Impact of Covid-19 on Mental Health among Healthcare Workers in India: A Mixed-Methods Systematic Review

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Received: 4 January 2023

Accepted: 16 May 2023

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DOI 10.5001/omj.2023.111

Abstract

Healthcare workers (HCWs) experienced significant mental health challenges during the COVID-19 pandemic. This review aimed comprehensively assess the impact of the COVID-19 pandemic on the mental health of HCWs in India. A mixed-methods review adopted a results-based convergent approach incorporating quantitative and qualitative data. A comprehensive literature search was conducted in relevant databases: PubMed-MEDLINE, CINAHL, Web of Science, and ProQuest. All available full-text studies in the English language that assessed the mental health outcomes (anxiety, stress, depression) of HCWs during the pandemic and published till February 28, 2022, were included. A total of 31 studies were included in this review (27 quantitative studies, three qualitative studies, and one mixed-method study). The pooled prevalence of depression, anxiety, and stress was 32.96%, 29.49%, and 33.47 %, respectively among the HCWs in India. The qualitative analysis resulted in the themes: challenges faced, and coping strategies used during the COVID-19 pandemic. Integration of quantitative and qualitative findings using social determinants of health framework resulted in various contributing factors and coping strategies. There is a need for a supportive work environment, mental health support, and mental health policies for HCWs in India.

Keywords: Anxiety, Stress, Depression, COVID-19 Pandemic, Healthcare Workers, Mental Health, India.

Introduction

The World Health Organization, on January 30, 2020, reported the discovery of the novel coronavirus and designated it a Public Health Emergency of International Concern under the International Health Regulation[1]. The emergence of the COVID-19 pandemic resulted in a high percentage of viral infection-related deaths as well as psychological and emotional consequences[2]. Healthcare Workers (HCWs) had to respond to this pandemic by becoming actively involved in the diagnosis and treatment of COVID-19 patients, risking exposure to the novel virus and thereby bearing the brunt of physical, psychological, and behavioural health issues[3].

It has become evident that extreme pressure while working affects the physical, emotional, and mental health of the HCWs[4]. Furthermore, it has been reported that most HCWs underwent depression, insomnia, stigma, and frustration during the pandemic. Southeast Asia had lower rates of anxiety, depression, and sleeplessness than other regions which was evident from comparing two meta-analyses. The discrepancy is compounded when contrasted to South European nations like Spain, France, Italy, and Greece. Southeast Asia's lower prevalence rates may be attributed to the region's recent experience with epidemics and the use of early interventions akin to those in China and East Asia to improve healthcare workers' mental health[5].

According to the Oxford COVID-19 Government response tracker, India is the most impacted country in terms of confirmed COVID-19 cases, after only the United States, Brazil, Russia, Spain, and the United Kingdom [6]. In the Indian population, stress, anxiety, and depression were reported to be present among 28.9%, 35.6%, and 17.0% respectively during the COVID-19 lockdown[7]. The mental health issues experienced by HCWs impacted competency and motivation and increased the risk of emotional exhaustion, hindering the healthcare response to COVID-19[8]. A cross-sectional study from India identified the prevalence of anxiety (23.9%) and depression (20%) among HCWs [9]. But to date, there is no robust evidence on the magnitude of stress, anxiety, and depression among HCWs in India and its context as a mental health problem in the healthcare system of India. Therefore, the purpose of this mixed-methods review was to measure the impact of COVID-19 on the mental health of the HCWs in India and to identify the contributing factors to contextualize evidence to inform policies to meet the mental health needs HCWs in the future.

Methods

This review adopted a results-based convergent approach incorporating quantitative and qualitative data[10,11] We started with quantitative survey data to determine the prevalence of mental health problems faced by HCWs in India during the COVID-19 pandemic and integrated quantitative (meta-analysis) and qualitative data (themes) to identify the contributing factors and coping strategies across six domains: individuals, family, peers, community, health services, and the wider society.

This systematic review protocol was registered in PROSPERO (CRD42021236500) (https://www.crd.york.ac.uk/PROSPERO). We adhered to PRISMA (Preferred Reporting Items for Systematic Meta-analysis) framework to report this systematic review.

Search strategy

The search was limited to papers published in the English language until February 28, 2022. An electronic search of four databases: PubMed-MEDLINE, CINAHL, Web of Science, and ProQuest was conducted to identify peer-reviewed articles focusing on the impact of COVID-19 on the mental health of HCWs in India. The search process is reported using the PRISMA diagram (Figure 1). Initially, each database was searched and the title and abstract were screened independently by two reviewers (EGM & ADS) based on the inclusion and exclusion criteria (Table 1). Thereafter, the full text of each article was thoroughly reviewed by two reviewers independently. Reference lists of relevant studies were examined to identify the additional studies. Discrepancies between the two reviewers were resolved through discussion with a third reviewer (BSN).

Data Extraction

Those studies (quantitative) that met the inclusion criteria were exported from each database into an excel sheet. Two reviewers (EGM & ADS) independently performed the data extraction using the piloted data extraction form. The data extraction form included data related to authors & year of publication, study design, sample size, outcomes, and study findings.

The included qualitative studies were reviewed independently by the same two reviewers and line-by-line coding of the findings was done to identify themes. Common themes were derived after summarising the findings and supporting quotes were drawn from the qualitative studies. Any disagreement between the two reviewers was resolved in consultation with a third reviewer (BSN).

Critical appraisal

The methodological quality of the included quantitative and qualitative studies was assessed using the Joanna Briggs Institute (JBI) quality assessment instruments[51,52] and Mixed method study by Mixed meithods appraisal tools Version 2018[53], which were appropriate and relevant to the study designs. The first and second reviewers independently assessed the quality of the included studies (EGM & ADS). Any discrepancies between the two authors were resolved in a discussion with a third reviewer (BSN) The quality assessment is presented in tables (table 2,3 &4)

Data synthesis

The data synthesis was conducted in three stages based on the framework described by [12]. Firstly, a meta-analysis was undertaken to determine the pooled prevalence of anxiety, stress, and depression among the HCWs during the pandemic from quantitative studies using the STATA software version 13.1 by the statistician (RS). We assessed the heterogeneity between estimates using I^2 statistic which describes the percentage of variation. I^2 value above 75% is considered high heterogeneity. As we had anticipated a significant heterogeneity, the random effects model was used for meta-analysis. For each outcome, a forest plot was generated and the results were presented in terms of pooled prevalence with a 95% confidence interval.

Then, a thematic synthesis of the findings from the qualitative studies was undertaken. Lastly, a conceptual matrix was used to integrate the findings of quantitative and qualitative synthesis. This integration clearly explained the factors related to individuals, family, peers, community (living and working conditions), health services, and wider society that impacted the mental health of HCWs during the COVID-19 pandemic.

Results

Selection of the studies

As illustrated in Figure 1, a total of 334 studies were retrieved from four databases. Out of 334 studies retrieved, 09 duplicates were removed. From the remaining 325 studies, 270 studies were excluded by title screening. The remaining 55 studies were checked against the eligibility criteria and 24 articles were excluded (four editorials and commentaries, four studies unrelated to COVID-19, two studies did not involve HCWs, five studies were conducted outside of India, and nine studies included outcomes beyond the scope of this review). Finally, 31 studies met the inclusion criteria and were included in this review (27 quantitative studies, three qualitative studies, and one mixed-methods study). However, for meta-analysis number of studies included were 28 (27 quantitative and one mixed-methods study) and for qualitative synthesis, data from three qualitative studies and one mixed-methods study was incorporated.

Characteristics of the included studies

The total number of samples included in the review was 10,043 HCWs. The participants were in the age group of 18-78 years and were employed in governmental as well as non-government organizations from various parts of India. The participants were HCWs like nurses, doctors including residents, paramedical, and support staff. A summary of the included studies is presented in Table 5.

Assessment of Publication Bias

The publication bias among the included quantitative studies were assessed using Egger's test which indicated no evidence of publication bias ($p > 0.05$) (table 6)

Findings from the quantitative studies

Depression

Sixteen studies reported the prevalence of depression [13, 14, 15, 1, 1, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28] Other characteristics of the study findings are presented in Table 2. The calculated pooled prevalence by the random effect model was found to be 32.96% [95% CI, 23.74- 42.90, I^2=98.47%, (p= 0.00)] (Figure 2).

Anxiety

Twenty-two studies (twenty-one quantitative studies and one mixed method study) reported on the prevalence of anxiety among HCWs [13,14,15,16,17,23,24,8,18,29,30,19,25,27,26,31,32,20,21,22,33,34]. Other characteristics of the study findings are presented in Table 2. The pooled prevalence of anxiety (Figure 3) was calculated using the random-effect model, and it was found to be 29.49% [95% CI, 21.52-38.13, I^2=98.39%, (p= 0.00) (Figure 3).

Stress

Stress was reported in sixteen studies (Fifteen quantitative studies and one mixed method study [13, 14, 17, 18, 29, 30, 19, 34, 32, 21,35, 36, 27, 25, 37, 26]. Other characteristics of the study findings are presented in Table 2. The pooled prevalence of stress was 33.47% [95% CI, 18.45-50.43, I^2=99.36% (p= 0.00)], as depicted in Figure 4.

Findings from the qualitative review:

Qualitative data were extracted from four studies (n=344). The data from three qualitative studies and one mixed-methods study [39, 40, 41, 29] were synthesized (Table 3).

The three included qualitative studies used different approaches to data analysis. Banerjee et al. (2021) used 'Charmaz's grounded theory approach', [40] followed 'Colaizzi's protocol', and Chakma et al. (2021) did not use any preconceived theoretical framework but performed descriptive content data analyses [41]. George et al. (2020) used the framework approach for data analysis [29]. Thematic synthesis resulted in the following themes:

Challenges

i) Fear of contracting the disease and spreading it to family.

A common theme in all four studies was fear of contracting the virus and spreading it to family members. The healthcare workers were in daily contact with infected patients and high infectivity of the novel virus feared them of contracting the virus from them. Furthermore, there were afraid of spreading the virus to their families, particularly children, elderly parents especially those with chronic health conditions. Participants indicated that severe infection and death were topics of conversation in every family.

ii) Extreme stress, anxiety, and frustration

All four studies also provided data on the level of stress experienced by healthcare workers. George et al. (2020) [29] reported HCWs and Chakma et al. (2021) [41] did not only expressed being stressed due to their 'high susceptibility' to contracting the virus but also the increased workload due to the high volume of patients, resulting in exhaustion and frustration.

One study reported that in addition to giving care, HCWs had an additional emotional burden of providing psychological and emotional counseling and assurance to patients, families as well as colleagues.

iii) Work fatigue and disruption of everyday life

HCWs were expected to work for extended periods, to meet demand and cover for staff illnesses. This resulted in significant fatigue and physical tension that affected their mental health and decision-making skills. The

management's capability to combat the unprecedented pandemic situation was beyond the scope of their previous training and experience which caused overworking and surplus duty hours, leading to burnout.

HCWs struggled to balance their work commitments and family life. The most common factor causing disruption was their separation from their families for an extended period.

iii) Social stigma

The qualitative study findings revealed that most HCWs attending to COVID-19 patients faced social discrimination and rejection. Neighbors, friends, and family made them feel like COVID-19 spreaders often fuelled by the mass media coverage. Often unpleasant remarks were thrown at them, and members of society were hesitant to engage with them and often avoided them.

iv) Personal Protective Equipment (PPE) concerns

Health workers expressed that wearing PPE kits for a prolonged time made them feel physically exhausted because it was hot, and they were not able to eat or drink or use the washroom easily with the PPE on. Another issue was the quality of the PPEs which was a cause of concern for the HCWs and hampered their confidence in providing care.

Coping strategies

i) Family and peer support

HCWs expressed that the only way they could cope with the problems they experienced was due to the support they received from their immediate family and friends especially co-workers were an immense source of support, and sharing their trying times was encouraging for them. Having another family member on COVID-19 duty was a powerful motivator to get through these challenging times. Several of them valued the appreciation they received from higher authorities and social media.

ii) Self-care and lifestyle modifications

HCWs adopted individual strategies such as wellness activities and specific relaxation techniques like yoga, meditation, music, walks, and exercises to improve physical and mental health balance[40].

iii) Higher purpose through God/religion

Some HCWs believed that their capacity to cope was attributed to their faith in God. Saying prayers and spiritual dependency played a role for some HCWs[41].

iv) Value of duty and passion

Many HCWs expressed that they felt a sense of duty and calling by serving patients even at the expense of risking their lives. They felt the value and strength of being health professionals (42); (41).

Synthesis of quantitative and qualitative findings

The quantitative and qualitative findings were integrated using the social determinants of health framework[43].

Individual domain: Fear of contracting COVID-19 and spreading it to their family members, and physical and emotional exhaustion contributed to the considerable stress and anxiety experienced by the HCWs. Individually HCWs coped with self-initiated well-being activities, moral and social obligations, and their own spiritual beliefs.

Interpersonal domain (family and peers): Having vulnerable, old, and young family members was a significant cause of concern for HCWs. Some HCWs stayed away from their family as a protective measure, but this separation affected their mental health. Isolation and discrimination from family members and peers were added

sources of stress. HCWs with childcare responsibilities were significantly affected as they found balancing home life and work-life difficult. However, the support and encouragement from family and friends were a tremendous source of coping as expressed by the HCWs.

Health services domain: Increased workload and prolonged working hours were the most common source of stress among HCWs. The lack of mental health providers to support the public and the support staff in the healthcare setting was emotionally overburdening to HCWs. Assuming new responsibilities with little preparedness, and unsafe environments with unpredictable consequences added anxiety and stress. PPE-related issues such as shortage, discomfort, and poor quality were additional stress factors.

Community and wider society: HCWs felt rejected and stigmatized by society, often facing discriminatory behaviours and hatred. Sometimes, they were evicted from the rented properties, which made HCWs depressed. The support received from co-workers was valued by the HCWs.

Discussion

India is one of the world's hardest-hit nations by the COVID-19 pandemic. India's dense population placed a massive burden on mortality and morbidity. The remarkable effect of COVID-19 had a grave psychological impact on the HCWs. Therefore, this mixed-methods review was undertaken to determine the impact of COVID-19 on healthcare workers' mental health status in India and its attributing factors.

As compared to the global prevalence by Ghahramani et al. (2022)[44], this review findings showed a lower prevalence of depression (32.96% vs 36%) and, anxiety (29.49% vs 47%) except for stress which had a higher prevalence in India (33.47% vs 27%). According to our findings, the prevalence of depression (32.96%) and anxiety (29.49%) among HCWs is much higher in India than in the Asian subcontinent (China, South Korea, Saudi Arabia, Israel, Jordan, Palestine, Turkey, India, and Pakistan) and the Southeast-Asia region (Bangladesh, Pakistan, India, and Nepal) wherein the pooled prevalence was 27.2% (10,617/39,014), and 25.9% (6305/24,297) and 34.1% and 41.3% respectively[45].

Another qualitative systematic review [46] on experiences and views of frontline HCWs during the COVID-19 pandemic reported similar themes identified in our review. The themes of fear of contagion, PPE issues, heavy workload, social stigma, and the complex dynamic between the HCWs, family members, colleagues, media, and society were overarching and are proof that the effect of COVID-19 on the HCWs largely transcends temporal and geographical boundaries.

In India, PPE was a great concern for healthcare workers during the pandemic as reported by studies included in this review. Similarly, in Oman, they faced an excessive need for face masks and gowns which was tackled by the endowment fund dedicated to public healthcare services[47]. Only one study included in the review compared the anxiety score between male and female HCWs which reported female HCWs had higher anxiety. This finding was similar to a study conducted among female healthcare workers during the pandemic in Oman wherein 27.9% had moderate to severe anxiety[48]. Another important stressor among the HCWs was the heavy workload which was causing fatigue and affecting their mental health due to the high number of cases admitted to the hospitals. An effective intervention to overcome such a challenge would be a healthcare system change. One of the exemplary models adopted in response to the pandemic in India was the Udupi-Manipal model which was a public-private partnership. One of the private hospitals was designated as a COVID hospital to treat the overwhelming number of COVID-19 cases in the district[49]. Similarly, the primary health care in Oman partnered with private establishments, in tracking, testing, managing the cases, and data management as well[50]. However, studies on the role of the healthcare system in supporting the mental health of HCWs during the pandemic are lacking.

Recommendations for policy and practice:

As HCWs continue to be the front-line workers in the face of the pandemic, they continue to be at significant risk of developing long-term psychological impacts. Implementing appropriate interventions to help HCWs cope with various mental health problems is the need of the hour. However, there were no studies on healthcare policies and interventional measures to meet the mental health needs of the HCWs during the pandemic. Due to the observed deficiency from this review, we recommend that there must be interventions and protocols at the institutional level, and policies at the governmental level to support HCWs' mental health. Furthermore, adequate training in

management and counselling services to equip the HCWs in providing care confidently can play a role in mitigating the psychological impact of the COVID-19 pandemic. The role of media should be above and beyond to spread community awareness to remove the stigma associated with COVID-19.

Strengths and limitations

In our mixed method analysis, integrating the quantitative and qualitative data using the social determinants of health framework provided a comprehensive insight into the factors related to individuals, family, peers, community, health services, and wider society that influences the mental health of HCWs during the pandemics. There is no evidence of publication bias in the included studies in all the three outcomes assessed.

Due to the heterogeneity in the data from the included studies, we were unable to perform a sub-group analysis. Another limitation of this review was that outcomes like insomnia, fear, quality of life, psychological impact, and PTSD (Post-Traumatic Stress Disorder) were not measured because we found that the most reported mental health outcome among the HCWs in India was anxiety, stress, and depression.

Conclusion

This review found a significant prevalence of depression, anxiety, and stress among HCWs in India. Integrating quantitative and qualitative data explained the psychological impact of the COVID-19 pandemic on the mental health of HCWs. The review recommends multi-prong and multi-level approaches as a way forward to protect the health care workers and preserve their service.

Disclosure Statement

The authors of this review reported no potential conflict of interest.

Acknowledgment:

We acknowledge the funding agency Scheme for Promotion of Academic and Research Collaboration (SPARC), Department of Education, Govt. of India for supporting to collaborate with experts from UCL and the UCL-AIIMS collaboration grant.

References

1. Cucinotta D, Vanelli M. WHO Declares COVID-19 a Pandemic. Acta Biomed. 2020 Mar 19;91(1):157–60.

2. Aly HM, Nemr NA, Kishk RM, Elsaid NMA bakr. Stress, anxiety, and depression among healthcare workers facing COVID-19 pandemic in Egypt: a cross-sectional online-based study. BMJ Open. 2021 Apr;11(4):e045281.

3. Spilchuk V, Arrandale VH, Armstrong J. Potential risk factors associated with COVID-19 in health care workers. Occup Med (Lond). 2022 Jan 13;72(1):35–42.

4. Badahdah A, Khamis F, Al Mahyijari N, Al Balushi M, Al Hatmi H, Al Salmi I, et al. The mental health of health care workers in Oman during the COVID-19 pandemic. Int J Soc Psychiatry. 2021 Feb;67(1):90–5.

5. Hossain MM, Rahman M, Trisha NF, Tasnim S, Nuzhath T, Hasan NT, et al. Prevalence of anxiety and depression in South Asia during COVID-19: A systematic review and meta-analysis. Heliyon. 2021 Apr;7(4): e06677.

6. Pal R, Yadav U. COVID-19 Pandemic in India: Present Scenario and a Steep Climb Ahead. J Prim Care Community Health. 2020; 11:2150132720939402.

7. Rehman U, Shahnawaz MG, Khan NH, Kharshiing KD, Khursheed M, Gupta K, et al. Depression, Anxiety and Stress Among Indians in Times of Covid-19 Lockdown. Community Ment Health J. 2021 Jan;57(1):42–8.

8. Singh J, Sood M, Chadda RK, Singh V, Kattula D. Mental health issues and coping among health care workers during COVID19 pandemic: Indian perspective. Asian J Psychiatr. 2021 Jul 1; 61:102685.

9. Parthasarathy R, Ts J, K T, Murthy P. Mental health issues among health care workers during the COVID-19 pandemic - A study from India. Asian J Psychiatr. 2021 Apr; 58:102626.

10. Campbell R, Gregory KA, Patterson D, Bybee D. Integrating qualitative and quantitative approaches: An example of mixed methods research. In: Methodological approaches to community-based research. Washington, DC, US: American Psychological Association; 2012. p. 51–68.

11. Hong QN, Pluye P, Bujold M, Wassef M. Convergent and sequential synthesis designs: implications for conducting and reporting systematic reviews of qualitative and quantitative evidence. Syst Rev. 2017 Mar 23;6(1):61.

12. Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Med Res Methodol. 2008 Jul 10;8:45.

13. Chatterjee SS, Bhattacharyya R, Bhattacharyya S, Gupta S, Das S, Banerjee BB. Attitude, practice, behavior, and mental health impact of COVID-19 on doctors. Indian J Psychiatry. 2020;62(3):257–65.

14. Wilson W, Raj JP, Rao SR, Ghiya M, Nedungalaparambil NM, Mundra H, et al. Prevalence and Predictors of Stress, anxiety, and Depression among Healthcare Workers Managing COVID-19 Pandemic in India: A Nationwide Observational Study. Indian Journal of Psychological Medicine. 2020 Jul 6;42(4):353–8.

15. Dordi MMD, Jethmalani MK, Surendran MKK, Contractor DA. The effect of the COVID-19 pandemic on the mental health of Indian health care workers. Int j Indian psychol [Internet]. 2020 Aug 23 [cited 2022 Dec 8];8(3). Available from: https://ijip.in/articles/the-effect-of-the-covid-19-pandemic-on-the-mental-health-of-indian-health-care-workers/

16. Suryavanshi N, Kadam A, Dhumal G, Nimkar S, Mave V, Gupta A, et al. Mental health and quality of life among healthcare professionals during the COVID-19 pandemic in India. Brain and behavior. 2020 Nov;10(11):e01837.

17. Chew NWS, Lee GKH, Tan BYQ, Jing M, Goh Y, Ngiam NJH, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. Brain Behav Immun. 2020 Aug; 88:559–65.

18. Patel A, Kandre DD, Mehta P, Prajapati A, Patel B, Prajapati S. Multi-centric study of psychological disturbances among health care workers in tertiary care centers of western India during the COVID-19 pandemic. Neuropsychiatria i Neuropsychologia/Neuropsychiatry and Neuropsychology. 2020;15(3):89–100.

19. Chauhan VS, Chatterjee K, Yadav AK, Srivastava K, Prakash J, Yadav P, et al. Mental health impact of COVID-19 among health-care workers: An exposure-based cross-sectional study. Industrial Psychiatry Journal. 2021 Oct 1;30(3):63.

20. Khan H, Srivastava R, Tripathi N, Uraiya D, Singh A, Verma R. Level of anxiety and depression among health-care professionals amidst of coronavirus disease: A web-based survey from India. Journal of Education and Health Promotion. 2021 Jan 1;10(1):408.

21. Jakhar J, Biswas PS, Kapoor M, Panghal A, Meena A, Fani H, et al. Comparative study of the mental health impact of the COVID-19 pandemic on health care professionals in India. Future Microbiol. 2021;1267–76.

22. Raj R, Koyalada S, Kumar A, Kumari S, Pani P, Nishant, et al. Psychological impact of the COVID-19 pandemic on healthcare workers in India: An observational study. Journal of Family Medicine and Primary Care. 2020 Dec 31;9(12):5921–6.

23. Sharma SK, Mudgal SK, Thakur K, Parihar A, Chundawat DS, Joshi J. Anxiety, depression and quality of life (QOL) related to COVID-19 among frontline health care professionals: A multicentric cross-sectional survey. J Family Med Prim Care. 2021 Mar;10(3):1383–9.

24. Gupta AK, Mehra A, Niraula A, Kafle K, Deo SP, Singh B, et al. Prevalence of anxiety and depression among the healthcare workers in Nepal during the COVID-19 pandemic. Asian J Psychiatr. 2020 Dec;54:102260.

25. Sukumaran AB, Manju L, Jose R, Narendran M, Padmini C, NazeemaBeevi P, et al. Mental health problems among health-care workers during the COVID-19 pandemic. Indian Journal of Community and Family Medicine. 2021 Jan 1;7(1):31.

26. Yadav R, Yadav P, Kumar SS, Kumar R. Assessment of Depression, Anxiety, and Sleep Disturbance in COVID-19 Patients at Tertiary Care Center of North India. J Neurosci Rural Pract. 2021 Apr;12(2):316–22.

27. Sharma R, Saxena A, Magoon R, Jain MK. A cross-sectional analysis of prevalence and factors related to depression, anxiety, and stress in health care workers amidst the COVID-19 pandemic. Indian J Anaesth. 2020 Sep;64(Suppl 4):S242–4.

28. Saurabh K, Ranjan S. Preparedness, perceived impact and concerns of health care workers in a teaching hospital during coronavirus disease 2019 (COVID-19). J Family Med Prim Care. 2020 Aug;9(8):4247–51.

29. George CE, Inbaraj LR, Rajukutty S, de Witte LP. Challenges, experience and coping of health professionals in delivering healthcare in an urban slum in India during the first 40 days of COVID-19 crisis: a mixed method study. BMJ Open. 2020 Nov;10(11):e042171.

30. Rathore P, Kumar S, Choudhary N, Sarma R, Singh N, Haokip N, et al. Concerns of Health-care Professionals Managing COVID Patients under Institutional Isolation during COVID-19 Pandemic in India: A Descriptive Cross-sectional Study. Indian J Palliat Care. 2020 Jun;26(Suppl 1):S90–4.

31. Dharra S, Kumar R. Promoting Mental Health of Nurses During the Coronavirus Pandemic: Will the Rapid Deployment of Nurses' Training Programs During COVID-19 Improve Self-Efficacy and Reduce Anxiety? Cureus. 2021 May 24;13(5):e15213.

32. Garg S, Yadav M, Chauhan A, Verma D, Bansal K. Prevalence of psychological morbidities and their influential variables among nurses in a designated COVID-19 tertiary care hospital in India: A cross-sectional study. Ind Psychiatry J. 2020;29(2):237–44.

33. Sharma V, Kumar N, Gupta B, Mahajan A. Impact of COVID-19 pandemic on orthopaedic surgeons in terms of anxiety, sleep outcomes and change in management practices: A cross-sectional study from India. J Orthop Surg (Hong Kong). 2021;29(1):23094990211001620.

34. Gupta B, Sharma V, Kumar N, Mahajan A. Anxiety and Sleep Disturbances Among Health Care Workers During the COVID-19 Pandemic in India: Cross-Sectional Online Survey. JMIR Public Health Surveill. 2020 Dec 22;6(4):e24206.

35. Das K, Ryali VSSR, Bhavyasree R, Sekhar CM. Postexposure psychological sequelae in frontline health workers to COVID-19 in Andhra Pradesh, India. Ind Psychiatry J. 2021;30(1):123–30.

36. Mishra S, Singh S, Tiwari V, Vanza B, Khare N, Bharadwaj P. Assessment of level of perceived stress and sources of stress among dental professionals before and during the COVID -19 outbreak. Journal of International Society of Preventive and Community Dentistry. 2020 Nov 1;10(6):794.

37. Chatterjee SS, Chakrabarty M, Banerjee D, Grover S, Chatterjee SS, Dan U. Stress, Sleep and Psychological Impact in Healthcare Workers During the Early Phase of COVID-19 in India: A Factor Analysis. Frontiers in Psychology. 2021;12.

38. Uvais NA, Aziz F, Hafeeq B. COVID-19-related stigma and perceived stress among dialysis staff. J Nephrol. 2020 Dec;33(6):1121–2.

39. Banerjee D, Tss R, Kallivayalil R, Javed A. Psychosocial Framework of Resilience: Navigating Needs and Adversities During the Pandemic, A Qualitative Exploration in the Indian Frontline Physicians. Frontiers in Psychology. 2021 Mar 16;12.

40. Golechha M, Bohra T, Patel M, Khetrapal S. Healthcare worker resilience during the COVID-19 pandemic: A qualitative study of primary care providers in India. World Med Health Policy. 2022 Mar;14(1):6–18.

41. Chakma T, Thomas BE, Kohli S, Moral R, Menon GR, Periyasamy M, et al. Psychosocial impact of COVID-19 pandemic on healthcare workers in India & their perceptions on the way forward - A qualitative study. Indian J Med Res. 2021;637–48.

42. Banerjee D, Tss R, Kallivayalil R, Javed A. Psychosocial Framework of Resilience: Navigating Needs and Adversities During the Pandemic, A Qualitative Exploration in the Indian Frontline Physicians. Frontiers in Psychology. 2021 Mar 16;12.

43. The Dahlgren-Whitehead rainbow (1991) [Internet]. Patient Safety Learning - the hub. [cited 2022 Dec 8]. Available from: https://www.pslhub.org/learn/improving-patient-safety/health-inequalities/the-dahlgren-whitehead-rainbow-1991-r5870/

44. Ghahramani S, Kasraei H, Hayati R, Tabrizi R, Marzaleh MA. Health care workers' mental health in the face of COVID-19: a systematic review and meta-analysis. Int J Psychiatry Clin Pract. 2022 Jul 23;1–10.

45. Thatrimontrichai A, Weber DJ, Apisarnthanarak A. Mental health among healthcare personnel during COVID-19 in Asia: A systematic review. J Formos Med Assoc. 2021 Jun;120(6):1296–304.

46. Billings J, Ching BCF, Gkofa V, Greene T, Bloomfield M. Experiences of frontline healthcare workers and their views about support during COVID-19 and previous pandemics: a systematic review and qualitative meta-synthesis. BMC Health Serv Res. 2021 Sep 6;21(1):923.

47. Fannah AI J, Harthy Al H, Salmi Al Q. COVID-19 Pandemic: Learning Lessons and a Vision for a Better Health System. Oman Med J. 2020 May 17; 35(5): e169.

48. Khamis F, Nawal Al M, Lawati Al F, Badahdah M Abdulla. The Mental Health of Female Physicians and Nurses in Oman during the COVID-19 Pandemic. Oman Med J. 2020 Jul 27; 35(6): e203.

49. Umakanth S (2020) [Internet]. Udupi-Manipal Model: Public-Private Partnership during a Public Health Emergency. [cited 2023 Mar 15]. Available from: https://www.pgurus.com/udupi-manipal-model-public-private-partnership-during-a-public-health-emergency/.

50. Ghafri Al T, Ajmi Al F, Balushi Al L, Kurup M P, Ghamari Al A, Balushi Al Z, et al. Responses to the Pandemic COVID-19 in Primary Health Care in Oman: Muscat Experience. Oman Med J. 2020 Jul 6; 36(1): e216.

51. Lockwood C, Munn Z, Porritt K. Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. Int J Evid Based Healthc. 2015;13(3):179–187.

52. Moola S, Munn Z, Tufanaru C, Aromataris E, Sears K, Sfetcu R, Currie M, Qureshi R, Mattis P, Lisy K, Mu P-F. Chapter 7: Systematic reviews of etiology and risk . In: Aromataris E, Munn Z (Editors). *JBI Manual for Evidence Synthesis*. JBI, 2020. Available from https://synthesismanual.jbi.global.

53. Hong QN, Pluye P, Fàbregues S, Bartlett G, Boardman F, Cargo M, Dagenais P, Gagnon M-P, Griffiths F, Nicolau B, O'Cathain A, Rousseau M-C, Vedel I. Mixed Methods Appraisal Tool (MMAT), version 2018. Registration of Copyright (#1148552), Canadian Intellectual Property Office, Industry Canada.

Table 1: Eligibility Criteria

	Inclusion criteria	**Exclusion criteria**
Population	Doctors, nurses, and paramedical health personnel (technicians, and physiotherapists)	Studies that included children and the general population
Type of Study	Descriptive, cross-sectional, observational studies, qualitative and mixed-method studies.	Intervention studies, systematic reviews, commentaries, literature reviews and letters
Outcome	Anxiety, depression & stress	
Context	Studies that were conducted among HCWs working in hospital settings in India during the COVID-19 pandemic	

Table 2: Critical appraisal of quantitative studies based on JBI checklist for cross-sectional studies.

Authors	**Were the criteria for inclusion in the sample clearly defined?**	**Were the study subjects and the setting described in detail?**	**Was the exposure measured in a valid and reliable way?**	**Were objective, standard criteria used for The measurement of the condition?**	**Were confounding factors identified?**	**Were strategies to deal with confounding factors stated?**	**Were the outcomes measured in a valid and reliable way?**	**Was appropriate statistical analysis used?**	**Overall appraisal**
Chatterjee et al., 2020	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Include
Wilson et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Dordi et al., 2020	Yes	Yes	Yes	Yes	Unclear	unclear	Yes	Yes	Include
Suryavanshi et al., 2020	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Include

Khanam et al., 2020	Yes	Yes	Unclear	Yes	unclear	unclear	Yes	Yes	Include
Chew et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Rathore 2020	Yes	Yes	No	No	unclear	unclear	Yes	Yes	Include
Patel et al., 2020	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Include
Rehman et al., 2020	Unclear	Unclear	yes	yes	Unclear	Unclear	yes	yes	include
Uvais et al., 2020	Yes	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Include
Gupta et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Chauhan et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Das et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Dharra et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Include
Garg et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Khan et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Jakhar et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Mishra et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Raj et al., 2020	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Include

Chatterji et al., 2021	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Include
Sharma et al., 2020	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Include
Gupta et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Singh et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Sukumaran et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Sharma S et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Sharma V et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
Yadav et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include

Table3: Critical appraisal of qualitative studies based on JBI checklist for qualitative studies

Author	**Is there congruity between the stated philosophical perspective and the research methodology?**	**Is there congruity between the research methodology and the research question or objectives**	**Is there congruity between the research methodology and the methods used to collect data?**	**Is there congruity between the research methodology and the representation and analysis of data?**	**Is there congruity between the research methodology and the interpretation of results?**	**Is there a statement locating the researcher culturally or theoretically?**	**Is the influence of the researcher on the research, and vice-versa, addressed?**	**Are participants, and their voices, adequately represented?**	**Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?**	**Do the conclusions drawn in the research report flow from the analysis or interpretation of the data.**	**Overall appraisal**
Chakma et al., 2021	Yes (research methodology was mentioned as qualitative research)	Yes	Yes (telephonic interview)	Yes (thematic analysis)	yes	No	unclear	yes	yes	yes	include
Golecha et al., 2021	Yes (The study followed a qualitative approach applying in-depth one-on-	Yes	Yes (telephonic interview)	Yes (Colaizzi's protocol was followed)	Yes	No	Unclear	Yes	Yes	Yes	Include

	one interviews)										
Banerjee et al., 2021	yes (adopted a qualitative design for the study with a social constructivist paradigm)	yes	Yes (virtual (Google Meet/Zoom/ Skype) one-to-one detailed interviews	Yes (Charmaz's grounded theory approach	Yes	No	Unclear (not specified)	Yes	Yes	Yes	Include

Table 4: Critical appraisal of Mixed methods study based on Mixed Methods Appraisal Tool (MMAT), version 2018

Author	Are there clear research questions?	Do the collected data allow to address the research questions?	Is there an adequate rationale for using a mixed methods design to address the research question?	Are the different components of the study effectively integrated to answer the research question?	Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?
George et al., 2020	Yes	Yes	Yes (This design helped the researchers explore diverse perspectives and uncover complex relationships in this unique social and cultural context)	Yes	Yes	Yes	Yes

Table 5: Characteristics of included studies

S. No.	Author, year & region	Setting/Mode	Study Design	Sample characteristics	Outcome Variable	Instrument used	Results
1	Chatterjee et al., 2020 West Bengal	online survey	Cross-sectional study	152 doctors Male-119 Female-33 mean age: 42.05 (±12.19) years	Depression, Anxiety, and Stress	Depression, Anxiety, and Stress Scale (DASS)-21	34.9% were depressed and 39.5% and 32.9% had anxiety and stress, respectively.
2	Wilson et al., 2020 India Nationwide (10 states and one union territory)	online survey	Cross-sectional survey	350 doctors and nurses Males-187 Females-163 Age range: 18-60 years	Depression Anxiety Stress	Patient Health Questionnaire (PHQ-9) Generalized Anxiety Disorder-7 Cohen's perceived stress scale (PSS)	The prevalence (95% CI) of HCWs with high-level stress was 3.7% (2.2, 6.2), depressive symptoms requiring treatment, and anxiety symptoms requiring further evaluation were 11.4% (8.3, 15.2) and 17.7% (13.9, 22.1), respectively.
3	Dordi et al., 2020 Sir H.N. Reliance Hospital and Research Centre.	Hospital-based survey	Hospital-based survey	280 (100 Patient facing and 100 non-patients facings) participants from the hospital Males-80 Females-200 Age:20-60 years	Depression Anxiety Psychological distress	The Beck Depression Inventory (BDI-II) The Hamilton Anxiety Rating Scale (HAM-A) Kessler Psychological Distress Scale	Depression (17%), Anxiety (7.12%), and Psychological distress (31.67%). There was a higher prevalence of distress among nurses than in doctors. There was a significant difference in the depression scores of HCWs who were seeing patients vs HCWs not seeing any patients.
4	Suryavanshi et al., 2020 Maharashtra	Online survey	Survey	197 HCWs including doctors, nurses, and paraclinical staff. Males-96 Females-101	Depression Anxiety	PHQ-9 GAD-7	Symptoms of depression (92, 47%), anxiety (98, 50%), and low QoL (89, 45%). Odds of combined depression and anxiety were 2.37 times higher

							among single HCPs compared to married (95% CI: 1.03–4.96). Work environment stressors were associated with a 46% increased risk of combined depression and anxiety (95% CI: 1.15–1.85).
5	Khanam et al., 2020 Kashmir, India	Hospital-based online survey	Exploratory study	133 front-line HCWs including doctors, nurses, technicians, and others Males-74; Females-59 Age: not specified	Stress Psychological impact	The self-reported stress questionnaire IES-R scale	Nurses had significantly more stress than doctors. Stress was seen more in FHCWs working in the swab collection center as compared to those working in the other departments. The severe psychological impact was seen in 81 (60.9%) of FHCWs and was significantly more in males and married HCWs.
6	Chew et al., 2020 Singapore & India	5 major hospitals from India and Singapore	A multi-national, multicentre study	426 HCWs from India including doctors, nurses, allied health staff, administrators, clerical staff, and maintenance workers Age: 25-35 years	Depression, Anxiety & stress	DASS-21	The prevalence of Depression in Indian health care workers was 53(12.4%), anxiety 73 (17.1%), stress 16(3.8%), PTSD 31(7.3%).
7	Rathore 2020	Online survey	Cross-sectional study	100 HCWs Males-69 Females-31 Age:<30-45 years	Anxiety Stress	Likert scale Likert scale	72% of HCWs were concerned about the risk of infection, while 46% reported disruption in daily activities. 17% of HCWs were concerned about inadequate PPE & related challenges. 20% had inadequate knowledge and training about COVID. 16% of HCWs were anxious all the time, 11% feared all the time, and 12% had stress all the time while treating COVID patients.

8	Patel et al., 2020 India	Tertiary care institutions in a western state of India	Online survey	302 HCW'S Males-189 Females-113 Age: 21-60 years	Depression Anxiety Stress	DASS-21 PSS	101 (33.44%) HCWs reported low, 185 (61.26%) moderate, and 16 (5.30%) high levels of stress. Depression was reported by 56 (18.54%) subjects, 60 (19.87%) were found to have anxiety, and 50 (16.56%) reported having stress. Perceived Stress was significantly correlated with depression, anxiety, and stress.
9	Rehman et al., 2020	Online survey	Online survey	403 total sample 34 mental health professionals, 33 health professionals (doctors and nurses) Average age: 28.95 years	Depression, Anxiety, and Stress	DASS-21	The mean (SD) depression score of healthcare professionals was 10.79 (6.56) and that of mental health professionals was 6.76 (10.04). The mean anxiety score was mean 12.55 (6.23) in health professionals and 5.65 (8.35) in mental health professionals. The mean stress score in health professionals was 14.61 (7.85) and in mental health professionals was 9.29 (8.87).
10	George et al., 2020 Bangalore, India	Community Health Division, Baptist Hospital, Bangalore	A quantitative (QUAN) paradigm nested in the primary qualitative (QUAL) design.	HCWs include doctors, nurses, paramedical and support staff. Out of 87 staff, 42 participated in the QUAL study, and 64 participated in the QUAN survey. Males-40 Females-24	Anxiety & Stress	Likert scale	Hobbies (20.3%) and spending more time with family (39.1%) were cited as a means of emotional regulation in the QUAN survey. QUAL findings: fear of death, guilt of disease transmission, anxiety about probable violence, stigma, and exhaustion were the major themes causing stress. Positive reframing, peer support, distancing, information

				The mean age: 34.6 ±10.7			seeking, response efficacy, self-efficacy, existential goal pursuit, value adherence, and religious coping were the coping strategies.
11	Uvais et al., 2020 Kerala, India	Staff working in the Dialysis unit	Online survey	335 (dialysis technicians and dialysis nurses) Males-91 Females-244 Age: 18-30 years	Stress	PSS	121 (36.1%) had high stress and the mean PSS-10 score was 17.72 (4.48).
12	Gupta et al., 2020 India	Online survey	Cross-sectional online study	368 (full-time practicing doctors, nurses, dentists, and paramedic staff) Males-168, Females-200 Age: 30 - 60 years	Anxiety	GAD-7	Severe anxiety was observed among 7.3% (27/368) HCWs, whereas moderate, mild, and minimal anxiety was observed among 12.5% (46/368), 29.3% (108/368), and 50.8% (187/368) respectively.
13	Chauhan et al., 2021 India	HCWs of two large tertiary care hospitals providing COVID-19 treatment	Cross-sectional	200 High Covid Exposure (HCE) HCWs Males-129 Females-71 Age:18 - 60 years	Depression Anxiety Stress	PHQ-9 GAD-7 IES-R	Stress symptoms were found in 23.5%, depressive symptoms in 17%, and anxiety symptoms in 10.85% among the HCE HCWs.
14	Das et al., 2021 Andhra Pradesh	COVID - 19 care settings	Cross-sectional survey	321 frontline HCWs (Doctors, and Nurses) Males- 168 Females-153 Age: not specified	Stress	PSS-10	About 69.7% of the frontline HCWs recorded higher perceived stress.

15	Dharra et al., 2021 Uttarakhand	All India Institutes of Medical Sciences, Rishikesh.	Cross-sectional study	368 nurses Males-149 Females-219 Mean age = 28.91 ±3.68	Anxiety	GAD-7	The mean anxiety scores were 32.19±4.53 and 3.82±2.87 for female and male nurses. Age>30 years (p=.003), diploma qualification (p<.001), and lack of training in handling COVID-19 patients (p=.003) were significant determinants of higher anxiety among nurses.
16	Garg et al., 2020 India	COVID-19 exclusive hospital	Online cross-sectional survey	209 nurses Males-16 Females- 193 Age: 21 - 60 years	Anxiety Stress	GAD-7 PSS-10	65 (31.1%) participants had anxiety symptoms and 35.40% had moderate to high stress. The risk factors of anxiety and stress were working experience of >10 years (odds ratio [OR] = 3.36), direct involvement in the care of suspected/diagnosed patients (OR = 3.4), feeling worried about being quarantined/isolated (OR = 1.69,) and high risk of being infected at the job (OR = 2.3).
17	Khan et al., 2021 Pan India	COVID ward and COVID intensive care unit (ICU)	Cross-sectional study (online)	829 HCWs including doctors and nurses and other medical staff Males-475 Females- 354 Age: 19 - 64 years	Depression Anxiety	PHQ9 HAM-A	Anxiety and depression were significantly higher in doctors and staff nurses as compared to other medical staff. 64.7% of respondents had mild depression, 25.9% mild to moderate, and 9.4% moderate to severe depression. Anxiety was mild in 540 (65.1%), mild to moderate in 182 (22%) and moderate to severe in 107 (12.9).

18	Jakhar et al., 2021 Across the nation	Government health sectors	cross-sectional survey (online)	450 HCWs (Doctors & nurses) Males-216 Females-234 Age: 31.6 ± 6.6 years	Depression, Anxiety & Stress	DASS – 21	The prevalence of stress, anxiety, and depression among HCWs were 33.8, 38.9, and 43.6%, respectively.
19	Mishra et al., 2020 Chhattisgarh, India.	Dentists working in various regions of the Chhattisgarh	Cross-sectional survey (Online)	1253 dentists Males- 607 Females- 646 Mean age: 28 ± 7.64 years	Stress	PSS	The mean PSS for dentists was 18.61 ± 6.87 in phase I and 20.72 ± 1.95 in phase II. No family time due to long working hours (90%) was the major stressor among dentists during phase I and concern about getting infected (83.3%) was identified as the most frequent stressor during phase II.
20	Raj et al., 2020 India	Electronic Mail System	Cross-sectional study	Physicians n=100; Nurses n=80; technical staff n=20 Males- Physicians 37.2%; Nurses 15%; technical staff 57% Females- Physicians 62.8%; nurses 85%, technical staff 43% Mean Age: Doctors (35.54±6.09), nurses (33.84±7.87), Technical staff (32.16±5.89)	Depression & Anxiety	Structured questionnaire	Anxiety was seen in 55.65%, 48.54%, and 52.34% of physicians, nursing staff, and technicians of the study population while depression was evidently reported in 32.1%, 53.72%, and 42.7% respectively.

21	Chatterji et al., 2021 West Bengal, India	Diamond Harbour Medical College & Hospital.	Cross-sectional study	N=140 HCWs (56 doctors, 46 nurses, 20 ward staff, and 18 non-clinical staff. Males-61 Females-79 Mean age 37.67 ± 9.8 years	Stress	PSS-10	Low stress 29 (20.7%), Moderate stress - 102 (72.9%) High stress 9 (6.4%) were reported by the HCWs. Doctors had the highest level of anxiety. Younger age, higher education, female gender, and urban habitat were associated with a greater perception of anxiety.
22	Sharma et al., 2020 Noida, UP	Super Speciality Paediatric Hospital and Post Graduate Teaching Institute	cross-sectional study	150 HCWs	Depression, Anxiety & Stress	DASS-21	HCWs demonstrated a high prevalence of anxiety: 85/150 (56.7%), stress: 82/150 (54.7%), and depression: 72/150 (48.0%)
23	Gupta et al., 2020 Across India	Not specified	cross-sectional study	1124 HCWs, including 749 doctors, 207 nurses, 135 para-medics, 23 administrators, and ten supporting staff members. Males-718 Females-406 Age: Not specified	Depression	Hospital Anxiety and Depression Scale (HADS)	One-third of the HCWs reported anxiety and depressive symptoms. The risk factors for anxiety symptoms were female gender, younger age, and job profile (nurse), and for depressive symptoms younger age and working at a primary care hospital.

24	Singh et al., 2021 New Delhi, India	Hospitals providing Covid care	Cross-sectional online survey	348 HCWs Males-194 Females-154 Mean age: 31.8 years	Depression Anxiety	PHQ-9 GAD-7	Depression, anxiety, and somatic symptoms were present in 54 %, 44.3 %, and 54.6 % of HCWs.
25	Sukumaran et al., 2021 Kerala	Online survey mode	Cross-sectional survey	544 HCWs (doctors, nurses, and paramedical staff) Males- 186 Females 358 Age:22 - 78 years	Depression, Anxiety, Stress	DASS-21	9.7% of HCWs had mild depression and 13.3% had moderate-to-severe depression. While 4% had mild anxiety and 3.5% had moderate-to-severe anxiety, about 6.8% had mild stress and 6.4% had moderate-to-severe stress. Emotional and social support from higher health authorities is a significant protective factor against stress and depression.
26	Sharma S et al., 2021 Covid care institutes of India	government tertiary healthcare institutes	Cross-sectional online survey	354 nurses Males-241 Females- 113 Mean age 28.78 ± 4.3 years	Depression & Anxiety	HADS	Of 354 nurses, 12.1% were suffering from anxiety while 14.7% had depression.
27	Sharma V et al., 2021 India	Online survey	Cross-sectional study	100 male Orthopaedic surgeons Age: 30 - 60 years	Anxiety	GAD-7	Severe anxiety scores were observed in 8%; moderate, mild, and minimal anxiety was observed in 12%, 27%, and 53% of surgeons.
28	Yadav et al., 2021 India	Private practitioners' clinics	Internet-based survey	120 private practitioners Males-99 Females-21 Age: 29 - 50 or more	Depression, Anxiety, Stress	DASS-21	Severe depression was in 35% and 13.3% of HCWs had extremely severe depression. Severe and extremely severe anxiety was noticed in 31.66% and 15% of HCWs. Severe and

							extremely severe stress was found in 30% and 12.5% of private practitioners.
29	Chakma et al., 2021 10 States across India	A multicentre study conducted in 10 States across India	A qualitative study (Telephonic interviews)	111 HCWs (doctors, nurses, pharmacists, ambulance workers, community workers, housekeeping staff, security guards, stretcher-bearers, sanitation workers, laboratory staff, and hospital attendants). Males: 51 Female: 60 Age: 20 -30 years	Psychosocial challenges faced and coping strategies adopted by HCWs	Interview Questionnaire	HCWs report major changes in the work-life environment. Family-related issues. Stigma from the community and peers. Coping strategies included peer and family support and positive experiences.
30	Golecha et al., 2021 Gujarat	Primary and community health centres of rural Gujarat	A qualitative study (In-depth one-to-one interviews)	19 Rural primary care providers (12 Doctors & 7 nurses) Males:14 Females:5 Average age: 35 years	Perspectives and lived experiences of PCPs during Covid-19	Semi-structured questionnaire	The themes identified were lack of preparedness, vulnerability, management, workload, training, equipment and supplies, organizational factors, psychosocial support, and health system resource. Resilience mechanisms were recognition from communities and authorities, professional and family networks, and self-regulatory behaviors such as faith-based activities and wellness and motivation activities.

31	Banerjee et al., 2021 India	COVID-designated centers all over India	A qualitative study with a constructivist paradigm (Charmaz's grounded theory)	172 physicians Mean age: 29.2±3.8 years	Challenges, needs, and processes of coping and support.	Semi-structured interview guide	Fear of infection, uncertainty, stigma, guilt, and social isolation emerged as the main challenges. "unmet needs" were flexible work policies, administrative measures for better medical protection, the sensitivity of media toward the image of HCW, effective risk communication for their health, and social inclusion. A resilience "framework" emerged: A "resilient identity," managing the resilience, and working through occupational distress. The role of mental well-being, social network, peer support, problem negotiation, and self-care emerged as the key coping strategies.

Table 6: Results of Egger's test for publication bias

Coefficient	Estimate (95%CI)	*P*-value
Depression		
Slope	0.1327 (-0.1901, 0.4557)	0.393
Bias	3.4729 (-2.9008, 9.8468)	0.262*
Anxiety		
Slope	0.2279 (-0.0286, 0.4845)	0.079
Bias	1.2759 (-3.4444, 5.9963)	0.579*
Stress		
Slope	0.6358 (0.1861, 1.0855)	0.009
Bias	-4.5075 (-12.7106, 3.6954)	0.258*

* not significant, $p > 0.05$

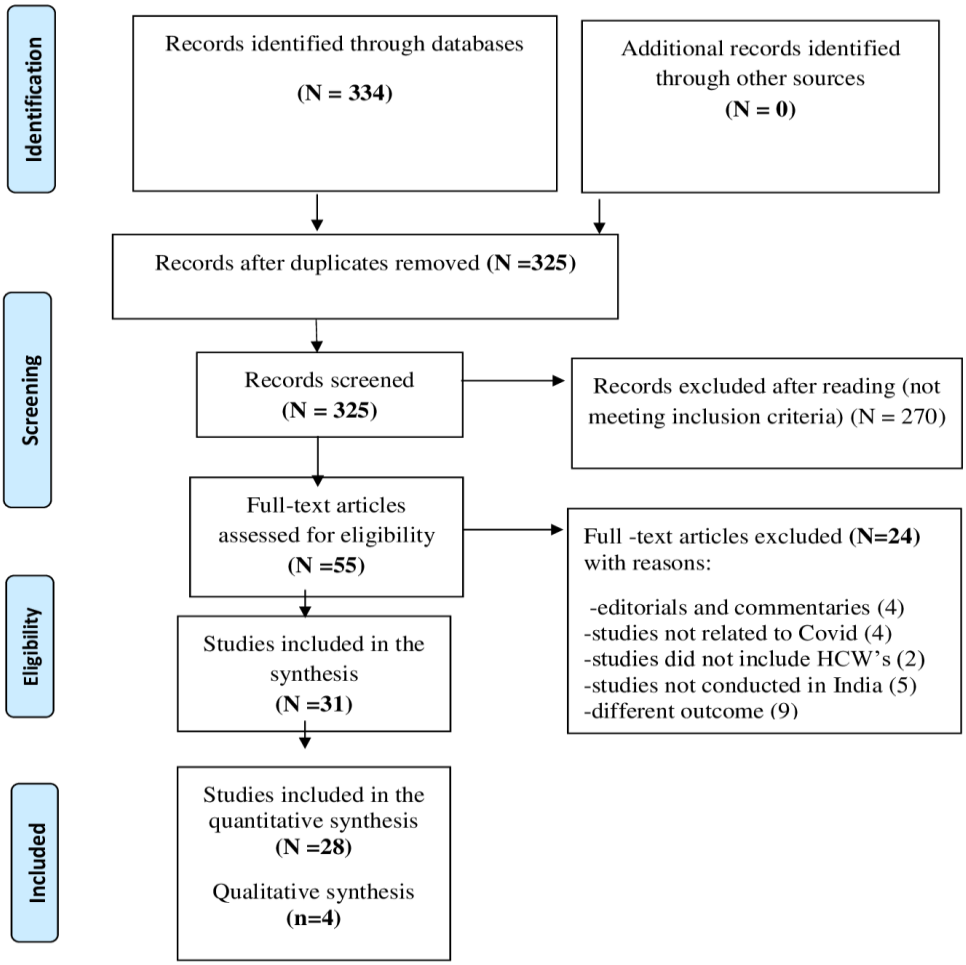

Figure 1: Study selection process

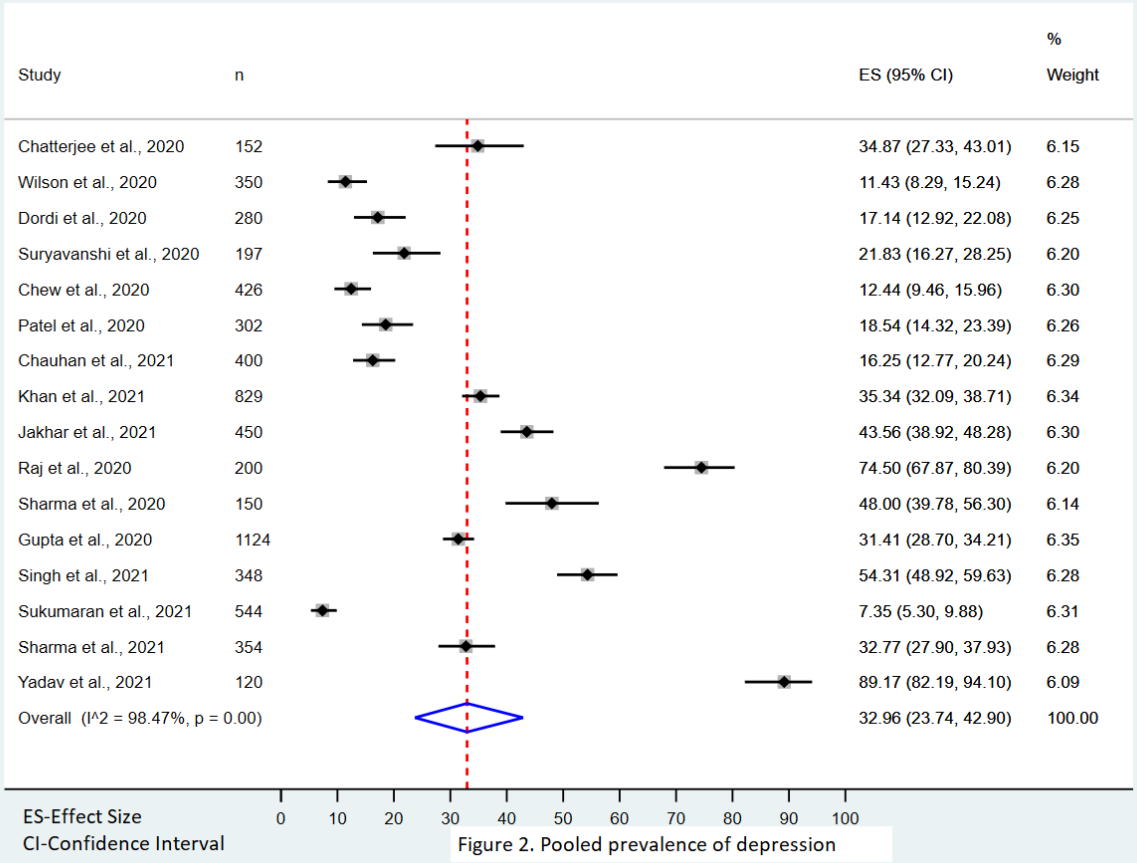

Figure 2. Pooled prevalence of depression

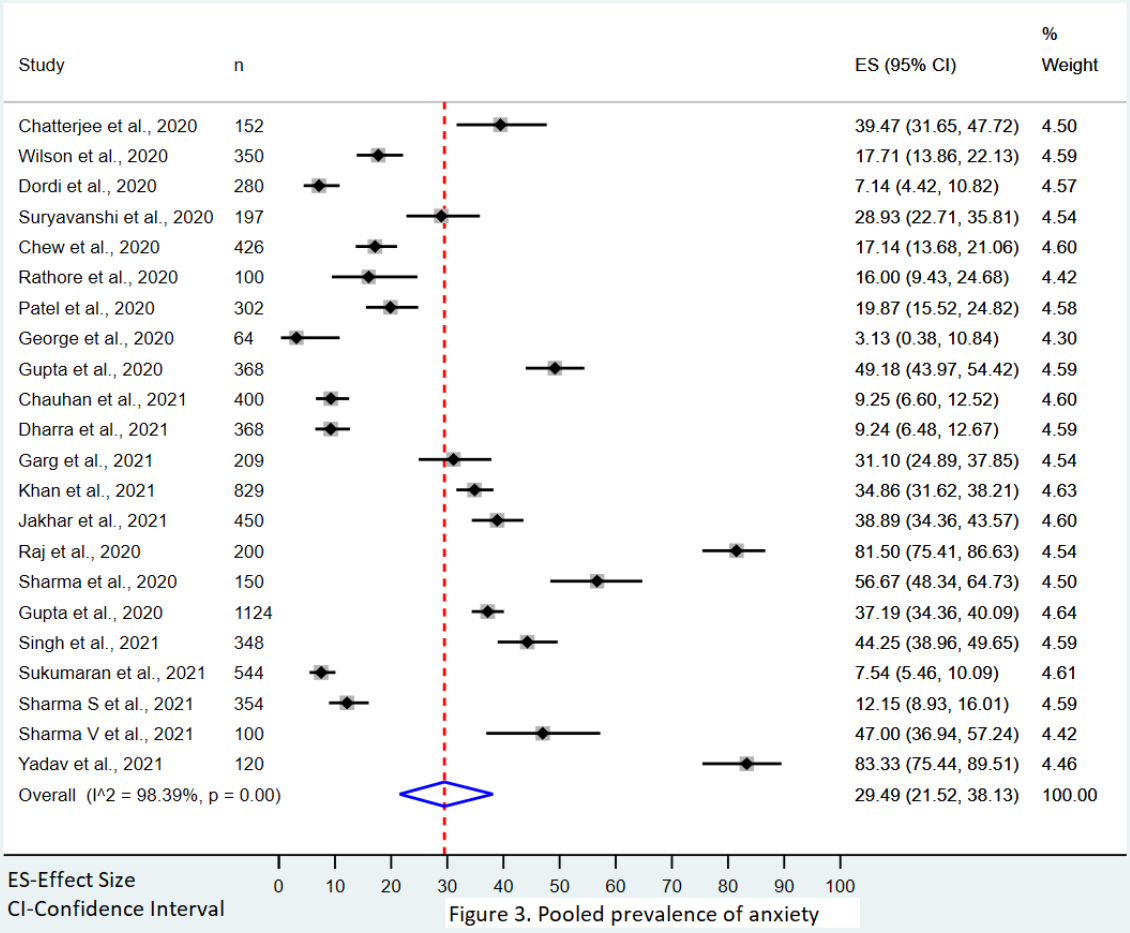

Figure 3. Pooled prevalence of anxiety

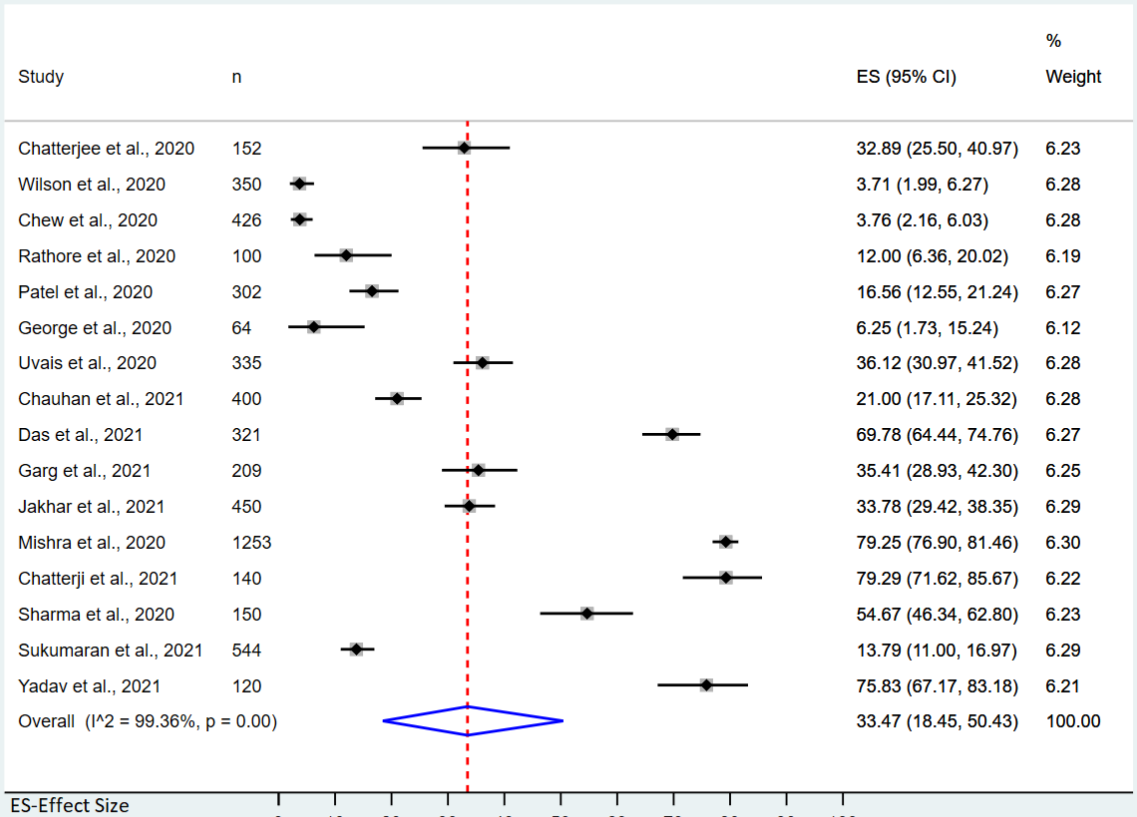

Figure 4. Pooled prevalence of stress