



RESEARCH ARTICLE

REVISED Perceived stress and generalized anxiety in the Indian population due to lockdown during the COVID-19 pandemic: a cross-sectional study [version 3; peer review: 3 approved]

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Abstract

Background: Research on the psychosocial toll of the COVID-19 pandemic is being conducted in various countries. This study aimed to examine stress levels and causal stressors for perceived stress and generalized anxiety in the Indian population related to the lockdown during the COVID-19 pandemic.

Methods: A total of 300 adults were invited to participate in the online study via snowball and virtual snowball sampling. They were requested to complete electronic survey forms for assessing perceived stress and anxiety, and questions related to psychosocial stressors. Frequency and percentage were used for categorical variables. Unpaired t-test was applied to compare responses based on gender, level of education, employment, and place of residence. A p-value of <0.05 was considered statistically significant.

Result: In total, 257 out of the 300 invited, responded and completed the survey. Men accounted for 58% (n=149) of the respondents. Overall, 84% (n=217) of participants had moderate to severe levels of perceived stress and 88% (n=228) had moderate to severe levels of anxiety. Women, as well as those not employed, reported significantly higher perceived stress and anxiety, urban residents reported higher perceived stress, while level of education had no difference in terms of perceived stress as well as anxiety. Fear of contracting COVID-19 was the highest stressor followed by difficulties in executing a routine exercise schedule and worry about the future.

Conclusion: The psychosocial impact of the nationwide lockdown on the Indian population has been high. Vulnerable groups for increased stress and anxiety include women, younger ages, and the unemployed. The stressors recognized include fear of contracting COVID-19, inability to execute a routine exercise schedule and worry

Open Peer Review

Reviewer Status

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version 1			
14 Oct 2020			
	report		

1. **Krishna Prasad Muliya** , National Institute of Mental Health and Neuro Sciences (INI), Bangalore, India

2. **Javier Santabárbara** , Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Madrid, Spain
 University of Zaragoza, Zaragoza, Spain

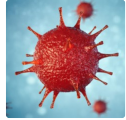
3. **Kiran Chaudhari**, University of North Texas Health Science Center, Fort Worth, USA

Any reports and responses or comments on the article can be found at the end of the article.

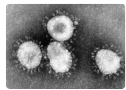
about the future.

Keywords

COVID-19, lockdown, perceived stress, anxiety, stressors, India, PSS-10, GAD-7



This article is included in the [Disease Outbreaks](#) gateway.



This article is included in the [Coronavirus](#) collection.

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Author roles: **Wakode N:** Conceptualization, Data Curation, Formal Analysis, Methodology, Software, Writing – Original Draft Preparation, Writing – Review & Editing; **Wakode S:** Conceptualization, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing; **Santoshi J:** Data Curation, Methodology, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: The author(s) declared that no grants were involved in supporting this work.

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REVISED Amendments from Version 2

Unpaired t-test has been used to compare the data. Percentages have been added to [Table 2](#).

Data analysis was done using Microsoft Excel 2016 with data analysis add-in and epidemiology & biostatistics calculator available on www.openepi.com.

Any further responses from the reviewers can be found at the end of the article

Introduction

Since the beginning of 2020, humanity has been confronted with a pandemic caused by the severe acute respiratory syndrome coronavirus-2 that causes coronavirus disease 2019 (COVID-19)¹. The government of India declared a 21-day nationwide 'lockdown' from 25th March 2020, which was subsequently extended in phases till 31st May 2020, to break the cycle of spread of infection. The lockdown was in tune with the initiatives taken by many countries across the globe against this pandemic^{2,3}.

'Lockdown' is an emergency protocol and is a means of preventing the public from moving from one place to the other. This led to shutting down of all activities except those considered 'essential services', which included healthcare, police, sanitation, grocery shops, petrol stations and fire stations. All educational institutions, offices, factories, shopping malls, religious places, and public transport, including buses, railways and aeroplanes, were completely shut down, and sports, religious ceremonies, family functions and all outdoor activities were strictly prohibited.

While isolation and lockdown are recognized as effective strategies of social distancing to stop the spread of COVID-19, the reduced access to family, friends, and other social support systems causes loneliness, increasing mental health issues like anxiety and depression⁴⁻⁶.

Researchers, in the past and during this present crisis, have tried to address the psychological stress in healthcare providers⁷⁻⁹ and the general population^{2,3,10}. The present study, conducted during the fourth phase of nationwide lockdown, from 18th to 31st May 2020, attempts to examine levels of perceived stress and generalized anxiety disorders and causal stressors among the Indian population related to the COVID-19 pandemic and consequent lockdown.

Methods

Study design and participants

We conducted an online survey wherein 300 participants were invited via snowball and virtual snowball sampling; the sample size was decided on the basis of logistics and time availability for the study. The study was approved by the Institutional Ethics Committee of the ABV Government Medical College, Vidisha, MP, India (reference no. 21(b)/IEC/ABV GMC/Vidisha/2020).

A link to the electronic survey forms (*Extended data*¹¹) was posted on Facebook, and was sent via WhatsApp by the authors

to multiple contacts, including colleagues and acquaintances that were from a wide section of society. Consent to participate was implied if the participant completed the questionnaire. The items for the questionnaire were derived from previous study on the topic¹².

Inclusion criteria of participants were: a) aged >18 years; b) have an internet connection and Facebook or WhatsApp installed on their mobile phone. Those unwilling to participate or did not provide consent and those <18 years of age were excluded because the psychometric measures utilized in the study were designed for adults only.

Data collection and survey

Data was collected from 18th to 25th May 2020.

The survey questionnaire, based on the perceived stress scale (PSS-10)¹² and Generalized Anxiety Disorder (GAD-7)⁷ instruments, explored the psychosocial stressors among the respondents. For each potential stressor, the frequency of occurrence was classified as never, almost never, sometimes, often, and very often, and these were scored as 0, 1, 2, 3 and 4, respectively. While PSS measures perception of stress over the last month GAD measures anxiety for the last 2 weeks; both these instruments have been used in previous studies on this subject^{7,10,12}.

Data analysis

The data collected were tabulated and analysed using Microsoft Excel 2016 with data analysis add-in and epidemiology & biostatistics calculator available on www.openepi.com. Frequency and percentage were used for categorical variables. Unpaired t-test was applied to compare responses based on gender, age, level of education, and place of residence. A p-value of <0.05 was considered statistically significant.

We used the STROBE cross sectional checklist when writing our report¹³.

Results

A total of 257, out of the 300 participants who were sent the survey, responded and completed the survey. They belonged to central, north and western India. The mean age of the participants was 25 years. Men constituted 58% (n=149) of the respondents. Overall, 84% (n=217) of participants had moderate to severe levels of perceived stress and 88% (n=228) had moderate to severe levels of anxiety ([Figure 1](#)).

[Table 1](#) shows the PSS-10 and GAD-7 scores of the study participants as stratified by gender, age, level of education, and place of residence. Women as well as those not employed reported significantly higher perceived stress and anxiety, urban residents reported higher perceived stress while the level of education had no difference in terms of perceived stress as well as anxiety. The psychosocial impact of the lockdown due to the COVID-19 pandemic is shown in [Table 2](#). Fear of contracting COVID-19 was the highest stressor followed by difficulties in executing routine exercise schedule and worry about the future.

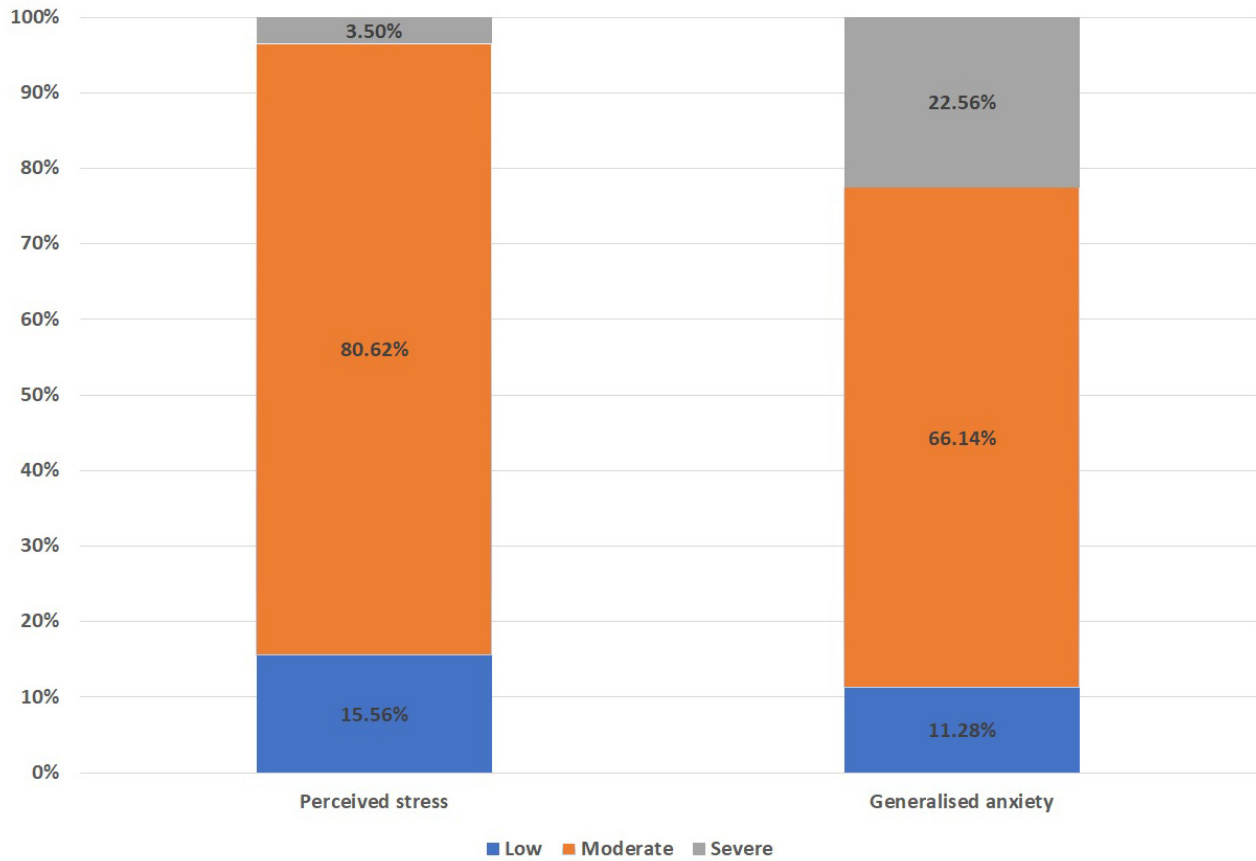


Figure 1. Percentage of perceived stress & generalized anxiety stress in Indian population.

Table 1. Demographic characteristics of participants showing perceived stress score and generalized anxiety disorder scale score.

Characteristics		Number (%)	Perceived Stress Scale (PSS-10)		Generalised Anxiety Disorder (GAD-7)	
			Score (Mean±SD)	p-value*	Score (Mean±SD)	p-value*
Gender	Male	149 (58)	17.28±5.25	0.0028	11.92±3.974	0.0176
	Female	108 (42)	19.11±4.44		12.93±2.80	
Employed	No	176 (68.48)	18.83±4.32	0.0009	13.18±2.93	0.000000722
	Yes	81 (31.51)	16.34±5.91		10.53±4.10	
Education	University	220 (85.6)	18.19±5.03	0.246	12.46±3.59	0.190
	School	37 (14.39)	17.18±4.818		11.67±3.31	
Place of residence	Urban	178 (69.26)	18.76±4.69	0.001	12.26±3.50	0.57
	Rural	79 (30.73)	16.44±5.33		12.54±3.70	

(SD: standard deviation; * by using unpaired t-test)

Table 2. Psychosocial impact of COVID-19 (rated on a Likert scale).

Statements	Frequency of occurrence (N)		
	Never / almost never	Sometimes	Often / very often
How often do you face financial strain during the lockdown period?	110 (42.8%)	84 (32.7%)	63 (24.5%)
How often do you worry about the future?	81 (31.5%)	94 (36.6%)	82 (31.9%)
How often do you fear contracting COVID-19?	35 (13.6%)	57 (22.2%)	165 (64.2%)
How often do you feel stress due to inability to socialize?	123 (47.9%)	81 (31.5%)	53 (20.6%)
How often do you face difficulties in executing your routine exercise schedule during the lockdown period?	100 (38.9%)	72 (28%)	85 (33.1%)
How often do you face sleeping difficulties during the lockdown period?	165 (64.2%)	48 (18.7%)	44 (17.1%)

Discussion

The levels of stress and anxiety reported in the present study are similar to those reported by researchers from other countries^{2,3,5,14}. The present study is in agreement with previous studies from other parts of the world where women and those with lower incomes are prone to higher levels of stress and anxiety^{2,3,5,15,16}; this was in contrast to a study from Pakistan where men reported a higher degree of stress during the current crisis¹⁷. This could be attributed to cultural factors, which need further evaluation for clearer understanding.

In the present study, older respondents reported lower levels of stress. This could suggest the struggle and hardships of daily life which the younger generation is under¹⁸; also, the younger generation tends to obtain a large amount of information from social media, which can easily trigger stress^{3,10}. We found significant difference in the levels of perceived stress reported between urban and rural residents, while no such difference was noted in generalised anxiety scores.

In the present study, we found no difference in the levels of stress when considering the level of education of the respondents. Vallejo *et al.*¹⁹ found those with a lower level of education to be reporting higher stress. Other studies found that those who were highly educated had a higher risk of depression; it is presumed that highly educated and professional people are forced to stay at home and delve into other aspects of family life leading to higher levels of perceived stress^{5,10}.

When considering the psychosocial impact of COVID-19, fear of contracting COVID-19 was the highest stressor, which was consistent with other studies^{17,20}. This was followed by difficulties in executing your routine exercise schedule and worry about the future (Table 2).

Limitations

This being a cross-sectional study, the selection of participants was non-random, and it is impossible to make unbiased estimates from snowball samples so the results of this study need to be interpreted with due caution. However, this was the best available method of data collection in the current circumstances. The study was also limited by the lack of other socio-demographic and cross-cultural comparison groups.

Conclusions

The psychosocial impact of the nationwide lockdown on the Indian population has been high. The vulnerable groups for stress and anxiety include women, those of a younger age, and the unemployed. The stressors recognized include fear of contracting COVID-19, inability to execute routine exercise schedule and worry about the future.

Data availability

Underlying data

Figshare: Raw data PSS_GAD Psychosocial impact of lockdown.csv, <https://doi.org/10.6084/m9.figshare.12860060.v2>¹¹.

Extended data

Figshare: Raw data PSS_GAD Psychosocial impact of lockdown.csv, <https://doi.org/10.6084/m9.figshare.12860060.v2>¹¹.

This project contains the following extended data:

- Online questionnaire.

Data are available under the terms of the [Creative Commons Zero “No rights reserved” data waiver](#) (CC0 1.0 Public domain dedication).

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Open Peer Review

Current Peer Review Status:   

Version 3

Reviewer Report 13 August 2021

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Javier Santabárbara 

¹ Ministry of Science and Innovation, Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Madrid, Spain

² University of Zaragoza, Zaragoza, Spain

The authors have addressed successfully all my concerns.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Biostatistics, Epidemiology, Mental health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 2

Reviewer Report 20 July 2021

<https://doi.org/10.5256/f1000research.56132.r89031>

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Kiran Chaudhari

Department of Pharmacology and Neuroscience, University of North Texas Health Science Center, Fort Worth, TX, USA

The authors have studied a critical and timely topic of the impact of the COVID-19 pandemic on

psychosocial behavior in the Indian sub-population. The study included a simple cross-sectional design and subjective survey-based assessment using online tools. The data presented is easy to understand and in a self-explanatory fashion.

There are some minor comments to be addressed:

- The authors mentioned that they used One-Way ANOVA for statistical analysis. It is unclear what component of the data was analyzed with the One-Way ANOVA (and any posthoc pairwise comparison test). There can be multiple ways the data is analyzed, and the simplest would be the use of the Student t-test (unpaired-test) to compare between 2 groups.
- Although the Figures and Tables are clear to understand, they need legends/footnotes with information such as a brief take-home message, what type of statistical analysis was used for that particular figure or table, and the set criteria for significance?
- It would be helpful to mention if the sample was limited to a particular region or a nationwide sample to conclude that the outcome is limited to the region or it can be applied to the whole population.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Neuroscience, cognition, anxiety, aging

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 23 Jul 2021

Santosh Wakode, All India Institute of Medical Sciences, Bhopal, India

We thank the reviewer for taking out time to review our article and the comments and suggestions.

These have definitely helped in making the article better.

- Unpaired t-test has been used for analysing the data.
- Legend of the figure has been modified for a clearer understanding
- The study participants belonged to central, north, and western India.

Competing Interests: No

Reviewer Report 15 July 2021

<https://doi.org/10.5256/f1000research.56132.r89032>

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Javier Santabárbara 

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² University of Zaragoza, Zaragoza, Spain

This is a good article and well written. In brief, objective and robust manuscript, current references, rigid and reliable design method, results and discussion are supported by the data and conclusion responds to the object of investigation.

This work represents an important area of inquiry that is relevant to the readership of this journal. However, additional details are needed for optimal review.

- The authors have obviated meta-analysis of anxiety in the general population (Santabárbara *et al.* (2020¹)) and in specific populations like health workers (Santabárbara *et al.* (2021²)) during COVID-19 outbreak that should be included in the introduction and discussion sections. In addition, a recent meta-analysis reported prevalence of anxiety in South Asia and also should be discussed (Hossain *et al.* (2021³)).
- Data analysis: Please, replace ANOVA by t-test.
- Table 2: Please, add percentages and chi-square test p-value to compare the categories.

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Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Biostatistics, Epidemiology, Mental health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 23 Jul 2021

Santosh Wakode, All India Institute of Medical Sciences, Bhopal, India

We thank the reviewer for taking out time and reviewing our article.

Unpaired t-test has been used to analyse the data.

We thank the reviewer for suggesting the articles for discussion.

Competing Interests: No competing interests were disclosed.

Version 1

Reviewer Report 10 March 2021

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**Krishna Prasad Muliya** 

Department of Psychiatry, National Institute of Mental Health and Neuro Sciences (INI), Bangalore, Karnataka, India

Please mention what GAD measures under the section of data collection and survey. Whereas, PSS measures perception of stress over the last month. GAD measures anxiety for the last 2 weeks.

What was the mean age of the respondents?

How were the items for the questions in Table 2 selected?

What is the time frame for these questions?

Which parts of India did the respondents belong to? The positivity rates and lockdowns may have had differential impact.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Psychiatry, mental health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 13 Apr 2021

Santosh Wakode, All India Institute of Medical Sciences, Bhopal, India

We thank the reviewer for the valuable comments.

GAD measures anxiety for the past 2 weeks.

The mean age of the respondents was 25 years.

The items for the questions in Table 2 were selected based on previous studies on this subject. (reference 12).

The time frame for the questions was the first week of 4th phase of nationwide lock down.

The respondents were mainly from central, north and western India.

Competing Interests: No competing interests were disclosed.

Comments on this article

Version 1

Reader Comment 25 Oct 2020

Krishna Prasad M, KSHEMA, India

Please mention what GAD measures under the section of data collection and survey. Whereas, PSS measures perception of stress over the last month. GAD measures anxiety for the last 2 weeks.

What was the mean age of the respondents?

How were the items for the questions in Table 2 selected?

What is the time frame for these questions?

Which parts of India did the respondents belong to? The positivity rates and lockdowns may have had differential impact.

Competing Interests: none

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