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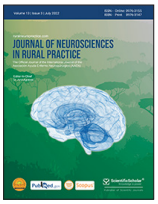

Review Article

Prevalence of anxiety and depressive symptoms during COVID-19 pandemic among the general population in India: A systematic review and meta-analysis

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ABSTRACT

Objective: The novel coronavirus (n COVID-19) has affected every walk of life across the world including India. Several studies have been available on the COVID-19-related anxiety and depressive symptoms in the public health context. However, there is a dearth of evidence of a meta-analysis regarding the pooled estimates of anxiety and depressive symptoms related to this pandemic based on the existing studies conducted among the general population of India. The aim of the study was to estimate the pooled prevalence of COVID-19-related anxiety and depressive symptoms among the general population in India.

Material and Methods: We searched the following electronic bibliographic databases: PubMed, Ovid, Science Direct, and Wiley online library for studies conducted from the onset of the COVID-19 pandemic and until September 25, 2021. We separately analyzed the outcome measures based on the risk of bias assessment. The publication bias was evaluated by funnel plots and Egger's test.

Results: We used a random-effect model due to the significant heterogeneity between the studies (Anxiety symptoms – I^2 = 99.40% and Depressive symptoms – I^2 = 95.3%). According to the index meta-analysis, the pooled estimates of anxiety and depressive symptoms among general population of India during COVID-19 pandemic are 23.5% (95% CI: 17.4–29.6%; *n* = 21 studies) and 20.2% (95% CI: 17.2–23.2%; *n* = 17 studies), respectively. In subgroup analyses, good-quality studies (Score ≥7/9) had a significant effect on the pooled prevalence.

Conclusion: About one-fifth of the general population of India reported having anxiety and depressive symptoms during the COVID-19 pandemic. The pooled estimates varied with the methodological quality of included studies. The present study provides a comprehensive picture of the overall magnitude of anxiety and depressive symptoms due to the COVID-19 outbreak which will guide the policy makers to measure the burden of similar pandemics more judiciously in the future.

Keywords: COVID-19, Pandemic, Anxiety, Depression, General population, India

PROSPERO REGISTRATION: CRD42021282389

INTRODUCTION

A group of pneumonia cases of blurred causation connected to the South China Seafood Market alerted the health authorities in Wuhan, China at the end of 2019. Subsequently, laboratory tests found a novel coronavirus, SARS-CoV-2 as a cause for this rapid surge in pneumonia cases.[1] Coronavirus disease 2019 (COVID-19) pandemic has affected every walk of life across the world. The COVID-19, first detected in India in January 2020, started to spread in the 2nd week of March 2020.[2] One of the main approaches adopted by many countries was to impose cross-country lockdowns to prevent the spread of COVID-19 infections. Although these lockdowns were able to reduce the risk of morbidity and mortality related to COVID-19, they caused varying levels of psychological trauma and affected the mental health of the population.[3] The consequences on the mental health of

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the people were reported among several population groups during the COVID-19 outbreak. Underlying anxiety and depressive symptoms about this new disease can affect anyone in a society that hatches fear among people.[4] Recent pieces of evidence reported the psychological impact of COVID-19 through anxiety, depression, insomnia, post-traumatic stress disorders, attention deficit hyperactive disorders, anger, and fear of getting infected with COVID-19 among the general population.[5] Consequently, the unending psychological impacts across all the socioeconomic domains from rapidly expanding panic related to COVID-19 could have potentially caused even more damage than physical symptoms.[6] Because of numerous psychological problems related to COVID-19, there is dearth of pooled data regarding the mental health statistics among the Indian population. Recently, quite a several research reports on anxiety and depressive symptoms about COVID-19 were published. However, there is a lacuna of evidence of a meta-analysis regarding the pooled estimates of anxiety and depressive symptoms related to this pandemic based on the existing studies conducted among the general population of India. This study systematically reviewed all the published online surveys and estimated the aggregate evidence regarding the anxiety and depressive symptoms expressed by the general public during COVID-19 pandemic in this setting.

MATERIALS AND METHODS

This systematic review is reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline checklist[7] and is registered in the PROSPERO (CRD42021282389).

Search strategy

Multiple electronic databases such as PubMed, Wiley online library, Science Direct, APA Psych Info, and grey literature sources were searched for articles published from January 2020 to September 2021, to retrieve potential articles on anxiety and depressive symptoms due to COVID-19 among the general population in India. We used the following search terms; "prevalence," "depression," "anxiety," "COVID-19," "India" combined with the use of Boolean operators "AND" and "OR." Both free-text words and MeSH terms were used for the search process [Supplementary Material 1]. The studies were independently reviewed by two reviewers (JJ and AV) for eligibility and eligible studies were selected after removing the duplicates manually.

Eligibility criteria

Our inclusion criteria were studies conducted in India, studies reporting anxiety or depressive symptoms, the population included the general population. Our exclusion criteria were studies conducted among health-care personnel, reviews, case reports, and qualitative studies. Further, studies with inadequate data and outcome measures other than anxiety and depressive symptoms such as psychological distress, post-traumatic stress disorders, and physical symptoms were also excluded from the study. No attempts are made to acquire grey/unpublished literature considering the inherent conflict of interest which might increase the risk of bias.

Data extraction, quality assessment, and data synthesis

The data from the studies were extracted onto a data extraction form with the following study characteristics and relevant data, namely, author (year and period of conducting the study), study design, sample size, age, and survey tools. The main outcomes assessed were the prevalence of anxiety and depressive symptoms. The methodological quality of included studies was assessed by two independent reviewers employing the "JBI Critical Appraisal Checklist for Studies Reporting Prevalence Data."[8] This checklist contains nine criteria with a total quality score ranging from 1 to 9. We classified scores as having a high (0–3), moderate (4–6), and low (7–9) risk of bias. Two independent reviewers (MD and JJ) assessed the methodological quality of the studies using the Joanna Briggs quality assessment tool. Discrepancies were addressed by discussion and mutual consensus and involved a senior third reviewer (SS).

In all statistical analyses, the significance level was considered at $P < 0.05$, employing the software open Meta. Statistical heterogeneity was measured using I^2 statistics. Heterogeneity was considered not important (0–40%), moderate (30–60%), substantial (50–90%), and considerable (75–100%).[9] Freeman-Tukey Double Arcsine Proportion metric was applied to calculate the pooled prevalence as it is one of the best methods to fix the variance between studies. The pooled estimate of prevalence was calculated using the DerSimonian and Laird method of random effects models and reported as a proportion with a 95% confidence interval.[10] The funnel plot and Egger's regression tests were used to assess potential publication.

RESULTS

The search across different electronic databases yielded 2984 citations. Duplicate studies were removed and 1384 studies were further screened. A total of 22 full-text studies (Studies evaluated anxiety symptoms – 21; and Studies evaluated depressive symptoms – 17) meeting inclusion and exclusion criteria were included in the final analysis [Figure 1]. The basic characteristics of the included studies are shown in [Table 1].[11-32] The studies were conducted from March 2020 to February 2021 across various regions of India. All the studies were cross-sectional and conducted among the general population through online web-based surveys.

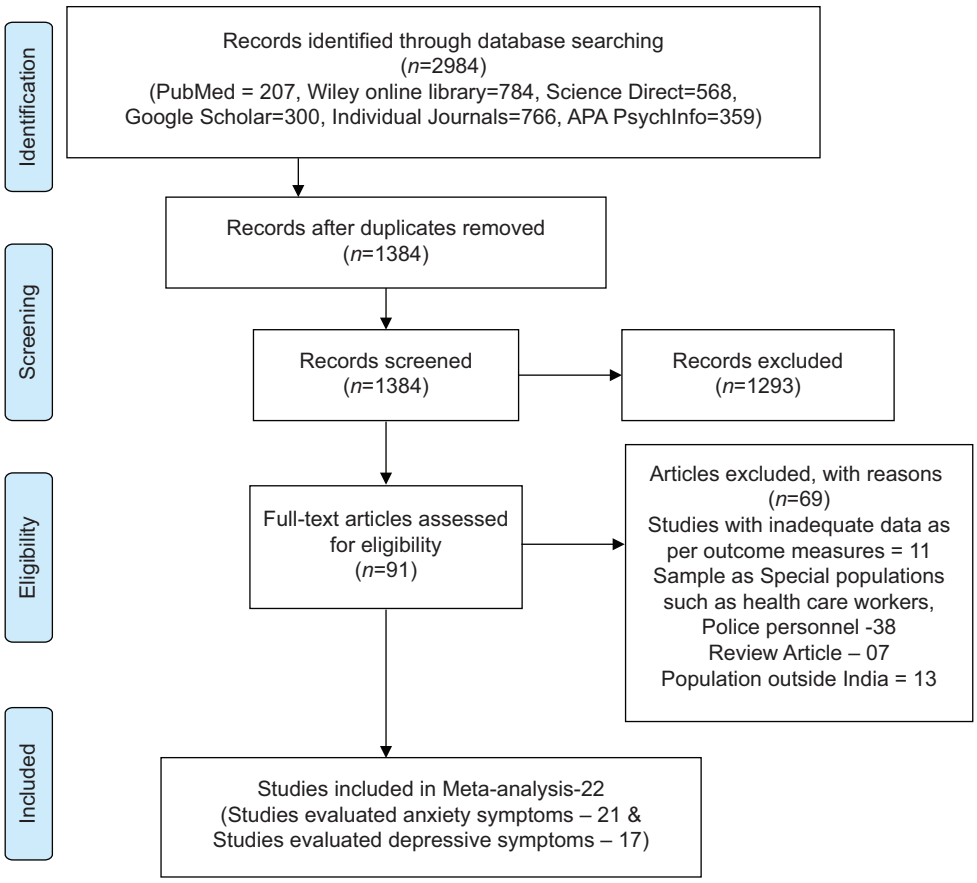

Figure 1: Process of search and selection of studies.

The total sample size was 17,683 ranging from 128 to 2245. The majority of the participants (52.4%) were males and details of the gender distribution of the study participants were not available in the three studies.[26-28] Twelve studies[11,13,14,18,19,23,25-30] specifically mentioned the details of the age of the study participants in which the mean age was 32.27 (SD-10.01).

The age range of the subjects varied from 10 to 80 years in which four studies enrolled participants <18 years of age,[11,22,31,32] and one study exclusively targeted the anxiety and depressive symptoms among the middle-aged and elderly population.[14] Out of the –22 studies, 15 studies[11,13,15,16,18,20-25,27-29,31] recruited study subjects from various states of India. The remaining seven studies had participants from Karnataka (n = 2),[17,32] West Bengal (n = 2),[12,19] Haryana (n = 1)[14], New Delhi (n = 1),[26] and Jammu and Kashmir (n = 1).[30] Various validated scales with specific cutoffs used in our study were: Depression, Anxiety, and Stress Scale-21 (DASS-21), Generalized Anxiety Disorder (GAD7), Patient health questionnaire (PHQ) (PHQ-4 and PHQ-9), Beck Anxiety Inventory, Coronavirus Anxiety Scale, and Zung Self-Rating Anxiety Scale.

The prevalence estimates

The pooled estimates of anxiety and depressive symptoms among general population of India during COVID-19 pandemic were 23.5% (95% CI: 17.4–29.6%; n = 21 studies) and 20.2% (95% CI: 17.2–23.2%; n = 17 studies), respectively [Figures 2 and 3]. We used the DerSimonian and Laird method of random-effects models to calculate the pooled estimates as there was a significant heterogeneity on the outcome measures (Anxiety symptoms – I^2 = 99.40%, Q = 3365.79, P < 0.001, Tau Squared = 0.02 and Depressive symptoms – I^2 = 95.3%, Q = 340.30, P < 0.001, Tau Squared = 0.04).

Methodological quality

Out of the 22 studies (21 studies evaluated anxiety symptoms and 17 studies evaluated depressive symptoms), the median quality score was 6 (Mean – 5.45; SD – 1.5) and the quality score ranged from 3 to 7. Among studies on anxiety symptoms, there were eight high-quality studies (Score ≥ 7/9), and the remaining 13 studies were found to have a moderate-to-high risk of bias. Among the 17 studies on

Table 1: Characteristics of the studies of the anxiety and depressive symptoms of COVID-19 pandemic among general population of India.

Author/ Period of study	Study setting and design	Male/ Female	Age in years (Mean±SD)/ Range	Sample size/ Sampling method	Survey tools	Depression % (n/N)	Anxiety % (n/N)
Pandey *et al.*[11] March 24–April 11, 2020	Across India/ Online survey	582/805	25.0±10.2	1387/ Snow ball	DASS-21	16.6% (232/1387)	14.3% (199/1387)
Bhowmick *et al.*[12] April 18–May 3, 2020	West Bengal/ Online survey	182/171/2 others	18-80	355/ Snow ball	GAD-7	NM	15.49% (55/355)
Gopal *et al.*[13] March 29–May 24, 2020	Across India/ Online survey	103/56	27.44±9.17	159/ Snow ball	GAD-7 PHQ-4	14.8% (23/159)	29.2% (62/159)
Joseph *et al*[14] 17th April–1th May 2020	Haryana/ Online survey	366/374	58.68±8.05	740/ Snow ball	PHQ-9 GAD-7	8.8% (65/740)	6.1% (45/740)
Verma *et al.*[15] April 4–14, 2020	Across India/ Online survey	183/173	18–41	345/ Snow ball	DASS-21	25% (86/345)	28% (97/345)
Kaurani *et al.*[16] April 19–May 5, 2020	Across India/ Online survey	310/317	20–70	627/ Snow ball	BAI-21	NM	23/627 36.68%
Chaudhary *et al.*[17] November 15, 2020–February 15, 2021	Karnataka/ Online Survey	180/144	18–30	324/ Snow ball	GAD-7 PHQ-9	28.7% (93/324)	23.76% 77/324
Kaur *et al.*[18] May 24–June 5, 2021	Across India/ Online survey	525/584	32.98±14.72	1109/ Snow ball	DASS-21	25.87% 287/1109	45.26% 506/1109
Singh and Khokhar[19] Last week of April 2020	West Bengal/ Online survey	95/139	28.59±10.47	234/ Snow ball	PHQ-9	14.1% 33/234	NM
Srivastava *et al.*[20] June 20–July 4, 2020	Across India/ Online survey	1146/858	37 (18–60)	2004/ Snow ball	CAS	NM	3.29% 66/2004
Wakode *et al.*[21] May 18–25, 2020	Across India/ Online survey	149/108	25	257/ Snow ball	GAD-7	NM	88% 228/257
Nathiya *et al.*[22] May 23–29, 2020	Across India/ Online survey	278/201	15–30	479/ Snow ball	DASS-21	24.63% 118/479	30.89% 148/479
Hazarika *et al.*[23] April 6–22, 2020	Across India/ Online survey	167/255	30.5±10.9	422/ Snow ball	DASS-21	34.7% (146/422)	32% (135/422)
Gaur *et al.*[24] April 24–May 7, 2020	Across India/ Online survey	653/362	18–60	1015/ Snow ball	GAD-7 PHQ-9	12.8% 129/1015	9% 92/1015
Chauhan *et al.*[25] April 1–30, 2020	Across India/ Online survey	614/373	34.28±12.27	987/ Snow ball	SAS	NM	32.2% (318/987)
Balhara YPS. *et al.*[26] April 2020- Journal Submission	New Delhi/ Online survey	NM	19.6±1.9	128/ Snow ball	PHQ-9 GAD-7	26.9% 105/393	16.92% 66/393
Sebastian *et al.*[27] Not Available	29 States of India/ Online survey	NM	29.3±9.7	1257/ Snow ball	PHO-4	13.9% (174/1257)	13.9% (174/1257)
Grover *et al.*[28] April 6–24, 2020	Across India/ Online survey	NM	41.2±13.6	894/ Snow-ball	GAD-7 PHQ-9	105/894 11.74	140/894 15.65%
Tomar *et al.*[29] April 28–May 8,2020	Across India/ Online survey	1160/1085	32.4±11.4	2245/ Snow ball	DASS-21	20.66% (464/2245)	23.47% (534/2245)
Wani *et al.*[30] May 2020	Kashmir/ Online study	138/149	27.35±7.81	287/ Snow ball	DASS-21	29.61% (85/287)	25.08% (72/287)
Reddy *et al.*[31] April 1–May 12, 2020	11 States of India/ Online survey	477/416	16-60	891/ Respondent -driven	DASS 21	22% 200/891	15% 138/891
Desai *et al.*[32] April 8–14, 2020	Karnataka/ Online survey	764/768/5 others	10-70	1537/ Snow ball	GAD-7 PHQ-9	16.7% (257/1537)	12.4% (192/1537)

NM: Not mentioned, Depression, Anxiety, and Stress Scale-21 (Cutoff: - Depression ≥ 13, Anxiety ≥ 09, Stress ≥ 19), GAD-7- generalized anxiety disorder (Cutoff ≥ 10), PHQ-4- Patient health questionnaire (Cutoff ≥ 3), PHQ-9: Patient health questionnaire (Cutoff ≥ 10), BAI: Beck Anxiety Inventory (Cutoff ≥ 22), CAS: Coronavirus anxiety scale (Cutoff ≥ 9), SAS: Zung Self-Rating Anxiety Scale (Cutoff ≥ 45)

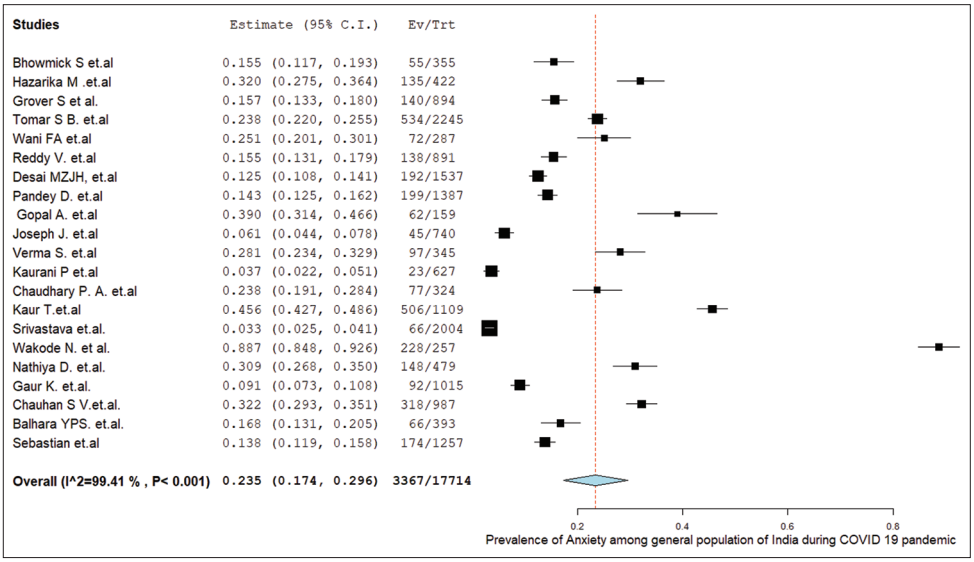

Figure 2: Prevalence of anxiety symptoms among general population of India during COVID-19 pandemic.

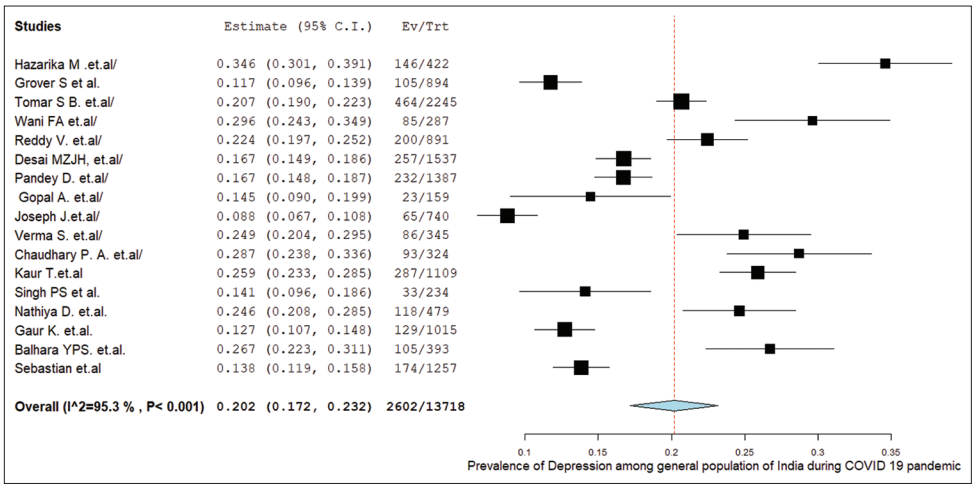

Figure 3: Prevalence of depressive symptoms among general population of India during COVID-19 pandemic.

depressive symptoms, there were eight high-quality studies (Score ≥ 7/9) and nine were of moderate-to-low quality. Altogether, the reporting structure was poorly followed in the majority of the studies making the comparisons an arduous task. The sample size calculation and the characteristics pertinent to standards of data collection were not addressed in many studies. [Table 2] summarizes the quality score of each study included in the meta-analysis.

Subgroup and sensitivity analysis

We did subgroup analyses based on the methodological quality of included studies [Table 3]. The pooled estimates of anxiety symptoms were slightly higher for good-quality studies (Score ≥ 7/9) than those with moderate and low quality (24.2%; 95% CI: 14.8–33.7% vs. 23.0%; 95% CI: 14.9–31.1%). The pooled prevalence of depressive symptoms was higher for those with good-quality studies (Score ≥ 7/9) as compared to those studies with moderate and low quality (23.2%; 95% CI: 17.5–28.9% vs. 17.5%; 95% CI: 14.3–20.7%). We did a leave-one-out sensitivity analysis using the random effect model to identify the effect of individual studies in which the prevalence of anxiety and depressive symptoms ranged between 20.1–24.5% and 19.3–20.9%, respectively. A reasonable asymmetry of the funnel plot [Supplementary Materials 2 and 3] revealed the existence of publication bias and Egger's test of the outcome measures revealed no publication bias (Anxiety symptoms: $P = 0.349$ and Depressive symptoms: $P = 0.897$).

Table 2: Quality assessment criteria – Joanna Briggs institute critical appraisal tool for prevalence studies.

Author	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Score	Remarks
Pandey *et al.*	1	1	0	0	1	1	0	1	0	5	Moderate risk of bias
Bhowmick *et al.*	0	0	0	1	1	1	0	1	0	4	Moderate risk of bias
Gopal *et al.*	0	0	1	1	0	1	1	1	0	5	Moderate risk of bias
Joseph *et al.*	1	1	1	0	1	1	0	1	1	7	Low risk of bias
Verma *et al.*	1	1	0	1	1	1	0	1	1	7	Low risk of bias
Kaurani *et al.*	1	0	0	0	1	1	0	1	0	4	Moderate risk of bias
Chaudhary *et al.*	1	1	1	1	1	1	0	1	0	7	Low risk of bias
Kaur *et al.*	1	1	0	1	1	1	0	1	1	7	Low risk of bias
Singh *et al.*	1	0	0	0	0	1	0	1	0	3	High risk of bias
Srivastava *et al.*	1	0	0	0	1	1	0	1	1	5	Moderate risk of bias
Wakode *et al.*	0	0	0	1	1	1	0	1	0	4	Moderate risk of bias
Nathiya *et al.*	1	1	0	1	1	1	1	1	0	7	Low risk of bias
Hazarika *et al.*	1	1	0	1	1	1	1	1	0	7	Low risk of bias
Gaur *et al.*	1	1	0	1	1	1	0	1	0	6	Moderate risk of bias
Chauhan *et al.*	0	0	0	0	1	1	0	1	0	3	High risk of bias
Balhara *et al.*	0	0	0	1	0	1	1	1	0	4	Moderate risk of bias
Sebastian *et al.*	1	1	0	0	1	1	1	0	1	6	Moderate risk of bias
Grover *et al.*	1	1	0	0	1	1	1	0	1	6	Moderate risk of bias
Tomar *et al.*	1	1	0	0	1	1	0	1	1	6	Moderate risk of bias
Wani *et al.*	0	0	0	0	1	1	0	1	0	3	High risk of bias
Reddy *et al.*	1	1	0	1	1	1	1	1	0	7	Low risk of bias
Desai *et al.*	1	0	1	1	1	1	1	1	0	7	Low risk of bias

Q1 - Was the sample frame appropriate to address the target population?; Q2 - Was study participants sampled in an appropriate way?; Q3 - Was the sample size adequate?; Q4 - Was the study subjects and the setting described in detail?; Q5 - Was the data analysis conducted with sufficient coverage of the identified sample?; Q6 - Was valid methods used for the identification of the condition?; Q7 - Was the condition measured in a standard, reliable way for all participants?; Q8 - Was there appropriate statistical analysis?; Q9 - Was the response rate adequate, and if not, was the low response rate managed appropriately? (1 – Yes; 0 – No)

Table 3: The prevalence of anxiety and depressive symptoms using random effect model by subgroup analyses.

Subgroup	Category	No. of studies	Events/N	Pooled prevalence (95% CI)	Heterogeneity		χ^2 (*P*-value)
					I^2	T	
Methodological Quality (Score ≥ 7/9)							
Depression	Moderate and High Risk	09	1350/7871	17.5% (14.3–20.7%)	92.72	0.022	26.64<0.0001
	Low Risk	08	1252/5847	23.2% (17.5–28.9%)	96.67	0.066	
Anxiety	Moderate and High Risk	13	2029/11867	23.0% (14.9–31.1%)	99.53	0.022	56.75<0.0001
	Low Risk	08	1338/5847	24.2% (14.8–33.7%)	98.95	0.018	

DISCUSSION

The present study provides a statistical summary of online surveys related to COVID-19 associated anxiety and depressive symptoms in the Indian general public. This meta-analysis reports that in India, the aggregate prevalence of depression and anxiety symptoms among the general population ranged from 20.2% to 23.5%, though estimates varied based on screening tools and methodological approaches. Psychological reactions may vary according to the impact of the pandemic and the time of data collection, hence, should be interpreted accordingly. There is a wide variation in the magnitude of psychological impact due to COVID-19 across the globe.[33] Two recently published meta-analyses estimated the pooled prevalence of COVID-19-related anxiety symptoms (31.9–38.12%) and depressive symptoms (33.7–34.1%) in the general population across the global community, which was notably higher than our findings.[34,35] Furthermore, a web-based survey from China reported an overall prevalence of anxiety and depressive symptoms of 35.1% and 25.1%, respectively, during the peak period of the COVID-19 epidemic.[36] These discrepancies in the results may be explained by significant heterogeneity based on the country-wide differences in onset and severity of the pandemic, availability, and utilization of healthcare, awareness of COVID-19, and guidelines for the general public. Our findings are based on the online surveys conducted from the inception of COVID-19 to September 2021. The first and

second waves of COVID-19 in India started in the middle of March 2020 and 2021, respectively.[37]

As expected, there was significant heterogeneity between the studies (Anxiety symptoms – I^2 = 99.40% and Depressive symptoms – I^2 = 95.3%) included in our meta-analyses. This might be attributed to the differences in the screening tools and methodological approaches employed in each study. However, it is worth noting that our pooled estimates are based on the existing studies with uniform cutoff scores as per the standard screening tools. Taken together, we also noted that the exclusion of a single study did not affect the overall pooled prevalence in which the prevalence of anxiety and depressive symptoms ranged between 20.1–24.5% and 19.3–20.9%, respectively. The National Mental Health Survey of India 2015–16 (NMHS-2015-2016) found that the mental morbidity of individuals above the age of 18 years was 10.6% in the lifetime prevalence of depression and was reported to be 5.2%.[38] As expected, the findings of the present study reported a high rate of pandemic-related depression in the general public as compared to the NMHS-2015-2016 data. However, our findings need to be interpreted based on several grounds of uncertainties that might confound the general public views related to the COVID-19 worldwide epidemic. The inherent design of the included studies like sampling techniques and the online surveys circulated through a few social media platforms such as WhatsApp which limit the generalizability of the study to people with internet access. The sample might be contaminated by selection and respondent bias and the likelihood of under or over-reporting is also need to be considered.

Implications

Certainly, the findings of this study might be the stepping-stones to devising appropriate planning to protect the general public during the current or emerging pandemic situation. An aggregate of estimates of anxiety and depressive symptoms across the country has implications for planning specialized mental health initiatives such as toll-free helplines, e sanjeevani helplines, and telepsychological consultation.[39] As the COVID-19 pandemic made greater demand on the mental health-care resources, the government policy should address the specialized services in times of pandemics. The present study further advocates the importance of sensitizing the public to stay away from overloaded information during every pandemic. Uncertainty and insecurity about the future result in depressive and anxiety symptoms. Therefore, the public mass campaigns should focus more on general coping strategies and positive well-being to address the psychological morbidities. Having said that, the effective utilization and reach of these services might not be possible without sound epidemiological data. With the history of worldwide epidemics repeating, the wide dissemination of psychological first aid services needs strategic plans in the form of virtual clinics and ongoing online surveillance systems.[40] All these efforts are vital for the successful monitoring and management of the future pandemic. Taken together, the current estimates will guide the researchers and policymakers to minimize the psychological impact caused by a similar pandemic in the future by focusing more on the public campaigns to build protective factors against anxiety and depressive symptoms.

Strength and limitations

The major strength of the present meta-analysis is its novelty of unique comprehensive data regarding the overall psychological burden of COVID-19 among the general population of India. Besides, to the best of our knowledge, this is the first meta-analysis that provides an epidemiological evidence base regarding the magnitude of anxiety and depressive symptoms linked to COVID-19 in the general population of India. The separate analysis based on methodological quality is a further strength in terms of the credibility of the findings. However, there are certain drawbacks to this paper. The results are purely based on online surveys recruited through snowball sampling using different web-based platforms posing a threat to the external validity of findings due to selection and respondent bias. In addition, confounding risk factors that may influence the findings of the study such as the presence of a history of mental illness and substance use were not reported in many of the studies. Several studies included in the meta-analysis were found to have moderate-to-high risk of bias leading to limitations in the quality of strength of evidence. Although the included studies used valid scales for measuring anxiety and depressive symptoms, high heterogeneity was observed due to differences in sensitivity and specificity of screening tools. Therefore, the data on the severity and type of anxiety disorder and depression have not been considered.

CONCLUSION

About one-fifth of the general population of India reported having anxiety and depressive symptoms during the COVID-19 pandemic. The pooled estimates varied with methodological quality of included studies. The present study provides a comprehensive picture of the overall mental health of the COVID-19 outbreak which will guide the policymakers to measure the burden of similar pandemics more judiciously in the future.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Kumar A, Singh R, Kaur J, Pandey S, Sharma V, Thakur L, *et al*. Wuhan to world: The COVID-19 pandemic. Front Cell Infect Microbiol 2021;11:596201.
2. Sarkar A, Chakrabarti AK, Dutta S. Covid-19 infection in India: A comparative analysis of the second wave with the first wave. Pathogens 2021;10:1222.
3. The Lancet. India under COVID-19 lockdown. Lancet 2020;395:1315.
4. Golechha M. COVID-19, India, lockdown and psychosocial challenges: What next? Int J Soc Psychiatry 2020;66:830-2.
5. Serafini G, Parmigiani B, Amerio A, Aguglia A, Sher L, Amore M. The psychological impact of COVID-19 on the mental health in the general population. QJM 2020;113:531-7.
6. Khan KS, Mamun MA, Griffiths MD, Ullah I. The mental health impact of the COVID-19 pandemic across different cohorts. Int J Ment Health Addict 2022;20:380-6.
7. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. BMJ 2009;339:b2535.
8. Munn Z, Moola S, Lisy K, Riitano D, Tufanaru C. Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and cumulative incidence data. Int J Evid Based Healthc 2015;13:147-53.
9. Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. BMJ 2003;327:557-60.
10. Borenstein M, Hedges LV, Higgins JP, Rothstein HR. A basic introduction to fixed-effect and random-effects models for meta-analysis. Res Synth Methods 2010;1:97-111.
11. Pandey D, Bansal S, Goyal S, Garg A, Sethi N, Pothiyill DI, *et al*. Psychological impact of mass quarantine on population during pandemics-the COVID-19 lock-down (COLD) study. PLoS One 2020;15:e0240501.
12. Bhowmick S, Parolia S, Jana S, Kundu D, Choudhury D, Das N, *et al*. A study on the anxiety level and stress during Covid19 lockdown among the general population of West Bengal, India-a must know for primary care physicians. J Family Med Prim Care 2021;10:978-84.
13. Gopal A, Sharma AJ, Subramanyam MA. Dynamics of psychological responses to COVID-19 in India: A longitudinal study. PLoS One 2020;15:e0240650.
14. Joseph J, Das K, Dhal S, Sehrawat T, Reshamia S, Huria G. Mental health concerns related to COVID-19 outbreak in the middle-aged and elderly population: A web-based, cross-sectional survey from Haryana, North India. J Geriatr Ment Health 2020;7:100-4.
15. Verma S, Mishra A. Depression, anxiety, and stress and socio-demographic correlates among general Indian public during COVID-19. Int J Soc Psychiatry 2020;66:756-62.
16. Kaurani P, Batra K, Hooja HR. Psychological impact of COVID-19 lockdown (Phase 2) among Indian general population: A cross-sectional survey. Int J Sci Res 2020;9:51-6.
17. Chaudhary AP, Sonar NS, Jamuna TR, Banerjee M, Yadav S. Impact of the COVID-19 pandemic on the mental health of college students in India: Cross-sectional web-based study. JMIRx Med 2021;2:e28158.
18. Kaur T, Ranjan P, Chakrawarty A, Kasi K, Berry P, Suryansh S, *et al*. Association of sociodemographic parameters with depression, anxiety, stress, sleep quality, psychological trauma, mental well-being, and resilience during the second wave of COVID-19 pandemic: A cross-sectional survey from India. Cureus 2021;13:e16420.
19. Singh SP, Khokhar A. Prevalence of posttraumatic stress disorder and depression in general population in India during COVID-19 pandemic home quarantine: Asia Pac J Public Health 2021;33:154-6.
20. Srivastava A, Bala R, Srivastava AK, Mishra A, Shamim R, Sinha P. Anxiety, obsession and fear from coronavirus in Indian population: A web-based study using COVID-19 specific scales. Int J Community Med Public Health 2020;7:4570-7.
21. Wakode N, Wakode S, Santoshi J. Perceived stress and generalized anxiety in the Indian population due to lockdown during the COVID-19 pandemic: A cross-sectional study. F1000Res 2020;9:1233.
22. Nathiya D, Singh P, Suman S, Raj P, Tomar BS. Mental health problems and impact on youth minds during the COVID-19 outbreak: Cross-sectional (RED-COVID) survey. Soc Health Behav 2020;3:83-8.
23. Hazarika M, Das S, Bhandari SS, Sharma P. The psychological impact of the COVID-19 pandemic and associated risk factors during the initial stage among the general population in India. Open J Psychiatry Allied Sci 2021;12:31-5.
24. Gaur K, Kunal K, Avinash S, Hariom P. A study of depression, anxiety and insomnia during COVID-19 lockdown. (Special Issue: COVID-19 and demographic impact). Demogr India 2020;49:140-52.
25. Chauhan VJ, Chatterjee K, Chauhan KS, Prakash J, Srivastava K. Impact on anxiety of COVID-19 and lockdown. J Mar Med Soc 2020;22:78-82.
26. Balhara YP, Kattula D, Singh S, Chukkali S, Bhargava R. Impact of lockdown following COVID-19 on the gaming behavior of college students. Indian J Public Health 2020;64:S172-6.
27. Sebastian J, Anand A, Rajesh RV, Lucca JM, Joseph R. Impact of COVID-19 pandemic on psychological responses of the general population in India: A nationwide survey. Int J Pharm Res 2020;12:2349-57.
28. Grover S, Sahoo S, Mehra A, Avasthi A, Tripathi A, Subramanyan A, *et al*. Psychological impact of COVID-19 lockdown: An online survey from India. Indian J Psychiatry 2020;62:354-62.
29. Tomar BS, Raj P, Suman S, Singh P, Nathiya D. Mental health and quality of life during COVID-19 pandemic in Indian population. Int J Pharm Pharm Sci 2020;12:74-9.
30. Wani FA, Jan R, Ahmad M. Impact of COVID-19 pandemic on mental health of general population in Kashmir Valley, India. Int J Res Med Sci 2020;8:4011-6.
31. Reddy VV, Karri SR, Jezreel T, Afeen S, Khairkar P. Psychosocial impact of COVID-19 lockdown on mental wellbeing among 11 states of India: A markov modeling approach. J Psychiatry

Psychiatr Disord 2020;4:158-74.
32. Desai MZ, Khan AR, Kulkarni R, Hegde B. The psychological impact of COVID-19 and the subsequent social isolation on the general population of Karnataka, India. J Ideas Health 2020;3:190-5.
33. Xiong J, Lipsitz O, Nasri F, Lui LM, Gill H, Phan L, *et al.* Impact of COVID-19 pandemic on mental health in the general population: A systematic review. J Affect Disord 2020;277:55-64.
34. Salari N, Hosseinian-Far A, Jalali R, Vaisi-Raygani A, Rasoulpoor S, Mohammadi M, *et al.* Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: A systematic review and meta-analysis. Global Health 2020;16:57.
35. Necho M, Tsehay M, Birkie M, Biset G, Tadesse E. Prevalence of anxiety, depression, and psychological distress among the general population during the COVID-19 pandemic: A systematic review and meta-analysis. Int J Soc Psychiatry 2021;67:892-906.
36. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: A web-based cross-sectional survey. Psychiatry Res 2020;288:112954.
37. Kar SK, Ransing R, Arafat SM, Menon V. Second wave of COVID-19 pandemic in India: Barriers to effective governmental response. EClinicalMedicine 2021;36:100915.
38. National Mental Health Survey of India, 2015-2016 Prevalence, Patterns and Outcomes, Supported by Ministry of Health and Family Welfare, Government of India, and. Bengaluru: Implemented by National institute of Mental Health and Neurosciences (NIMHANS). In Collaboration with Partner Institutions; 2015-2016. Available from: https://www.ruralindiaonline.org/en/library/resource/national-mental-health-survey-of-india-2015-16-summary [Last accessed on 2022 Apr 30].
39. Das S. Mental health and psychosocial aspects of COVID-19 in India: The challenges and responses. J Health Manag 2020;22:197-205.
40. Anand V, Verma L, Aggarwal A, Nanjundappa P, Rai H. COVID-19 and psychological distress: Lessons for India. PLoS One 2021;16:e0255683.

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SUPPLEMENTARY FILES

Supplementary Material 1

1. Example of search terms used in PubMed

Search concept	MeSH terms and keywords
Prevalence	"Prevalence" [MeSH] OR "Epidemiology" [MeSH]
Anxiety	"Anxiety"[MeSH] OR "Anxiety Disorder" [MeSH] OR "Anxiety Disorders"[Text Word] "Social Anxieties" [Text Word] OR "Nervousness" [Text Word] OR Anxiousness [Text Word]
Depression	"Depression" [MeSH] OR "Depressive disorder"[MeSH] OR depression[Text Word] OR Depressive Symptoms [Text Word] Emotional Depression [Text Word]
COVID-19	"COVID-19" [MeSH] OR "SARS Coronavirus 2" [MeSH] OR "COVID-19" [Text Word] OR "SARS-CoV-2 Infection" [Text Word] OR "2019 Novel Coronavirus Disease" [Text Word] OR "COVID-19 Virus Infection" [Text Word] OR Severe Acute Respiratory Syndrome Coronavirus 2 Infection [Text Word] OR COVID-19 Pandemic OR Wuhan Coronavirus [Text Word] OR 2019-nCoV OR SARS Coronavirus 2 [Text Word]
India	"India"[MeSH] OR "India" [Text Word] OR "South-east Asia" [Text Word] OR "low- and middle-income countries" [Text Word]

2. Wiley online library (Search hits=784)

Topic: humans AND (depression OR anxiety) AND (COVID-19 OR pandemic) AND (India)

3. Science direct (Search hits=568)

Topic: humans AND (depression OR anxiety) AND (COVID-19 OR pandemic) AND (India)

Refined by: Journal Article, from January 1, 2020 to October 30, 2021

4. Google Scholar (first 30 pages: search hits=300)

Topic: humans AND (depression OR anxiety) AND (COVID-19 OR pandemic) AND (India)

Refined by: Journal Article, from 2020 to 2021

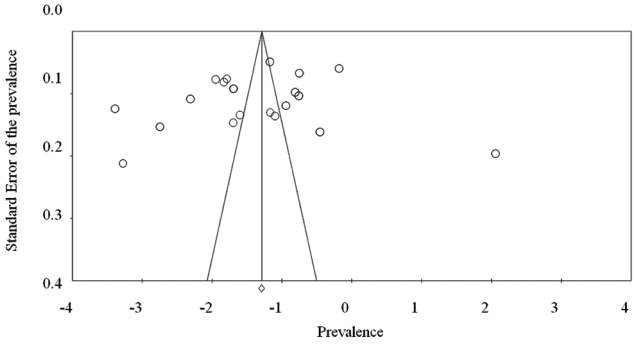
Relevant journals and search

Asian journal of psychiatry (12), Indian Journal of psychiatry (94), Indian Journal of social psychiatry (87), Indian Journal of psychological medicine (105), Annals of Indian psychiatry (15), Journal of mental health and human behavior (21), Journal of Family Medicine and Primary Care (289),International Journal of community medicine and public health (37), Indian Journal of psychiatric nursing (12), Kerala journal of psychiatry (1), Indian journal of community medicine (29), Indian journal of public health (64).

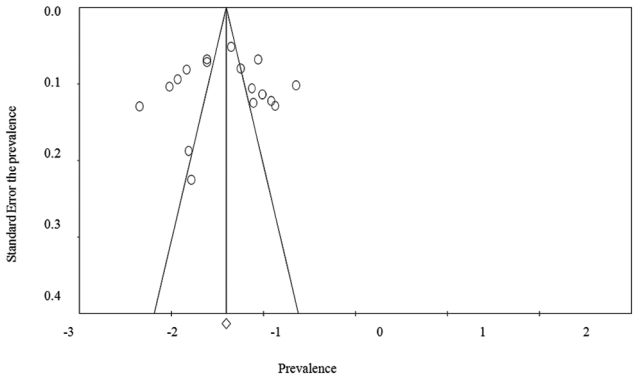
Search terms used: COVID-19, India, anxiety, depression

5. APA psych Info (search hits=359)

Topic: Any Field: COVID-19 *AND* Any Field: India *AND* Publication Type: Peer Reviewed Journal



Supplementary Material-2 Funnel Plot. Outcome: Prevalence of anxiety symptoms during COVID-19 pandemic among general population of India.



Supplementary Material-3 Funnel Plot. Outcome: Prevalence of depressive symptoms during COVID-19 pandemic among general population of India.