COVID-19 Pandemic–Related Perceived Stress, Insomnia, Depression, and Anxiety Among Rural Primary Care Health Workers:

A Mediation Analysis

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Abstract

Introduction: Mental health of health care workers (HCWs) was affected during the COVID-19 pandemic due to direct handling of suspected and confirmed cases. While neurobiological mechanisms that mediate stress, depression, and anxiety are well established, psychological mechanisms are not.

Objective: To assess (1) the prevalence of anxiety, depression, insomnia, and perceived stress among accredited social health activists, multipurpose health workers, auxiliary nurse midwives, and other certified HCWs of rural areas of Telangana, India and (2) the factors that mediate stress with depression and anxiety.

Methods: A total of 300 HCWs from across 10 primary health centers across 5 districts were selected. All participants self-reported their anxiety, depression, sleep problems, and perceived stress related to the pandemic. Sociodemographic and other relevant data pertinent to the context of stress and the pandemic were also obtained. The survey used translated and validated self-report instruments and was conducted during August and September 2021.

Results: The mean (SD) scores on the Insomnia Severity Index, 7-item Generalized Anxiety Disorder scale, Pandemic-Related Perceived Stress Scale of COVID-19, and 9-item Patient Health Questionnaire were 5.94 (5.6), 4.21 (4.5), 21.94 (5.8), and 3.89 (4.8), respectively. Age <35 years and family members being COVID-19 positive were significant predictors of depression and anxiety, respectively. Greater number of family members and COVID-19–positive status were significant predictors of insomnia. While the effect of stress on anxiety was indirect through the mediation of insomnia and depression, the effect of stress on depression was direct as well as through the mediation of anxiety.

Conclusion: The study results highlight the importance of measures to address sleep-related issues in individuals who are experiencing psychosocial stressors to prevent the development of depression and anxiety.

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The COVID-19 pandemic, which started in early 2020, had a massive impact on day-to-day activities worldwide. The pandemic ushered in not only anxiety related to acquiring the infection but also significant changes in the way we lived our lives. The measures taken to contain the infection such as lockdowns, isolation, and quarantine were a first-time experience for most of us, which led to disproportionate levels of stress.[1]

Several studies have reported a higher incidence of psychiatric symptoms following COVID-19 infection. Around 35%–45% of patients admitted with COVID-19 infection developed symptoms of depression and anxiety per 1 study.[2] In addition to psychosocial factors, there is a biological underpinning as well for the development of psychiatric issues. The cytokine storm syndrome that occurs in patients with COVID-19 impacts brain functions,[3] and interleukin-1β was found to be higher in COVID-19 patients who developed depression and anxiety compared to those who did not.[2]

However, just as those who acquired COVID-19 went through mental health issues, others who did not acquire COVID-19 infection experienced them as well. The general public was affected significantly due to the overall restrictions that were imposed by governments across the globe to contain the spread of infection.

Clinical Points

- Rates of depression, anxiety, stress, and insomnia were still prevalent in rural health care workers during the declining phase of the pandemic.
- Lower age, higher education, COVID-19–positive or suspected status, and family members influenced mental health rates.
- The effect of stress on depression and anxiety is mediated by insomnia.

Measures such as lockdown significantly restricted the movement of people, which led to reduced opportunities for recreational activities. Other measures such as work from home also reduced the interactions that would have occurred in the workplace between colleagues, thereby damaging the social support system. Another factor relates to the coverage by the media, which increased the fear of contracting the infection and led to significant stress among the general public. One meta-analysis found that the prevalence of anxiety and depression among the general public during the pandemic was between 30% and 35%.[4]

The pandemic had an even more significant effect on the mental health of health care workers (HCWs). HCWs were constantly dealing with confirmed and suspected cases of COVID-19, putting them at risk of acquiring the infection, as well as the stress of spreading the infection to their family members. To prevent such mishaps, HCWs had to undergo compulsory isolations after working with COVID-19–positive patients, but again isolation is a factor that increases the stress. Among HCWs working during the COVID pandemic, emotional exhaustion, depression, anxiety, and hopelessness were commonly seen.[5]

The neurobiological basis for stress and anxiety/depression is well established, but the psychological mechanism that mediates them is not well understood. There are studies that have proposed disturbed sleep as one of the factors that mediate stress and depression.

There are some studies conducted among frontline HCWs such as doctors and nurses,[6] but almost no studies have assessed the impact of COVID on grassroot-level HCWs working in rural settings. The objective of this study was to assess the prevalence of anxiety, depression, insomnia, and perceived stress among accredited social health activists (ASHAs), multipurpose health workers (MPHWs), auxiliary nurse midwives (ANMs), and other certified HCWs in rural areas of Telangana, India.

METHODS

The current study is part of the larger UNICEF-sponsored project titled "Mental health assessment of grassroot-level workers during the COVID-19 pandemic in rural Telangana," which was a cross-sectional survey of a sample of 300 rural HCWs. The survey used translated and validated self-report instruments and was conducted during August and September 2021. Participants were included in the study after written informed consent was obtained.

Sample Size

The sample size of 300 was calculated based on the pooled prevalence of anxiety, depression, and insomnia of 23.2%, 22.8%, and 38.9% reported among the frontline health care providers in a meta-analysis. Therefore, for reporting an average of 25% of anxiety, depression, and insomnia with 95% CI and 20% relative margin of error (ie, 5%), an estimated 300 samples will be required.

Sample

Ten primary health centers (PHCs) across 5 districts were selected. A total of 300 HCWs from those 10 PHCs were included in the study (Table 1). The districts and the PHCs were selected using convenience sampling. All HCWs belonging to any of the 3 cadres (ASHA, MPHW, and ANM) and other certified HCWs in each of the 10 PHCs were eligible for the study. Data from all available participants on the day of assessment were included. All the HCWs included in the study were currently employed and were involved in various community services such as maternal and child health and infectious diseases.

Instruments

The 7-item Generalized Anxiety Disorder (GAD-7) scale,[7] the 9-item Patient Health Questionnaire (PHQ-9),[8] and the Insomnia Severity Index (ISI)[9] were used to assess anxiety, depression, and insomnia. Additionally, the COVID-19 Pandemic-Related Perceived Stress Scale (PSS-10-C)[10] was used to assess perceived stress related to the pandemic. All assessment tools were self-report questionnaires, and Telugu-translated versions were

Table 1.
Number of Health Care Workers Across Different Patient Health Centers

Primary health center	District	N	%
Bibinagar	Yadadri-Bhuvanagiri	30	10.0
Bollepally	Yadadri-Bhuvanagiri	23	7.7
Bommalaramaram	Yadadri-Bhuvanagiri	30	10.0
Ghanapur	Jayashankar Bhupalpally	29	9.7
Kondamadagu	Yadadri-Bhuvanagiri	31	10.3
Kowdipally	Medak	29	9.7
Lingalaghanpur	Janagaon	46	15.3
Mothkur	Yadadri-Bhuvanagiri	25	8.3
Nawabpet	Vikarabad	29	9.7
Pochampally	Yadadri-Bhuvanagiri	28	9.3
Total		**300**	**100.0**

used. While Telugu versions of the GAD-7 and PHQ-9 were available as an open source (https://www.phqscreeners.com/select-screener/), the ISI and PSS-10-C were translated and validated as part of the present study.[11,12] Pandemic-related and sociodemographic data were collected using semistructured proforma.

Procedure

All participants were invited by telephone or in person by the medical officer in charge of the respective PHCs in the previous 2 weeks to participate on a predecided date. On the specified date, 4 investigators (2 psychiatrists, a junior resident, and a psychiatric nurse) conducted the assessments. The study was explained, and instructions for responding to the self-report questionnaires were provided to all participants. Each of the 4 investigators then had one-to-one and face-to-face interaction with the participants for the informed consent process and administration of the self-report tools. Sociodemographic and other relevant data pertinent to the context of stress and the pandemic were also obtained.

Analysis

The sample characteristics were assessed using descriptive measures frequencies and mean (SD). Chi-square test was used to assess the univariate association between demographic variables and positive screened status on depression, anxiety, insomnia, and perceived stress. To test for multivariate association, a multinomial logistic regression model was used. A mediation regression analysis was used to assess the mediation models explaining the association between perceived stress, insomnia, depression, and anxiety. The demographic predictors were added as covariates to the model. Analysis was conducted using the Statistical Package for Social Sciences (SPSS) Version 23. PROCESS v.4.0 macro for the SPSS version was used for mediation analysis.

Table 2.

Sociodemographic and COVID-19 Pandemic–Related Characteristics

Variable	N	%
Sex		
Female	265	88.3
Marital status		
Married	283	94.3
Unmarried	9	3.0
Widowed	8	2.7
Designation		
ASHA	149	49.7
ANM	34	11.3
MPHW	95	31.7
Family type		
Nuclear	93	31.0
Education		
High school	10	3.3
10th standard and intermediate	209	69.7
Graduation/postgraduation	81	17.0
Wages paid on time		
Yes	58	19.3
Adequate PPE		
Yes	210	70.0
Infected with COVID-19 in the past?		
Yes	63	21.0
Suspected to have COVID-19 infection in the past?		
Yes	115	48.5
High-risk contact of COVID-19 infected?		
Yes	243	81.0
Is spouse also a frontline health worker?		
Yes	63	21.0
COVID-19 infection in family members?		
Yes	81	27.0
If yes, hospitalization?		
Yes	19	6.3
If yes, death?		
Yes	5	1.67
Did you face any mental health issue because of the pandemic?		
Yes	198	66.0
If yes, did you seek help?		
Yes	111	56.1

Abbreviations: ANM = auxiliary nurse midwife, ASHA = accredited social health activist, MPHW = multipurpose health worker, PPE = personal protective equipment.

RESULTS

Sample Characteristics

Table 1 shows the number of HCWs included from each of the 10 selected PHCs. Of the 300 participants, the majority were ASHA workers, female, married, and educated at least to matriculation. While 21% of the sample was infected with COVID-19 in the past, 81% had high-risk contact with COVID-19–infected individuals. Table 2 shows sociodemographic and pandemic-related characteristics.

Depression, anxiety, insomnia, and perceived COVID-19–related stress. The mean (SD) score of the PHQ-9 was 3.89 (4.8). On the PHQ-9, 13.78% scored moderate and above levels of depression. The mean (SD) score on the GAD-7 was 4.21 (4.5), and 9.4% had moderate to severe scores on the GAD-7. The mean (SD) score on the ISI was 5.94 (5.6), and 8% had moderate to severe insomnia. The mean (SD) score on the PSS-10-C was 21.94 (5.8), and 23.7% had high levels of perceived stress (Table 3).

Univariate Associations

Tables 4 and 5 show univariate associations between demographic and COVID-19–related variables and scores of depression, anxiety, insomnia, and perceived stress. While lower age showed a significant association with moderate and severe anxiety, education of matriculation or lower showed a significant association with no/mild

Table 3.
Distribution of Depression, Anxiety, Insomnia, and Perceived COVID-19–Related Stress Scores

Assessment tool	Score, mean ± SD (range)	Categories	N	%
Depression (PHQ-9)	3.89 ± 4.8 (0–26)	Moderate, moderate-severe and moderate	41	13.7
		No and mild	259	86.3
Anxiety (GAD-7)	4.21 ± 4.5 (0–21)	Moderate and severe	28	9.3
		No and mild	272	90.7
Insomnia (ISI)	5.94 ± 5.6 (0–27)	Moderate and severe	24	8.0
		No and subthreshold	276	82.0
Perceived stress (PSS-10-C)	21.94 ± 5.8 (4–35)	High	71	23.7

Abbreviations: GAD-7 = 7-item Generalized Anxiety Disorder scale, ISI = Insomnia Severity Index, PHQ-9 = 9-item Patient Health Questionnaire, PSS-10-C = COVID-19 Pandemic-Related Perceived Stress Scale.

depression. COVID-19–positive status and having a COVID-19–positive family member had positive associations with moderate to severe insomnia and depression respectively.

Multivariate Analysis

The independent variables found to be statistically significant ($P < .05$) in the univariate analysis were selected and input in the multinomial logistic regression model. While age >35 (B = 1.074; $\chi^2 = 7.151$; $P = .007$) and family members being COVID-19 positive (B = 0.769; $\chi^2 = 4.688$; $P = .03$) were significant predictors of depression and anxiety, respectively, greater number of family members (B = 1.164; $\chi^2 = 7.082$; $P = .008$) and COVID-19–positive status (B = 1.149; $\chi^2 = 6.057$; $P = .014$) were shown to be significant predictors of insomnia in the multinomial regression model. While insomnia was a predictor of anxiety and depression (B = 3.246; $\chi^2 = 34.646$; $P = <.001$), depression was found to be a significant predictor of anxiety (B = 1.45; $\chi^2 = 6.241$; $P = .011$).

Mediation Analysis

The results of the mediation analysis are shown in Figure 1. While the direct model was statistically significant for depression as an outcome of perceived stress, it was not statistically significant for anxiety as an outcome. COVID-19–positive status for self or for a family member significantly influenced the direct effect of perceived stress on depression. For anxiety as an outcome, the indirect models with insomnia and depression as mediators were statistically significant; no covariates were significantly associated. For depression as an outcome, the indirect model with depression as a mediator was statistically significant; age as a covariate had a significant influence on this association. The indirect model with insomnia as a mediator was not significant. In summary, while the effect of perceived stress on anxiety was indirect through the mediation of insomnia and depression, the effect of stress on depression was direct as well as through the mediation of anxiety.

DISCUSSION

The study of the prevalence of common mental disorders in frontline HCWs during the COVID-19 pandemic is important. We found that depression, anxiety, stress, and insomnia were prevalent in rural HCWs of Telangana. Lower age, higher education, COVID-19–positive or suspected status, and family members being COVID-19 positive were significant predictors of common mental disorders. We found that the effect of stress on depression and anxiety was mediated by insomnia.

The prevalence of anxiety and depression in our study was 9.3% and 13.7%, respectively, which was significantly lower than that found in the meta-analysis by Pappa et al,[13] which was done with HCWs during the COVID-19 pandemic. The sample in the meta-analysis by Pappa et al[13] consisted of doctors, nurses, or others, but in our study, it consisted exclusively of grassroot HCWs such as ASHAs, MPHWs, and ANMs. This might explain the lower rates of anxiety, as the sample in our study was not involved in the direct handling of the confirmed COVID-19 cases. A study done with ASHA workers in India during the latter part of the first wave of COVID-19 (November 2020) found prevalence of anxiety, depression, or stress to be 56.5%.[14] This prevalence is higher than ours because that study included even those with lower threshold symptoms.[14] In addition, most of the studies conducted during the peak of the COVID-19 pandemic employed online surveys and found higher rates of anxiety/depression/stress.[15] In contrast, our study was conducted after the second wave of COVID-19

Table 4.

Univariate Association Between Sample Characteristics and ISI and GAD-7 Scores in the Rural Frontline HCWs[a]

	ISI				GAD-7			
Variable	No-subthreshold	Clinical	χ^2	*P*	No-mild	Moderate-severe	χ^2	*P*
Age								
≤35	99 (35.9)	12 (50.0)	1.89	.17	94 (34.6)	17 (60.7)	7.50	**.01***
≥36	177 (64.1)	12 (50.0)			178 (65.4)	11 (39.3)		
Sex								
Female	243 (88.0)	22 (91.7)	0.281	1.00	239 (87.9)	26 (92.9)	0.61	.76
Male	33 (12.0)	2 (8.3)			33 (12.1)	2 (7.1)		
Marital status								
Married	24 (100)	283	0.241	.46	257 (94.5)	26 (92.9)	0.85	.49
Unmarried	0 (0)	9			8 (2.9)	1 (3.6)		
Widowed	0 (0)	8			7 (2.6)	1 (3.6)		
Education								
High school	10 (3.6)	0 (0)	1.63	.79	10 (3.7)	0 (0)	7.47	.09
10th standard	126 (45.7)	11 (45.8)			126 (46.3)	11 (39.3)		
12th standard	65 (23.6)	7 (29.2)			63 (23.2)	9 (32.1)		
Undergraduate	45 (16.3)	5 (20.8)			42 (15.4)	8 (28.6)		
Postgraduate	30 (10.9)	1 (4.2)			31 (11.4)	0 (0)		
Duration of COVID-19 work								
≤ 1 y	17 (6.2)	1 (4.2)	0.16	1.00	17 (6.3)	1 (3.6)	0.32	1.00
>1 y	259 (93.8)	23 (95.8)			255 (93.8)	27 (96.4)		
Wages paid on time								
Yes	221 (80.1)	21 (87.5)	0.78	.589	219 (80.5)	23 (82.1)	0.04	1.00
No	55 (19.9)	3 (12.5)			53 (19.5)	5 (17.9)		
Family type								
Nuclear	192 (69.6)	15 (7.2)	0.52	.47	189 (69.5)	18 (64.3)	0.32	.57
Joint	84 (30.4)	9 (9.7)			83 (30.5)	10 (35.7)		
No. of family members								
≤4	179 (64.9)	9 (37.5)	7.10	**.01***	174 (64.0)	14 (50.0)	2.12	.15
≥5	97 (35.1)	15 (62.5)			98 (36.0)	14 (50.0)		
No. of children in family								
0	93 (33.7)	7 (29.3)	0.72	.72	90 (33.1)	10 (35.7)	0.12	.96
1–2	150 (54.3)	13 (54.2)			148 (54.4)	15 (53.6)		
≥3	33 (12)	4 (16.7)			34 (12.5)	3 (10.7)		
No. of elderly family members								
0	194 (70.3)	13 (54.2)	2.68	.10	191 (70.2)	16 (57.1)	2.03	.154
≥1	82 (29.7)	11 (45.8)			81 (29.8)	12 (42.9)		
COVID-19–positive status								
Yes	53 (19.2)	10 (41.7)	6.72	**.01***	54 (19.9)	9 (32.1)	2.31	.13
No	223 (80.8)	14 (58.3)			218 (80.1)	19 (67.9)		
COVID-19 suspected								
Yes	105 (46.7)	7 (58.3)	0.62	.43	104 (47.5)	8 (44.4)	0.06	.80
No	120 (53.3)	5 (41.7)			115 (52.5)	10 (55.6)		
High-risk contact of COVID-19								
Yes	223 (80.8)	20 (83.3)	0.09	1.00	223 (82.0)	20 (71.4)	1.84	.175
No	53 (19.2)	4 (16.7)			49 (18.0)	8 (28.6)		
Spouse FLHW								
Yes	57 (20.7)	6 (25.0)	0.25	.62	54 (19.9)	9 (32.1)	18.78	.07
No	219 (79.3)	18 (75.0)			218 (80.1)	19 (67.9)		
COVID-19 positive in family								
Yes	71 (25.7)	10 (41.7)	2.85	.09	70 (25.7)	11 (39.3)	2.37	.12
No	205 (74.3)	14 (58.3)			202 (74.3)	17 (60.7)		
Family member hospitalized for COVID-19								
Yes	17 (6.2)	2 (8.3)	0.18	.68	18 (6.6)	1 (3.6)	0.40	.53
No	259 (93.8)	22 (91.7)			254 (93.4)	27 (96.4)		
Death of family member from COVID-19								
Yes	5 (1.8)	0 (0)	0.44	1.00	3 (1.1)	2 (7.1)	5.65	.07
No	271 (98.2)	24 (100)			269 (98.9)	26 (92.9)		

(continued)

Table 4 (continued).

Variable	ISI				GAD-7			
	No-subthreshold	Clinical	χ^2	*P*	No-mild	Moderate-severe	χ^2	*P*
Adequate supply of PPE kits								
Yes	197 (71.4)	13 (54.2)	3.11	.08	192 (70.6)	18 (64.3)	0.48	.49
No	79 (28.6)	11 (45.8)			80 (29.4)	10 (35.7)		

*Indicates statistical significance.
[a]Values are presented as n (%).
Abbreviations: FLHW = frontline health worker, GAD-7 = 7-item Generalized Anxiety Disorder scale, HCW = health care worker, ISI = Insomnia Severity Index, PPE = personal protective equipment.

Table 5.

Univariate Association Between Sample Characteristics and PHQ-9 and PSS-10-C Scores in the Rural Frontline HCWs[a]

Variable	PHQ-9				PSS-10-C			
	No-mild	Moderate and severe	χ^2	*P*	Low	High	χ^2	*P*
Age								
≤35	97 (37.5)	14 (34.1)	0.17	.68	84 (36.7)	27 (38.0)	0.04	.84
≥36	162 (62.5)	27 (65.9)			145 (63.3)	44 (62.0)		
Sex								
Female	229 (88.4)	36 (87.8)	0.01	.91	206 (90.0)	59 (83.1)	2.47	.12
Male	30 (11.6)	5 (12.2)			23 (10.0)	12 (16.9)		
Marital status								
Married	246 (95.0)	37 (90.2)	1.51	.47	216 (94.3)	67 (94.4)	0.02	1.00
Unmarried	7 (2.7)	2 (4.9)			7 (3.1)	2 (2.8)		
Widowed	6 (2.3)	2 (4.9)			6 (2.6)	2 (2.8)		
Education								
High school	10 (3.9)	0 (0)	11.62	**.02***	8 (3.5)	2 (2.8)	7.35	.11
10th standard	125 (48.3)	12 (29.3)			111 (48.5)	26 (36.6)		
12th standard	62 (23.9)	10 (24.4)			54 (23.6)	18 (25.4)		
Undergraduate	36 (13.9)	14 (34.1)			31 (13.5)	19 (26.8)		
Postgraduate	26 (10.0)	5 (12.2)			25 (10.9)	6 (8.5)		
Duration of COVID-19 work								
≤1 y	15 (5.8)	3 (7.3)	0.15	.72	14 (6.1)	4 (5.6)	0.02	1.00
>1 y	244 (94.2)	38 (92.7)			215 (93.9)	67 (94.4)		
If wages were paid on time								
Yes	211 (81.5)	31 (75.6)	0.78	.38	186 (81.2)	56 (78.9)	0.19	.66
No	48 (18.5)	10 (24.4)			43 (18.8)	15 (21.1)		
Family type								
Nuclear	176 (68.0)	31 (75.6)	0.97	.33	153 (66.8)	54 (76.1)	2.17	.14
Joint	83 (32.0)	10 (24.4)			76 (33.2)	17 (23.9)		
No. of family members								
≤4	165 (63.7)	23 (56.1)	0.88	.35	141 (61.6)	47 (66.2)	0.50	.48
≥5	94 (36.3)	18 (43.9)			88 (38.4)	24 (33.8)		
No. of children in the family								
0	85 (32.8)	15 (36.6)	0.24	.89	77 (33.6)	23 (32.4)	0.04	.98
1–2	142 (54.8)	21 (51.2)			124 (54.2)	39 (54.9)		
≥3	32 (12.4)	5 (12.2)			28 (12.2)	9 (12.7)		
No. of elderly family members								
0	180 (69.5)	27 (65.9)	0.22	.64	153 (66.8)	54 (76.1)	2.17	.14
≥1	79 (30.5)	14 (34.1)			76 (33.2)	17 (23.9)		
COVID-19–positive status								
Yes	54 (20.8)	9 (22.0)	0.03	.87	50 (21.8)	13 (18.3)	0.41	.52
No	205 (79.2)	32 (78.0)			179 (78.2)	58 (81.7)		
COVID-19 suspected								
Yes	94 (45.6)	18 (58.1)	1.67	.20	87 (38.0)	28 (39.4)	0.01	**.97***
No	112 (54.4)	13 (41.9)			142 (62.0)	43 (60.6)		

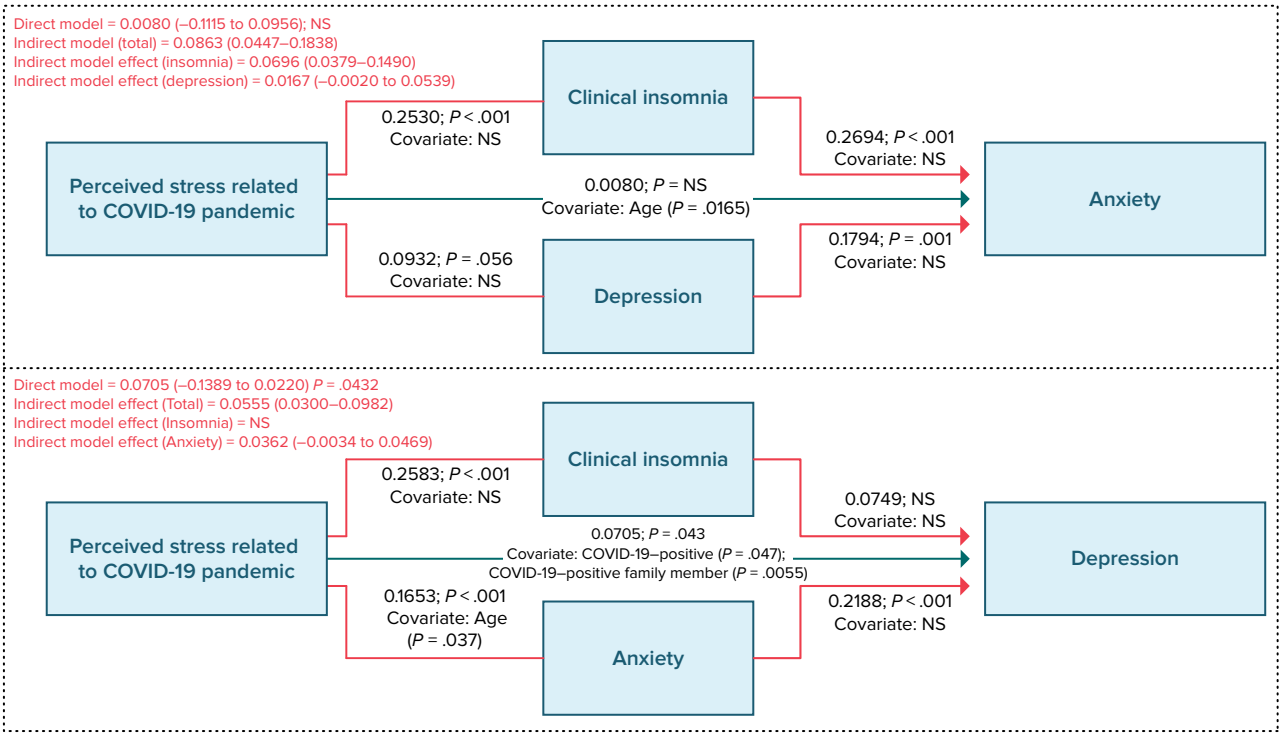
(continued)

Table 5 (continued).

Variable	PHQ-9				PSS-10-C			
	No-mild	Moderate and severe	χ^2	*P*	Low	High	χ^2	*P*
High-risk contact of COVID-19								
Yes	212 (81.9)	31 (75.6)	0.90	.34	188 (82.1)	55 (77.5)	0.76	.36
No	47 (18.1)	10 (24.4)			41 (17.9)	16 (22.5)		
Spouse FLHW								
Yes	51 (19.7)	12 (29.3)	1.96	.16	47 (20.5)	16 (22.5)	0.13	.72
No	208 (80.3)	29 (70.7)			182 (79.5)	55 (77.5)		
COVID-19 positive in family								
Yes	64 (24.7)	17 (41.5)	5.04	**.03***	61 (26.6)	20 (23.9)	0.06	.80
No	195 (75.3)	24 (58.5)			168 (73.4)	51 (76.1)		
Family member hospitalized for COVID-19								
Yes	16 (6.2)	3 (7.3)	0.08	.78	15 (6.6)	4 (5.6)	0.08	1.00
No	243 (93.8)	38 (92.7)			241 (93.4)	67 (94.4)		
Death of family member from COVID-19								
Yes	4 (1.5)	1 (2.4)	0.17	.52	4 (1.7)	1 (1.4)	0.04	1.00
No	255 (98.5)	40 (97.6)			225 (98.3)	70 (98.6)		
Adequate supply of PPE kits								
Yes	179 (69.1)	31 (75.6)	0.71	.40	160 (69.0)	50 (71.1)	0.01	.93
No	79 (28.6)	11 (45.8)			69 (29.4)	21 (35.7)		

[a]Values are presented as n (%).
*Indicates statistical significance.
Abbreviations: FLHW = frontline health worker, PHQ-9 = 9-item Patient Health Questionnaire, PPE = personal protective equipment, PSS-10-C = COVID-19 Pandemic-Related Perceived Stress Scale.

Figure 1.
Mediation Analysis



Abbreviation: NS = not significant.

and utilized face-to-face interviews, which explains the lower rates of stress, anxiety, and depression.

Age was one of the significant predictors of anxiety in our study, with those aged <35 years having higher anxiety scores compared to those aged >35 years. A similar correlation with age was also observed during the severe acute respiratory syndrome pandemic in 2007.[16] Studies from Canada and Spain have also reported similar findings even during the COVID-19 pandemic.[17–19] The reason behind this could be that the young people had more access to COVID-19–related news through social media platforms, thereby increasing their stress and anxiety levels. In our study, higher scores on the ISI were associated with bigger family size and COVID-19–positive status of the subject. This finding is due to overcrowded households, which might lead to lower privacy and increased sleep disturbances. COVID-19–positive status would have increased stress levels, thereby leading to increased sleep disturbances.

Multiple studies have established a bidirectional relationship between stress and anxiety/depression.[20] Chronic stress leads to changes in basolateral amygdala, thereby dysregulating glutamate release in basolateral amygdala to prefrontal cortex synapse.[21] There is enough evidence about neurobiological factors that mediate stress and anxiety/depression, but the studies that have explored psychological factors are sparse. Manzar et al[22] conducted a study to understand the mediating effect of insomnia between stress and anxiety and found that insomnia mediates stress and anxiety similar to the finding of our study. Another study by Liu et al[23] also established the mediating effect of insomnia between stress and depression. However, in our study, insomnia did not have a mediating effect between stress and depression. The above 2 studies[22,23] did not assess the direct relationship between stress and anxiety/depression. When this was assessed in our study, we found that there is a direct relationship between stress and depression. We also found that anxiety acts as a mediating factor between stress and depression. We did not find a direct relationship between stress and anxiety or a mediating influence of depression on the effect of stress on anxiety. This point highlights the possibility that the stress, apart from causing depression, directly also causes depression through anxiety, which in turn is mediated by insomnia. These findings suggest that strategies aimed at improving the sleep cycle and maintaining regular sleep might be helpful to combat the incidence of anxiety and depression.

Limitations

Restriction of the study sites to only 10 PHCs (samples conveniently based on willingness to participate and available resources) and lack of participation from many other districts where the rates of COVID-19 infection were high are major limitations of our study. The fact that the data were collected during the phase of declining infection rates of the pandemic might have inclined the findings toward lower rates of common mental disorders. The rates might have been different during the peak phases of the pandemic. The mediating effect of insomnia is best established when the subjects are followed up longitudinally from the point of development of stress to the point of insomnia and then to the point of development of either depression or anxiety. Our study being a cross-sectional study is therefore another limitation.

CONCLUSION

We conclude that the rates of depression, anxiety, stress, and insomnia were still prevalent in rural HCWs of Telangana during the declining phase of the COVID-19 pandemic. Demographic and COVID-19–related factors such as lower age, higher education, COVID-19–positive or suspected status, and family members influenced these rates. Further, we conclude that the effect of stress on anxiety is mediated by insomnia.

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