on the planet [56].

Multiple regression analysis is performed, and the result shows that the Unstandardized Coefficient is denoted by B, Standard Error as SE, Standardized Coefficients as Beta (β), Confidence Interval for B is denoted as CI which is 95% with upper bound and lower bound values. Also, the values of R,

R2, error in R(Δ), and in regression table sum of squares, degree of freedom, mean square, F, and significance are also observed.

Correlation coefficients are used to find how strong is the relationship between the variables and we check the relationship between GDS-4, GAD-7 and PHQ-9 tool to find how these are related when calculated for the same respondents. Positive correlation implies when values of one variable increase; then, the value of second variable also increases and same in case of decreasing value of both variables together. And the value of one variable increases, while other variable's value decreases or vice versa; the negative correlation is observed. And a correlation can be zero when there is no relation between the two variables.

6 Conclusion and future scope

The current study demonstrated that the effects of COVID-19 during pandemic and post-lockdown period generate significant level of mental health issues based on the cut scores.

When people transitioned to the new standards of covid, substantial level of anxiety, depressive symptoms, and poor mental health care were evaluated. When we thoroughly considered gender, age group, and occupational activity as three primary determinants, the results revealed that female students aged 21–35 were influenced more than male students. GDS-4 was utilized as a depression screening instrument in this study and determined that 92.22% respondents were depressed, 7.78% were uncertain, whereas no-depressive scale remains null. We detected that responders' anxiety levels as 42.22% contains mild, 35.65% moderate, 4.9% severe, and 17.2% with no symptoms of anxiety using the GAD-7. PHQ-9 symptoms such as mild, moderate, severely moderate, severe and no sickness were examined as 27.8%, 34.83%, 15.1%, 4.9%, and 17.2% respectively to generalize the level of common psychological issues. This work can finally enable the patients and professionals to focus on preventing the consequences and to apply diagnostic measures for their physiological health after post-covid phase. Since a sizeable portion of population was missing from the dataset, we were incapable of achieving intended outcomes. For further research, it is recommended that comparing other parameterized variables such as individual's location, impact of isolation and daily routine analysis can be used to expand the understanding of how these factors have been affected during and after enactment of the lockdown on public mental health.

Data availability The data shall be made available on request to the corresponding author.

Declarations

Conflict of interest No competing interest directly or indirectly related to the work submitted for publication exists.

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