

Comparative Study Analyzing Prevalence of Anxiety among Different Professions Using GAD-7 Scale during COVID-19 Pandemic in India

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Abstract

Original Research Article

COVID 19 pandemic is sweeping across the globe, causing adverse societal and economic consequences affecting mental health. Studies have documented increased prevalence of mental disorders including anxiety. Because of paucity of studies accessing mental disorders, we conducted a comparative study analyzing prevalence of anxiety among different professions using GAD-7 scale during COVID-19 pandemic in India. We conducted this study using completely voluntary anonymous GAD-7 Questionnaire by distributing hard copies and e-copies among > 20 years of age Indians, understanding English and willingness to participate after taking informed consent and ethical committee approval. Prevalence of anxiety among total study population of 4333 was 80.5% including 79.3% medical profession group, 85.1% business group, 79.8% teachers, 78.8% students and 82.4% non-medical profession group. Higher overall prevalence of mild anxiety was observed among all profession groups. Prevalence of mild anxiety was higher in male group and moderate anxiety in females and the difference was statistically highly significant. Results show significantly high prevalence of anxiety among all professions, gender and age groups in Indian population. Globally, COVID-19 pandemic has catastrophic effect on psychosocial and mental health. Our study analyzing prevalence of anxiety among different professions during COVID-19 pandemic in India found significantly high prevalence of anxiety among all professions, gender and age groups, necessitating increased focus on multilevel India specific mental health interventions and strategies for curbing and preventing mental health problems and need for further research.

Key words: Anxiety, Indian, Mental disorders, Prevalence, COVID-19.

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INTRODUCTION

COVID 19 pandemic is sweeping across the globe now for more than one and a half years after World Health Organization (WHO) declared it as a global pandemic on 12, Mar 2020. India, a developing country has faced this massive pandemic onslaught with two waves necessitating lockdowns disrupting all human usual activities and livelihoods causing great adverse societal and economic consequences resulting in atmosphere of deprivation, social stigma, loneliness, insomnia, anxiety, depression, substance use disorders and suicidal behaviour. Such a large scale global pandemic almost always affects the mental as well as

physical health of population [1] [Neria Y, *et al.* 2008] In the era of extensive social media indulgence, people are getting bombarded with information, misinformation, rumours, fake news and continuous stream of visuals both unverified and verified causing as well as fuelling pre-existing stigma, scare, anxiety and depression. Exposure of people to fake news or false information or distressing visuals lead to negative thoughts, misinterpretations and insecurity exacerbating anxiety, adversely affecting mental health of different groups of people including health care workers (HCWs) [1]. [Sallam M, *et al.* 2020]. Fearing this WHO had issued several advisories for different sections of society and professionals to support mental and

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psychosocial health, minimize fears and anxiety by suggesting getting authentic information from WHO website or local authority addressing public queries help coping with stigma, fear, uncertainty and depression during COVID-19 [iii]. [World Health Organization. 2020] Indian government, the health and family welfare department and number of other intuitions like National Institute of Mental Health and Neuro-Sciences (NIMHANS), All India Institute of Medical Sciences (AIIMS) and Indian Psychiatric Society (IPS) has also published materials on mental health care, initiated online and telemedicine services to promote deal and manage mental health problems during the COVID-19 pandemic [iv]. [Roy A., *et al.* 2020]. Meta-analysis of studies using different methods of assessing anxiety documented 25% overall prevalence of anxiety with substantial levels of anxiety among HCWs during the COVID-19 pandemic [v] [Javier Santabárbara, *et al.* 2021] Another systematic-review and meta-analysis from India on the basis of six studies showed 34.1% (95% CI: 26.3%–42.3%) pooled prevalence of anxiety and sub-group analysis observed higher prevalence of anxiety among HCWs as compared to the general population [vi]. [Singh RK, *et al.* 2021]. Based on the Diagnostic and Statistical Manual of Mental Disorders criteria, Generalized Anxiety Disorder Questionnaire-7 (GAD-7) [vii] [Spitzer RL, *et al.* 2006] has been found to be an effective and useful screening method with strong psychometric reliability and validity for meaningful comparison in Indian context among different tested subgroups and is also comparable to research in western settings [viii]. [De Man J, *et al.* 2021].

There are paucity of studies accessing prevalence of anxiety in Indian population and different professions including medical profession, so we conducted a comparative study analyzing prevalence of anxiety among different professions using GAD-7 scale during COVID-19 Pandemic in India.

MATERIAL AND METHODS

During COVID 19 pandemic from 1st October, 2020 to 20th February, 2021 we studied the prevalence of anxiety among different professions in Indian population using Generalized Anxiety Disorder Questionnaire-7 (GAD-7) scale [8]. [De Man J, *et al.* 2021]. Only Indian subjects > 20 years of age who were able to read and understand English and willingness to participate in study were included. Intuitional Ethical Committee approval was obtained. After explaining the study protocol in detail, verbal informed consent was obtained from all the participants without any coercion and participants were informed that they can stop participation in the study anytime without giving any reason or just ignore the message for participation and filling up the study e-performa. Completely voluntary and anonymous GAD-7 questionnaire in English including socio-demographics

characteristics like age, gender and profession were distributed as hard copies and e-copies via emails, SMS, whatsapp and facebook to Indian population for registering their response. To increase participation several reminders were sent via emails, SMS, whatsapp and facebook.

Study subjects were required to answer seven questions included in GAD-7 questionnaire and score was accessed on 4-point scale of 0–3 that is ‘not at all’ score 0, ‘several days’ score 1, ‘more than half the day’ score 2 and ‘nearly every day’ score 3 for rating the symptoms in past two weeks. Total score calculated for seven questions of GAD-7 questionnaire was used to access the prevalence and severity of anxiety. Score of 0-no anxiety, score of 1-5 mild anxiety, score of 6-10 moderate anxiety and score of >11 was accessed to have severe anxiety. GAD-7 scale has been shown to be a reliable screening tool for assessment of prevalence of anxiety which has been previously used for research in Middle East Respiratory Syndrome (MERS), Ebola outbreak as well as now for COVID-19 pandemic [ix] [Elezi F, *et al.* 2020]. In Indian context GAD-7 scale was demonstrated to be stable over time across various demographic subgroups supporting use for meaningful comparison among tested subgroups and psychometric properties were shown to be comparable with research in western settings and also showed full scalar invariance along with partial to full residual invariance across age, gender and measurement occasions [8] [De Man J, *et al.* 2021].

STATISTICAL ANALYSIS

The sample size of about 4100 subjects to achieve the margin of error of 15% was calculated on the basis of about 4% prevalence of anxiety documented by the National Mental Health Survey 2015-16 [x]. [Gururaj G, *et al.* 2016]. Data was represented as Frequency, Percentage, Mean and Standard Deviation. Association of levels of scores with socio-demographic variables represented as frequency and percentage was calculated using Chi-Square Test. Association of mean scores with socio-demographic variables was calculated using Student ‘t’ test / ANOVA test. P value < 0.05 was taken as statistically significant whereas p < 0.001 was taken as highly significant. All the analysis was done using SPSS 23.0 ver.

RESULTS

Socio- demographic characteristics: 4333 subjects were found to be eligible for inclusion in our study. The distribution of study population according to various socio-demographic variables like age, gender and profession were shown in table 1. Study population was dominated by medical professionals constituting 51.8% of study population where as 16% were from business profession, 7.4% teachers, 13.1% students and 11.7% was non-medical professional.

Table-1: Socio-demographic variables in study population and different profession groups. N (%)

Variables	Study Population	Medical Professionals	Business	Teachers	Students	Non-Medical Professionals	
Total	4333 (100.0)	2246 (51.8)	692 (16.0)	322 (7.4)	567 (13.1)	506 (11.7)	
Age Groups	20-40 Yrs	2080 (48.0)	972 (46.7)	277 (13.3)	106 (5.1)	567 (27.3)	158 (7.6)
	41-60 Yrs	1854 (42.8)	1027 (55.4)	332 (17.9)	200 (10.8)	0 (0.0)	295 (15.9)
	>60 yrs	399 (9.2)	247 (61.9)	83 (20.8)	16 (4.0)	0 (0.0)	53 (13.3)
Gender	Male	2741 (63.3)	1513 (55.2)	469 (17.1)	164 (6.0)	266 (9.7)	329 (12.0)
	Female	1592 (36.7)	733 (46.0)	223 (14.0)	158 (9.9)	301 (18.9)	177 (11.1)

Table-2 shows the prevalence of anxiety (score >1 on GAD-7) in study population and sub groups of age and gender among different profession groups. Total prevalence of anxiety in study population was 80.5% and difference of prevalence of anxiety among different profession groups was observed to be statistically significant (p 0.008). The difference of

prevalence of anxiety in profession groups among sub groups of age and gender was observed to be statistically highly significant (p<0.001) in the male sub-group, statistically significant (p<0.05) in sub groups of females, 41-60 years and >60 years age where as it was found to be statistically not significant in sub group of 20-40 years age.

Table-2: Prevalence of anxiety according to age and gender in different profession groups. N (%)

Variables	Anxiety [¥]	Professions [£]					Total	P Value	
		Med Prof	Busin	Teach	Stds	Non -Med Prof			
Total	No Anxiety	466 (20.7)	103 (14.9)	65 (20.2)	120 (21.2)	89 (17.6)	843 (19.5)	0.008*	
	Anxiety	1780 (79.3)	589 (85.1)	257 (79.8)	447 (78.8)	417 (82.4)	3490 (80.5)		
Age Groups	20-40 Yrs	No Anxiety	182 (18.7)	56 (20.2)	27 (25.5)	120 (21.2)	24 (15.2)	409 (19.7)	0.225; NS
		Anxiety	790 (81.3)	221 (79.8)	79 (74.5)	447 (78.8)	134 (84.8)	1671 (80.3)	
	41-60 Yrs	No Anxiety	189 (18.4)	32 (9.6)	34 (17.0)	0 (0.0)	44 (14.9)	299 (16.1)	0.002*
		Anxiety	838 (81.6)	300 (90.4)	166 (83.0)	0 (0.0)	251 (85.1)	1555 (83.9)	
	>60 yrs	No Anxiety	95 (38.5)	15 (18.1)	4 (25.0)	0 (0.0)	21 (39.6)	135 (33.8)	0.005*
		Anxiety	152 (61.5)	68 (81.9)	12 (75.0)	0 (0.0)	32 (60.4)	268 (66.2)	
Gender	Males	No Anxiety	331 (21.9)	78 (16.6)	40 (24.4)	86 (32.3)	61 (18.5)	596 (21.7)	<0.001**
		Anxiety	1182 (78.1)	391 (83.4)	124 (75.6)	180 (67.7)	268 (81.5)	2145 (78.3)	
	Females	No Anxiety	135 (18.4)	25 (11.2)	25 (15.8)	34 (11.3)	28 (15.8)	247 (15.5)	0.018*
		Anxiety	598 (81.6)	198 (88.8)	133 (84.2)	267 (88.7)	149 (84.2)	1345 (84.5)	

¥ GAD-7 scale: Score 0: no Anxiety and >1 anxiety

£ Med Prof= Medical Profession, Busin=Business, Teach=Teachers, Stds= Students, Non-Med Prof= Non-medical profession.

NS: p > 0.05; Not significant; *p<0.05; Significant; **p<0.001; Highly significant

Figure 1 shows the prevalence of anxiety according to severity score among different profession groups. Results shown in figure depict higher overall

prevalence of mild anxiety as compared to moderate and severe anxiety among all profession groups.

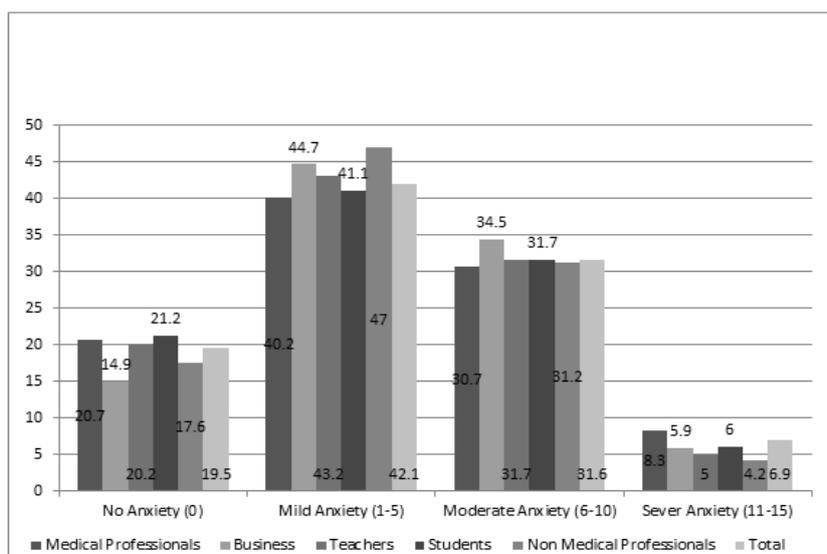


Fig-1: Prevalence of anxiety according to severity in different profession groups.

Table 3 shows the prevalence of anxiety according to severity score among different profession groups and analysis according to gender along with its statistical significance. Prevalence of mild anxiety in total study population as well as in male group was higher than the prevalence of moderate and severe anxiety, but in female subgroup the prevalence of moderate anxiety in total female study population as well as females among all profession groups was higher

than mild anxiety. Prevalence of severe anxiety was lowest among total population as well as gender and all profession groups. Results show that the difference of prevalence of anxiety according to severity scores among different profession groups as well as in sub groups of gender that is males and females was observed to be statistically highly significant ($p < 0.001$).

Table-3: Prevalence of anxiety according to severity scale related to gender in different profession groups. N (%)

Variables	Severity of Anxiety [¥]	Professions [£]					Total	P Value	
		Med Prof	Busin	Teach	Stds	Non-Med Prof			
Total	No Anxiety	466 (20.7)	103 (14.9)	65 (20.2)	120 (21.2)	89 (17.6)	843 (19.5)	<0.001**	
	Mild Anxiety	904 (40.2)	309 (44.7)	139 (43.2)	233 (41.1)	238 (47.0)	1823 (42.1)		
	Moderate Anxiety	690 (30.7)	239 (34.5)	102 (31.7)	180 (31.7)	158 (31.2)	1369 (31.6)		
	Severe Anxiety	186 (8.3)	41 (5.9)	16 (5.0)	34 (6.0)	21 (4.2)	298 (6.9)		
Gender	Males	No Anxiety	331 (21.9)	78 (16.6)	40 (24.4)	86 (32.3)	61 (18.5)	596 (21.7)	<0.001**
		Mild Anxiety	664 (43.9)	242 (51.6)	107 (65.2)	128 (48.1)	204 (62.0)	1345 (49.1)	
		Moderate Anxiety	420 (27.8)	137 (29.2)	17 (10.4)	40 (15.0)	48 (14.6)	662 (24.2)	
		Severe Anxiety	98 (6.5)	12 (2.6)	00 (0.0)	12 (4.5)	16 (4.9)	138 (5.0)	
	Females	No Anxiety	135 (18.4)	25 (11.2)	25 (15.8)	34 (11.3)	28 (15.8)	247 (15.5)	<0.001**
		Mild Anxiety	240 (32.7)	67 (30.0)	32 (20.3)	105 (34.9)	34 (19.2)	478 (30.0)	
		Moderate Anxiety	270 (36.80)	102 (45.7)	85 (53.8)	140 (46.5)	110 (62.1)	707 (44.4)	
		Severe Anxiety	88 (12.0)	29 (13.0)	16 (10.1)	22 (7.3)	5 (2.8)	160 (10.1)	

[¥] GAD-7 scale: Score 0: no Anxiety, 1-5 mild anxiety, 6-10 moderate anxiety and >11 severe anxiety

[£] Med Prof= Medical Profession, Busin=Business, Teach=Teachers, Stds= Students, Non-Med Prof= Non-medical profession.

** $p < 0.001$; Highly significant.

Table 4 shows the prevalence of anxiety according to severity score among different profession groups and age sub groups along with its statistical significance. Results show that the prevalence of mild anxiety was more as compared to moderate and severe anxiety among all professional groups as well as among all age groups except more prevalence of moderate

anxiety in >60 years business group as compared to mild and severe anxiety. The difference of prevalence of anxiety according to severity scores among different profession groups as well as in sub groups of age was observed to be statistically highly significant ($p < 0.001$).

Table-4: Prevalence of anxiety according to severity scale related to age in different profession groups. N (%)

Age Groups	Severity of Anxiety [¥]	Professions [£]					Total	P Value
		Medi Prof	Busin	Teach	Stds	Non-Med Prof		
20-40 Yrs	No Anxiety	182 (18.7)	56 (20.2)	27 (25.5)	120 (21.2)	24 (15.2)	409 (19.7)	<0.001**
	Mild Anxiety	386 (39.7)	157 (56.7)	45 (42.5)	233 (41.1)	76 (48.1)	897 (43.1)	
	Moderate Anxiety	312 (32.1)	54 (19.5)	24 (22.6)	180 (31.7)	46 (29.1)	616 (29.6)	
	Severe Anxiety	92 (9.5)	10 (3.6)	10 (9.4)	34 (6.0)	12 (7.6)	158 (7.6)	
41-60 Yrs	No Anxiety	189 (18.4)	32 (9.6)	34 (17.0)	0 (0.0)	44 (14.9)	299 (16.1)	<0.001**
	Mild Anxiety	426 (41.5)	141 (42.5)	88 (44.0)	00 (0.0)	145 (49.2)	800 (43.1)	
	Moderate Anxiety	340 (33.1)	140 (42.2)	74 (37.0)	00 (0.0)	99 (33.6)	653 (35.2)	
	Severe Anxiety	72 (7.0)	19 (5.7)	4 (2.0)	00 (0.0)	7 (2.4)	102 (5.5)	
>60 yrs	No Anxiety	95 (38.5)	15 (18.1)	4 (25.0)	0 (0.0)	21 (39.6)	135 (33.8)	<0.001**
	Mild Anxiety	92 (37.2)	11 (13.3)	6 (37.5)	00 (0.0)	17 (32.1)	126 (31.6)	
	Moderate Anxiety	38 (15.4)	45 (54.2)	4 (25.0)	00 (0.0)	13 (24.5)	100 (25.1)	
	Severe Anxiety	22 (8.9)	12 (14.5)	2 (12.5)	00 (0.0)	2 (3.8)	38 (9.5)	

[¥] GAD-7 scale: Score 0: no Anxiety, 1-5 mild anxiety, 6-10 moderate anxiety and >11 severe anxiety
[£] Med Prof= Medical Profession, Busin=Business, Teach=Teachers, Stds= Students, Non-Med Prof= Non- medical profession.
 **p<0.001; Highly significant.

Table 5 shows the results of response to the question about difficulties to do work, takes care of things at home, or get along with other people and need for treatment. 57.9% of study population did not have any difficulty to do work, takes care of things at home, or get along with other people, 38.3% had some difficulty, 3.0% has very difficult feelings and 0.8% faced extreme difficulty to do work, takes care of things at home, or get along with other people. Similar results were observed among other profession groups except business group were 43.9% had no difficulty and 52.5% had somewhat difficulty to do work, takes care of things at home, or get along with other people. The difference in the response to question to do work takes care of things at home, or get along with other people was

statistically highly significant ($p < 0.001$) among all the profession groups.

Response to question about need for treatment among study population and all profession groups is shown in table 5. Results show that majority of study population (69.9%) as well as subjects among all profession groups did not needed some medicines or treatment, where as 27.2% of study population required medicines occasionally and only 2.9% subjects required regular treatment. The difference of requirement for treatment or medicines among the different profession groups was found to be statistically highly significant ($p < 0.001$).

Table-5: Response to the question about difficulties to do work, takes care of things at home, or get along with other people and need for treatment? (N %)

Questions		Total	Professions [£]					P Value
			Medi Prof	Busin	Teach	Stds	Non-Med Prof	
If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all	2510 (57.9)	1431 (63.7)	304 (43.9)	189 (58.7)	329 (58.0)	257 (50.8)	<0.001**
	Somewhat difficult	1658 (38.3)	728 (32.4)	363 (52.5)	132 (41.0)	197 (34.7)	238 (47.0)	
	Very difficult	131 (3.0)	69 (3.1)	25 (3.6)	1 (0.3)	30 (5.3)	6 (1.2)	
	Extremely difficult	34 (0.8)	18 (0.8)	0 (0.0)	0 (0.0)	11 (1.9)	5 (1.0)	
Whether you needed some medicine	No	3030 (69.9)	1497 (66.7)	483 (69.8)	244 (75.8)	414 (73.0)	392 (77.5)	<0.001**
	Occasionally	1177 (27.2)	684 (30.5)	178 (25.7)	73 (22.7)	136 (24.0)	106 (20.9)	
	Regularly	126 (2.9)	65 (2.9)	31 (4.5)	5 (1.6)	17 (3.0)	8 (1.6)	

**p<0.001; Highly significant
[£] Med Prof= Medical Profession, Busin=Business, Teach=Teachers, Stds= Students, Non-Med Prof= Non- medical profession.

Table 6 shows the comparison of mean values of anxiety assessed by GAD-7 among different professions. The prevalence of anxiety in study population was 80.5% with mean score of 4.5885, SD + 3.79730, median 4.00, IQR of 5.00, 95% CI 4.475-

4.701. Results show the maximum mean score (4.8642) in business group as compared to other profession groups with teachers group (4.0373) showing the minimum mean score.

Table-6: Comparison of mean values of anxiety assessed by GAD-7 among different professions

Prof [£]	N	Mean Score	± SD	Median	Inter-Quartile Range	Mean Rank	Standard error of mean	95% CI		Minimum	Maximum
Med Prof	2246	4.6919	4.00883	4.000	6.000	2179.88	0.08459	4.5260	4.8578	0.00	21.00
Busin	692	4.8642	3.43626	5.000	5.000	2306.82	0.13063	4.6077	5.1206	0.00	16.00
Teach	322	4.0373	3.41955	3.000	4.000	2002.93	0.19056	3.6624	4.4122	0.00	14.00
Stds	567	4.3915	3.73719	4.000	6.000	2103.69	0.15695	4.0833	4.6998	0.00	19.00
Non-med Prof	506	4.3241	3.54235	3.000	4.000	2093.95	0.15748	4.0147	4.6335	0.00	20.00
Total Popu	4333	4.5885	3.79730	4.000	5.000	-	0.05769	4.4754	4.7016	0.00	21.00

[£] Prof = Profession, Med Prof= Medical Profession, Busin=Business, Teach=Teachers, Stds= Students, Non-Med Prof= Non- medical profession. Popu = Population

Multiple Comparison of GAD-7 score among different professional groups using Mann-Whitney Test is shown in table 7. GAD-7 score for medical professional group showed statistically significant relationship with business and teachers group and statistically non-significant relationship with students and non-medical professional groups. Similarly business group showed statistically highly significant

relationship with teachers group and statistically significant relationship with students and non-medical professional groups. Relationship of teachers groups with students and non-medical professional groups were shown to be statistically non significant. Similarly the relationship of students group with non-medical professional group was shown to be statistically non significant.

Table-7: Multiple comparison of GAD-7 score among professions using Mann-Whitney Test

Professions	Professions	Z value	P value
Medical Professionals	Business	2.253	0.024*
	Teachers	2.333	0.020*
	Students	1.250	0.211; NS
	Non-medical Professionals	1.393	0.164; NS
Business	Teachers	3.772	<0.001**
	Students	2.844	0.004*
	Non-medical Professionals	3.173	0.002*
Teachers	Students	1.024	0.306; NS
	Non-medical Professionals	1.197	0.231; NS
Students	Non-medical Professionals	0.010	0.992; NS

NS: $p > 0.05$; Not significant; * $p < 0.05$; Significant; ** $p < 0.001$; Highly significant

DISCUSSION

Emergence of COVID-19 pandemic, previously unknown disease has taken the whole world by surprise leading to wide spread anxiety and mental health issues so much so that mental health problems are being considered as serious global public health concern in general, as well as, among vulnerable populations [xⁱ]. [Holmes EA, *et al.* 2020]. Assessment of the prevalence of mental health issues are very important for policy decisions, formulating appropriate management guidelines and initiate preventive measures to contain, curb and prevent mental health problems becoming a serious public health catastrophe. In spite of seriousness of the issue, there are still paucity of quantifiable and uniform information related to mental health issues created due to the COVID-19 pandemic [xⁱⁱ] [Ram Lakhan, *et al.* 2020] may be because of variable population size, heterogeneity of population studied, different methodologies, diagnostic or screening criteria used [xⁱⁱⁱ] [De Boni RB, *et al.* 2020]. Therefore, the present large comparative study was undertaken to document the prevalence of anxiety among different professions using GAD-7 scale during COVID-19 pandemic in India. Application of GAD-7 scale for epidemiological assessment of prevalence of anxiety has been proved to be stable and useful among various demographic groups for meaningful comparison and psychometric properties both in Indian and western context showing full scalar invariance [x^{iv}]. [De Man J, *et al.* 2021].

To best of our knowledge and review of literature, our study seems to be one of the largest study involving 4333 subjects from India. In our study the prevalence of anxiety among total study population (n-4333) was 80.5% (mean 4.58, IQR-5.00, 95% CI 4.47-4.70) including 79.3% (mean 4.69, IQR-6.00, 95% CI 4.52-4.85) among medical professionals (n-2246), 85.1% (mean 4.86, IQR-5.00, 95% CI 4.60-5.12) among business group (n-692), 79.8% (mean 4.03, IQR-4.00, 95% CI 3.66-4.41) among teachers (n-322), 78.8% (mean 4.39, IQR-6.00, 95% CI 4.08-4.69) among students (n-567) and 82.4% (mean 4.32, IQR-4.00, 95% CI 4.01-4.63) non-medical profession group (n-506).

In random-effects model review of 31 studies (28,877 subjects) showed 41.3% (95% CI: 34.7–48.1, $I^2 = 99.18\%$) pooled prevalence of anxiety. Among studies 52.3% highest prevalence of anxiety was reported from Bangladesh (95% CI: 41–63.6, $I^2 = 98.67\%$), 50.4%, (95% CI: 30.5–70.2, $I^2 = 99\%$) from Pakistan, 49.6% (95% CI: 30.6–68.7, $I^2 = 95.45\%$) from Nepal and the lowest among the South Asian countries of 34.7% (95% CI: 25.4–44.7, $I^2 = 99.13\%$) was reported from India. This review reported 40.7% (95% CI: 31.6–50.1, $I^2 = 99.15\%$) pooled prevalence of anxiety among general population and 43.6% (95% CI: 33.1–54.5, $I^2 = 99.15\%$) among the healthcare workers [x^v] [Hossain MM, *et al.* 2021]. Prevalence of anxiety documented by this review was lower than expressed by our study. Similarly a meta-analysis of 17 studies [x^{vi}] [Salari N., *et al.* 2020]. documented 31.9% (95% CI 27.5 to 36.7%) prevalence of anxiety during COVID-19 pandemic in general population which was much lower than 80.5% (mean 4.58, IQR-5.00, 95% CI 4.47-4.70) documented by our study. A study documented the prevalence of anxiety to be 2.5% (95% CI: 0.34–4.66) estimated by using GAD-7 scale [x^{vii}]. [Rehman T, *et al.* 2021]. Another study of 1,215 subjects reported 20.2% (CI 95% 17.9–22.5) prevalence of clinically significant anxiety [x^{viii}] [Anindyajati G, *et al.* 2021] and almost same prevalence of 20.4% with median total score of 10 (IQR: 9-14) on GAD-7 scale was observed by a study from China [x^{ix}] [Li J, *et al.* 2020]. Yet another survey stated that 28% study subjects were anxious over last three weeks [x^x] [Shankey Verma, *et al.* 2020].

25.8% (95% CI 20.5–31.9%) prevalence of anxiety was shown by a systematic review and meta-regression analysis involving 29 studies among COVID-19 care hospital staff [x^{xi}] [Salari, N., *et al.* 2020]. Another study during COVID-19 outbreak involving 1210 subjects observed prevalence of 28.8% moderate to severe anxiety symptoms [x^{xii}]. [Wang C, *et al.* 2020]. A study analysing 1685 responses documented 38.2% prevalence of anxiety on GAD 7 scale [x^{xiii}] [Grover S, *et al.* 2020]. A study involving North Indian population reported 50% subjects screen positive for anxiety during COVID-19 the pandemic [x^{xiiii}]. [Kumar K, *et al.* 2020]. A cross-sectional study involving South Indian medical students documented

75.5% prevalence of anxiety symptoms which was comparable to the results observed in our study [^{xxiv}] [Nihmath Nisha, *et al.* 2020].

The studies mentioned above show great difference in prevalence of anxiety ranging from 2.5% [¹⁷] to 75.5% [²⁴] [Nihmath Nisha, *et al.* 2020] and this difference in the prevalence can be because of the heterogeneity in study population, different methodology and assessment scale used for the studies. Evidence suggests that with GAD-7 scale, the prevalence of anxiety was accessed to be higher of 49.2%, (95% CI: 39.1–59.3, $I^2 = 99.34\%$) than the studies using the Depression, Anxiety and Stress-21 Scale (DASS) that is 34.2%, (95% CI: 19.2–51, $I^2 = 99.35\%$) and with Hospital Anxiety and Depression Scale (HADS) scale of 32.8%, (95% CI: 25.1–41, $I^2 = 94.39\%$) [¹⁴] [Hossain MM, *et al.* 2021]. Whereas another meta-analysis during the COVID-19 pandemic involving 43 studies observed a lower prevalence of anxiety of 8% [95% CI: 7%–9%] using the Self-rating Anxiety Scale (SAS) scale, 18% [95% CI: 9%–30%] using the Beck Anxiety Inventory (BAI) scale, 21% [95% CI: 17%–26%] accessed with GAD-7 scale, 28% (95% CI: 26%–29%) with the HADS scale, 32% (95% CI: 24%–41%) with DASS scale, 32% (95% CI: 30%–33%) with Beck Anxiety Inventory (BSI) scale and 33% (95% CI: 31%–34%) with the State-Trait Anxiety Inventory (STAI) scale documenting the fact that the assessment of prevalence of anxiety was dependent on the assessment scale used for the study. An overall 25% (95% CI 21%–29%) prevalence of anxiety in the general population was documented by this meta-analysis [⁵] [Javier Santabárbara, *et al.* 2021].

Before the COVID-19 pandemic systematic reviews and meta-regressions expressed existence of considerable uncertainty about estimated prevalence of anxiety disorders and observed current global prevalence of anxiety disorders to be 7.3% (95% CI: 4.8% to 10.9%) [⁵] [Javier Santabárbara, *et al.* 2021] In general population, the prevalence of anxiety during the epidemic of Severe Acute Respiratory Syndrome, SARS; H1N1 influenza, Ebola was estimated to be between 3.2% and 12.6% [⁵] [Javier Santabárbara, *et al.* 2021] But results of our study suggests much higher prevalence of anxiety during COVID-19 pandemic as compared to previous outbreaks, may be because of frequent disruption of all routine human activities with lockdowns, extensive adverse social and economic consequences. Results of our study showed that prevalence of anxiety according to the severity scale in overall study population was 42.1% mild anxiety, 31.6% moderate anxiety and 6.9% had severe anxiety. Similarly the prevalence of anxiety among different profession groups was shown to be 40.2% mild anxiety, 30.7% moderate anxiety, and 8.3% severe anxiety among medical profession group, 44.7% mild anxiety, 34.5% moderate anxiety, and 5.9% severe anxiety among business group, 43.2% mild anxiety, 31.7%

moderate anxiety, and 5.0% severe anxiety among teachers group, 41.1% mild anxiety, 31.7% moderate anxiety, and 6.0% severe anxiety among students group and 47.0% mild anxiety, 31.2% moderate anxiety, and 4.2% severe anxiety was observed among non-medical profession group. Analysis of our data shows higher prevalence of mild anxiety as compared to moderate and severe anxiety in all profession groups and the difference was observed to be statistically highly significant ($p < 0.001$).

There is paucity of studies exploring prevalence of anxiety among different professional groups. A study involving 351 subjects using GAD-7 scale showed 51.3% prevalence of mild anxiety, 29% moderate anxiety and 19.9% had severe anxiety [^{xxv}]. [Malarkodi S, *et al.* 2021]. Results of this study were almost similar to our study except the prevalence of severe anxiety in our study was lower. A review of several studies documented the 27.24% (95% CI: 19.38–35.89, $I^2 = 99.3\%$) overall pooled prevalence of mild anxiety, 14.68% (95% CI: 12.3–17.22, $I^2 = 94.7\%$) moderate anxiety and 9.94% (95% CI: 7.09–13.2, $I^2 = 97.6\%$) severe anxiety [¹⁴]. [Hossain MM, *et al.* 2021]. As compared to results of our study prevalence of mild and moderate anxiety was lower but the prevalence of severe anxiety was higher. Another meta-analytic review [^{xxvi}] [Naveed S., *et al.* 2020] showed 25.8% prevalence of anxiety which was again much lower than the prevalence documented by our study. A study of 283 subjects representing general population using Hamilton anxiety rating scale reported 26.14% mild anxiety, 17.31% had mild to moderate, 19.08% had moderate to severe, and 37.45% had very severe anxiety, whereas analysis involving 197 health care workers reported 27% mild anxiety, 18.7% mild to moderate, 17.7% moderate to severe and 35.5% had very severe [^{xxvii}]. [Nimarpreet Kaur, *et al.* 2021]. Various Studies involving HCWs from different countries documented high 64.7% from Turkey [^{xxviii}] [Elbay RY, *et al.* 2020] as well as low 15.7% from India and Singapore [^{xxix}] [Chew NW, *et al.* 2020] prevalence of anxiety. Similarly a high of 57% and a low of 0.6% prevalence of anxiety were reported by a study done by Kazmi *et al.* [^{xxx}] [Kazmi, Syed Sajid Husain *et al.* 2020]. and Ong *et al.* [^{xxxi}] [Ong JJ, *et al.* 2020] respectively. A web survey from Brazil and Spain documented 11.6% prevalence of anxiety [¹³] [De Boni RB, *et al.* 2020] and 34.1% (95% CI: 26.3%–42.3%) pooled prevalence of anxiety was documented by an analysis of six studies and 35.3% (95% CI: 26.3%–44.9%) was by analysis of five studies involving HCWs whereas 28.0% (95% CI: 23.4%–33.0%) prevalence was documented by one study involving the general population [⁶] [Singh RK, *et al.* 2021]. A meta-analysis including studies conducted in countries from different continents reported 29.0% (95% CI: 14.2%–50.3%) pooled prevalence of anxiety among HCWs exposed to SARS/MERS/COVID-19 [^{xxxii}] [Pablo GS De, *et al.* 2020]. Prevalence of anxiety among different

professions like 73% among Egyptian medical students, 50.1% among Hong Kong nurses, 10.5% among general American population were shown by different studies [20] Salari, N., *et al.* 2020]. A study documented 55.65%, 48.54%, 52.34%, and 56% presence of anxiety among physicians, nursing staff, technicians, and non-healthcare subjects [xxxiii] [Raj R, *et al.* 2020]. Study by Que *et al.* observed 46.0% prevalence of anxiety among the healthcare professionals [xxxiv]. [Que J, *et al.* 2020]. Similarly, Barzelay *et al.* [xxxv] [Barzelay R, *et al.* 2020]. reported 22.7% anxiety among HCWs and a systematic review and meta-analysis documented 56% (39–73%) prevalence of anxiety among HCWs as well as general population [xxxvi]. [Huang V, *et al.* 2020]. Another study observed 13% medical fraternity and 8.5% of non-medical staff suffers from anxiety symptoms and the difference was statistically significant. ($P < 0.01$) [xxxvii]. [Zhang W, *et al.* 2020].

Analysis of the data, studies, reviews and meta-analysis mentioned in literature exploring prevalence of anxiety show lower prevalence of anxiety as compared to higher prevalence observed in our study among total study population as well as profession groups.

Overall prevalence of anxiety and according to severity score among gender groups in our study was 78.3% (49.1% mild, 24.2% moderate and 5% severe anxiety) in males and 84.5% (30.0% mild, 44.4% moderate and 10.1% severe anxiety) in females. Prevalence of anxiety among medical profession group was 78.1% (43.9% mild, 27.8% moderate and 6.5% severe anxiety) in males, 81.6% (32.7% mild, 36.8% moderate and 12.0% severe anxiety) in females, among business group was 83.4% (51.6% mild, 29.2% moderate and 2.6% severe anxiety) in males, 88.8% (30.0% mild, 45.7% moderate and 13.0% severe anxiety) in females, among teachers was 75.6% (65.2% mild, 10.4% moderate and 0.0% severe anxiety) in males, 84.2% (20.3% mild, 53.8% moderate and 10.1% severe anxiety) in females, among students was 67.7% (48.1% mild, 15.0% moderate and 4.5% severe anxiety) in males, 88.7% (34.9% mild, 46.5% moderate and 7.3% severe anxiety) in females, among non- medical profession group was 81.5% (62.0% mild, 14.6% moderate and 4.9% severe anxiety) in males, 84.2% (19.2% mild, 62.2% moderate and 2.8% severe anxiety) in females. Data analysis shows higher prevalence of mild anxiety among males in total study population as well as all profession groups where as higher prevalence of moderate anxiety was observed among females in total study population as well as all profession groups and the difference was statistically highly significant ($p < 0.001$). Maximum prevalence of mild anxiety (65.2%) was observed in male teachers group, moderate (62.1%) in female non-medical professional group and severe (13.0%) in female business group. In a review significantly higher prevalence of anxiety was observed in females

(46.49%) as compared to males (41.13%) [14]. [Hossain MM, *et al.* 2021]. Another study using GAD-7 scale involving 88611 teachers documented 13.67% overall prevalence of anxiety reporting higher prevalence (13.895) in women as compared to men (12.93% [xxxviii] [Li Q, *et al.* 2020]. Significantly higher association of anxiety level with female gender (mean anxiety score: 9.3 vs. 8.7, $p = 0.007$, M-W) was shown by a study observing variables with total number of subjects who had a valid anxiety score of 3035 and mean score of 9.2 (range: zero-21.0)[2]. [Sallam M, *et al.* 2020].

Existing evidence suggests greater risk of psychological problems in women than men, because of the interplay between several factors like biological, social, psychological, gender stereotypes, social stigma, inequity and social autonomy [xxxix]. [Riecher-Rössler. 2017] which tends to increase during epidemics or humanitarian crises because of disproportionate impact on the most vulnerable section of society including females. Entrenched inequalities of access to education, job opportunities and healthcare often leave women inadequately equipped to effectively protect themselves and their families from pandemic and bear secondary negative effects like economic insecurity or inaccessible health services. In India, gender disparities may have exacerbated during COVID-19 pandemic affecting women's ability to make informed decisions, increased psychological distress, household stress, increase in gender-based violence, poor mental health symptoms, lost employment, stress and ongoing lockdowns significantly affecting the overall well-being and mental health [xl]. [Pinchoff J, *et al.* 2020].

Analysis of our study data for overall prevalence of anxiety and according to severity score among the age groups was 80.3% (43.1% mild, 29.6% moderate and 7.6% severe anxiety) in 20-40 years age group, 83.9% (43.1% mild, 35.2% moderate and 5.5% severe anxiety) in 41-60 years age group and 66.2% (31.6% mild, 25.1% moderate and 9.5% severe anxiety) in >60 years age group. Prevalence of anxiety among medical profession group was 81.3% (39.7% mild, 32.1% moderate and 9.5% severe anxiety) in 20-40 years age group, 81.6% (41.5% mild, 33.1% moderate and 7.0% severe anxiety) in 41-60 years age group and 61.5% (37.2% mild, 15.4% moderate and 8.9% severe anxiety) in >60 years age group, among business group was 79.8% (56.7% mild, 19.5% moderate and 3.6% severe anxiety) in 20-40 years age group, 90.4% (42.5% mild, 42.2% moderate and 5.7% severe anxiety) in 41-60 years age group and 81.9% (13.3% mild, 54.2% moderate and 14.5% severe anxiety) in >60 years age group, among teachers was 74.5% (42.5% mild, 22.6% moderate and 9.4% severe anxiety) in 20-40 years age group, 83.0% (44.0% mild, 37.0% moderate and 2.0% severe anxiety) in 41-60 years age group and 75.0% (37.5% mild, 25.0% moderate and 12.5% severe anxiety) in >60 years age group, among students was 78.8% (41.1% mild, 31.7% moderate and

6.0% severe anxiety) in 20-40 years age group, 0.00% in 41-60 years age group and 0.00% in >60 years age group, among non-medical profession group was 84.8% (48.1% mild, 29.1% moderate and 7.6% severe anxiety) in 20-40 years age group, 85.1% (49.2% mild, 33.6% moderate and 2.4% severe anxiety) in 41-60 years age group and 60.4% (32.1% mild, 24.5% moderate and 3.8% severe anxiety) in >60 years age group. Maximum prevalence of anxiety of 90.4% was observed in 41-40 years business group and minimum of 60.4% in >60 years non-medical profession group. Similarly highest prevalence of anxiety according to severity score of 56.7% mild anxiety was observed in 20-40 years business group, 42.2% moderate anxiety in 41-60 years business group, 14.5% severe anxiety in >60 years business group, whereas lowest of 13.3% mild anxiety was observed in >60 years business group, 15.4% moderate anxiety in >60 years medical professional group, 2.0% severe anxiety in 41-60 years teachers group. An analysis of another study involving 88611 teachers accessed on GAD-7 scale showed 13.67% prevalence of anxiety, teachers of all age groups of 18-30, 30-40, 40-50, 50-60 and 60-100 years indicated high prevalence of minimal anxiety of 49.89%, 47.27%, 48.33%, 50.83%, and 52.67% respectively. 38.73% mild anxiety in 30-40 age group was most prevalent. Among teachers of age groups of 18-30, 30-40, 40-50, and 50-60 years prevalence of severe anxiety was observed to be 4.07%, 4.50%, 4.18%, and 4.91%, respectively. Prevalence of minimal anxiety was observed to highest 52.6% among 60-100 years age group and lowest 47.2% among 30-40 years age group. Similarly highest 38.7% prevalence of mild anxiety was observed among 30-40 years group and lowest 33.7% among 60-100 years age group, highest 9.5% prevalence of moderate anxiety was observed among 30-40 years group and lowest 7.4% among 60-100 years age group and highest 6.1% prevalence of severe anxiety was observed among 60-100 years group and lowest 4.0% among 18-30 years age group [38]. [Li Q, *et al.* 2020]. The results of this study were almost comparable to the results of our study.

In our study multiple comparisons of GAD-7 score among different profession groups using Mann-Whitney Test observed statistically significant difference when medical profession group was compared with business and teachers group and statistically not significant difference with students and non-medical profession group. Comparison of business group with teachers, students and non-medical profession showed statistically significant difference, whereas the comparison of teachers group with students and non-medical professional groups showed statistically not significant difference. Comparison of students group with non-medical profession groups showed statistically not significant difference. A study showed HCWs and students experiencing anxiety more than other professions and significant difference was noted among students and teachers (Md = 3.97,

$p < 0.05$), students and mental health care professionals (Md = 6.99, $p < 0.01$), students and corporate employees (Md = 5.43, $p < 0.01$), mental health care professionals and HCWs (Md = 6.90, $p < 0.01$), and health professionals and corporate employees (Md = 5.35, $p < 0.05$) signifying the fact that extent and level of anxiety differ among different professional groups [xli]. [Rehman U, *et al.* 2021].

Our study observed that 57.9% of study population did not have any difficulty, 38.3% faced some difficulty, 3.0% faced great difficult and 0.8% faced extreme difficulty to do work, takes care of things at home, or get along with other people. Results observed among other profession groups showed statistically highly significant ($p < 0.001$) difference in response to extent of difficulty among all the profession groups.

Similarly results of our study show 69.9% study population did not require any medicine, 27.2% required medicines occasionally and only 2.9% required medicines regularly. Statistically highly significant ($p < 0.001$) difference was observed among all professional groups for extent of requirement of medicines. On review of literature and internet search, we found paucity of studies, meta-analysis or reviews exploring the prevalence of anxiety among different professional groups, their relationships, extent of difficulties faced and need of medicines for treatment of anxiety, so we did not have much the opportunity to compare results of the study with other research observations or documentations.

Very high prevalence of anxiety in Indian population suggests urgent need for increased focus on mental health issues. Accessing, managing and preventing mental health issues in Indian context during COVID-19 pandemic is much more complex because significant number of people are socially and economically deprived and vulnerable with high prevalence of pre-existing mental problems [xlii] [Murthy R. S. (2017) deficient mental health services including professionals and infrastructure [xliii] [Cullen W., *et al.* 2020] and more importantly constrained use and availability of digital mental health solutions especially when population is faced with tremendous misinformation and fake news on social media, need for India specific interventions becomes much more relevant to manage mental health issues. The MOHFW-GOI, Indian Psychiatric Association and several other psychiatry help groups has initiated several mental health assistance measures during the COVID-19 pandemic like toll-free helpline for 'Behavioural Health' and for the Psycho-Social health assistance. MOHFW-GOI web portal provides several advisories, videos, resource materials, yoga and meditation advice, guidelines for mental health care of vulnerable groups, measures for coping with the lockdown and handling isolation, post COVID-19 mental health issues and on

coping stress during COVID-19 pandemic [^{xiv}] [MoHFW Home. 2020]. Several bodies like The National Institute of Mental Health and Neuro-Science, All India Institute of Medical Sciences and Indian Psychiatric Society have initiated online and telemedicine services to manage mental health issues and suggested formation of 'Psychological intervention medical team' to fight mental health challenges [⁴³]. [Cullen W., *et al.* 2020]. High prevalence of social and economic problems like illiteracy, poverty, gender inequity, unemployment, violence, socioeconomic disparity may adversely affect mental health across venerable population groups and may contribute to aggravate mental health problems during the COVID-19 pandemic, so it becomes very important to initiate a holistic approach to address the all determinants of mental health disorders [¹⁴]. [Hossain MM, *et al.* 2021].

For this, first step for the policymakers and other key stakeholders is to know the prevalence and extent of mental health issues and our study is a step forward in this direction which will help collaborative decision-making, empowering communities, institutions and policy makers to adopt evidence-based information and device integrated policies to alleviate the psychosocial burden of COVID-19 in India.

Limitations

Our study has certain limitations and we admit that the study population may be constituting one of the largest sample size in Indian context, but may not be representative of Indian population partly because study was limited to English reading or understanding population and partly related to distribution of study performs via physical contacts and social media network make sampling bias inevitable. Another limitation is that higher proportion of medical professionals as compared to other professional groups may influence the results of our study. Though GAD-7 scale has been shown to be easily reproducible, very well validated assessment scales for prevalence of anxiety, stable across demographic subgroups, comparable psychometric properties both in Indian and western settings, still evidence suggests GAD-7 scale may assess higher prevalence of anxiety as compared to other assessment scales. For future studies, we suggest more emphasize on larger sample, longitudinal studies involving every section of society with or without availability of online participation providing more generalizable methods using multipronged sampling and recruitment strategies for collection of data on prevalence of mental health issues among Indian population.

CONCLUSION

Globally, COVID-19 pandemic has catastrophic effect on psychosocial and mental health leading to increased mental health problems especially among resources constrained developing countries like India. Our comparative study analyzing prevalence of

anxiety among different professions using GAD-7 scale during COVID-19 Pandemic in India has provided quantitative evidence of significantly high prevalence of anxiety among all professions, gender and age groups in Indian population. High burden of anxiety in Indian population necessitate increased focus on initiation as well as strengthening already initiated multilevel India specific mental health interventions and strategies to prevent, treat and manage increasing burden of psychosocial and mental health burden of COVID-19. Moreover, marked knowledge gaps, high variability and heterogeneity of data among various studies on mental health issues especially on psychosocial epidemiology in India substantiates the need for further research, facilitating evidence-based data and solutions to increasing mental health problems during and after the COVID-19 pandemic.

REFERENCES

- ¹Neria. Y., Nandi, A., Galea, S. (2008). Post-traumatic stress disorder following disasters: A systematic review. *Psychol Med*, 38(04); 467–480.
- ²Sallam, M., Dababseh, D., Yaseen, A., Al-Haidar, A., Taim, D., Eid, H. (2020). COVID-19 misinformation: Mere harmless delusions or much more? A knowledge and attitude cross-sectional study among the general public residing in Jordan. *PLoS ONE*, 15(12); e0243264
- ³World Health Organization. (2020). Mental health and psychosocial considerations during the COVID-19 outbreak. Available at: https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf?sfvrsn=6d3578af_2.
- ⁴Roy, A., Singh, A.K., Mishra, S., Chinnadurai, A., Mitra, A., Bakshi, O. (2020). Mental health implications of COVID-19 pandemic and its response in India. *Int J Soc Psychiatr*, 1–14
- ⁵Javier, S., Isabel, L., Darren, M. Lipnicki, JuanBueno-Notivol, (2021). Prevalence of anxiety in the COVID-19 pandemic: An updated meta-analysis of community-based studies. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 109; 110207
- ⁶Singh, R.K., Bajpai, R., Kaswan, P. (2021). COVID-19 pandemic and psychological wellbeing among health care workers and general population: A systematic-review and meta-analysis of the current evidence from India. *Clin Epidemiol Glob Health*, 11; 100737.
- ⁷Spitzer, R.L., Kroenke, K., Williams, J.B., Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 166 (10):1092-7
- ⁸De Man, J., Absetz, P., Sathish, T. (2021). Are the PHQ-9 and GAD-7 Suitable for Use in India? A Psychometric Analysis. *Front Psychol*. 12: 676398.
- ⁹Elezi, F., Tafani G, Sotiri E, Agaj H, Kola K. (2020). Assessment of anxiety and depression symptoms in the Albanian general population during the outbreak of COVID -19 pandemic. *Indian J Psychiatry*. 62: S470-5.

- ¹⁰Gururaj G, Varghese M, Benegal V, Rao GN, Pathak K, Singh LK, Mehta RY, Ram D, et al and NMHS collaborators group. (2016). National Mental Health Survey of India, 2015-16: Prevalence, patterns and outcomes. Bengaluru, National Institute of Mental Health and Neuro Sciences, NIMHANS Publication No. 129.
- ¹¹Holmes EA, O'Connor RC, Perry VH. et al. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psychiatry*, 7 (06) 547-560.
- ¹²Ram Lakhan, Amit Agrawal, Manoj Sharma. (2020). Prevalence of Depression, Anxiety, and Stress during COVID-19 Pandemic. *J Neurosci Rural Pract*, 11(04): 519-525.
- ¹³De, Boni, R.B., Balanzá-Martínez, V., Mota, J.C., Cardoso, T.D.A., Ballester, P. (2020). Depression, Anxiety, and Lifestyle among Essential Workers: A Web Survey from Brazil and Spain during the COVID-19 Pandemic. *J Med Internet Res*, 22(10); e22835
- ¹⁴Hossain, M.M., Rahman, M., Trisha N.F. (2021). Prevalence of anxiety and depression in South Asia during COVID-19: A systematic review and meta-analysis. *Heliyon*. 7(4):e06677.
- ¹⁵Salari, N., Hosseini-Far, A., Jalali, R. (2020). Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Glob. Health*, 16(1):57.
- ¹⁶Rehman, T., Singh, T., Sharma, S., Kumar, J., Govindan, D., Singh, S.M. (2021). Prevalence of Depression and Anxiety during the COVID-19 Pandemic among the Residents of an Urban Slum in North India. *J Neurosci Rural Pract*, 12(1); 153-158.
- ¹⁷Anindyajati, G., Wiguna, T., Murtani, B.J., Christian, H, Wigantara, N.A. (2021). Anxiety and Its Associated Factors during the Initial Phase of the COVID-19 Pandemic in Indonesia. *Front. Psychiatry*. 12: 634585
- ¹⁸Li, J., Yang, Z., Qiu, H. (2020). Anxiety and depression among general population in China at the peak of the COVID-19 epidemic. *World Psychiatry*, 19(2); 249-250.
- ¹⁹Shankey, V., Aditi, M. (2020). Depression, anxiety, and stress and sociodemographic correlates among general Indian public during COVID-19. *International Journal of Social Psychiatry*, 66(8) 756–762.
- ²⁰Salari, N., Khazaie, H., Hosseini-Far, A. (2020). The prevalence of stress, anxiety and depression within front-line healthcare workers caring for COVID-19 patients: a systematic review and meta-regression. *Hum Resour Health*, 18, 100.
- ²¹Wang, C., Pan, R., Wan, X. (2020). A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain Behav Immun*, 87; 40–48.
- ²²Grover, S., Sahoo, S., Mehra, A., Avasthi, A., Tripathi, A., Subramanyan, A. (2020). Psychological impact of COVID-19 lockdown: An online survey from India. *Indian J Psychiatry*, 62; 354-62
- ²³Kumar K, Mehra A, Sahoo S, Nehra R, Grover S. (2020). The psychological impact of COVID-19 pandemic and lockdown on the migrant workers: a cross-sectional survey. *Asian J Psychiat*, 53;102252.
- ²⁴Nihmath, N. S., Francis, Y. M., Balaji, K., Raghunath, G., Kumaresan, M. (2020). A survey on anxiety and depression level among South Indian medical students during the COVID 19 pandemic. *International Journal of Research in Pharmaceutical Sciences; 11(Special Issue 1):779-786*.
- ²⁵Malarkodi, S., Belsiyal, X.C., Deol, R., Sankarapandian, C. (2021). Perception and Anxiety of Indian Population during COVID-19 Pandemic: A Questionnaire-based Survey. *Int J Med Public Health*, 11(2); 90-5.
- ²⁶Naveed, S., Waqas, A., Chaudhary, A.M.D. (2020). Prevalence of common mental disorders in South Asia: a systematic review and meta-regression analysis. *Front. Psychiatr*, 11; 899.
- ²⁷Nimarpreet, K., Hatinder, J. S. S., Sharad, Bedi, Deepti, D. (2021). Journal of the Association of Physicians of India. Vol. 69: 23-27.
- ²⁸Elbay, R.Y., Kurtulmuş, A., Arpacioğlu, S., Karadere, E. (2020). Depression, anxiety, stress levels of physicians and associated factors in Covid-19 pandemics. *Psychiatry Res*, 113130.
- ²⁹Chew, N.W., Lee, G.K., Tan, B.Y., Jing, M., Goh, Y., Ngiam, N.J. (2020). A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun*, 88; 559-565.
- ³⁰Kazmi, S. S. H., & Hasan, Kashif and Talib, Sufia and Saxena, Sagar. (2020). COVID-19 and Lockdown: A Study on the Impact on Mental Health. *Mukt Shabd Journal*. (9), Issue 4: 1477-89.
- ³¹Ong, J.J., Bharatendu, C., Goh, Y., Tang, J.Z., Sooi, K.W., Tan, Y.L. (2020). Headaches associated with personal protective equipment—a cross-sectional study among frontline healthcare workers during COVID-19. *Headache J Head Face Pain*, 60(5); 864–77.
- ³²Pablo, G.S, De, Vaquerizo-serrano, J., Catalan, A. (2020). Impact of coronavirus syndromes on physical and mental health of health care workers: systematic review and meta-analysis. *J Affect Disord*, 275; 48–57.
- ³³Raj, R., Koyalada, S., Kumar, A., Kumari, S., Pani, P., Nishant. (2020). Psychological impact of the COVID-19 pandemic on healthcare workers in India: An observational study. *J Family Med Prim Care*, 9; 5921-6.
- ³⁴Que, J., Shi, L., Deng, J., Liu, J., Zhang, L., Wu, S. (2020). Psychological impact of the COVID-19 pandemic on healthcare workers: A cross-sectional study in China. *Gen Psych*. 30:e100259
- ³⁵Barzelay, R., Moore, T.M., Greenberg, D.M., Di Demenico, G.E., Brown, L.A., White, L.K. (2020). Resilience, COVID-19-related stress, anxiety and depression during the pandemic in a large population enriched for healthcare providers. *Transl Psychiatry*. 10:291-9.

³⁶Huang, V., Zhao, N. (2020). Mental health burden for the public affected by the COVID-19 outbreak in China: Who will be the high-risk group? *Psychol Health Med.* 1-12.

³⁷Zhang, W., Wang, K., Yin, L., Zhao, W.F., Xue, Q., Peng, M. (2020). Mental health and psychosocial COVID-19 epidemic in China. *Psychother Psychosom*, 89; 242–250.

Journal of the Association of Physicians, 113(5), 311–312.

⁴⁴MoHFW / Home. (2020). Retrieved April 6, 2020, from <https://www.mohfw.gov.in/>

³⁸Li, Q., Miao, Y., Zeng, X., Tarimo, C.S., Wu, C., Wu, J. (2020). Prevalence and factors for anxiety during the coronavirus disease 2019 (COVID-19) epidemic among the teachers in China. *J Affect Disord*, 277; 153-158.

³⁹Riecher-Rössler. (2017). A. Sex and gender differences in mental disorders. *Lancet Psychiatry*, 4(1); 8-9.

⁴⁰Pinchoff, J., Santhya, K., White, C., Rampal, S., Acharya, R., Ngo, T.D. (2020). Gender specific differences in COVID-19 knowledge, behavior and health effects among adolescents and young adults in Uttar Pradesh and Bihar, India. *PLoS ONE*, 15(12); e0244053.

⁴¹Rehman, U., Shahnawaz, M.G., Khan, N.H. (2021). Depression, Anxiety and Stress among Indians in Times of Covid-19 Lockdown. *Community Ment Health J*, 57(1):42-48.

⁴²Murthy, R. S. (2017). National mental health survey of India 2015–2016. *Indian Journal of Psychiatry*, 59(1), 21

⁴³Cullen, W., Gulati, G., Kelly, B. D. (2020). Mental health in the COVID-19 pandemic. *QJM: Monthly*