

## Factor Structure and Reliability of New COVID-19 Anxiety Scale

Dr. Vandana Gupta<sup>1\*</sup>

### ABSTRACT

**Introduction:** Covid-19 pandemic poses a challenge to our mental health. Anxiety and depression cases are increased dramatically due to economic, psychological, and social changes in this time. The present study aimed to develop a covid-19 anxiety scale on the Indian sample. **Methods:** The first pool of items has been written after the interview of 5 participants who had identified as more fearful with covid-19 in observation. Thereafter, a questionnaire of 9-items with a 5-point rating scale was distributed to 300 participants, of which 253 filled questionnaires were collected. Data were analyzed with the help of Excel and SPSS version 23. Item-discrimination, principal component analysis for factor structure, and reliability analysis were done to evaluate the psychometric properties of the scale. In addition to this, correlation of anxiety and depression was analyzed with a covid-19 anxiety scale. **Results:** Item discrimination analysis revealed that items are discriminating from high anxiety to low anxiety groups. The principal component analysis gives a two-factor structure solution, and the alpha coefficient has been found 0.80 which is a good reliability coefficient for a scale. Results of correlation and regression analysis showed that covid-19 anxiety significant predicted the anxiety and depression. **Conclusion:** Results of study suggest that the in initial test of present covid-19 anxiety scale found reliable. It can be used to screen out the individuals with covid-19 anxiety. However, further and more studies will be required to validate this scale with multiple approach and across the population. This newly developed scale would be helpful in the diagnosis and treatment of people suffering from covid-19 anxiety.

**Keywords:** COVID-19, Anxiety, Depression, Mental Health

Pandemics in the world affect people from time to time. Many epidemics like plague and spine flu have engulfed the world. But covid-19 has been different from all these pandemics in many ways. Its economic, social, and psychological effects have been more widespread. The various waves of this pandemic made people panic, which resulted in health and well-being problems. Cases of psychological problem like fear, isolation, and depression increased dramatically. A literature review reported the high prevalence of psychological problems like depression, anxiety, and stress in developing countries (Lakhan et al., 2020). Verma and Mishra (2020) indicated the prevalence of high depression (25.1%), anxiety (28%), and stress (11%) in the Indian population, which were associated with employment status, drinking behavior, and gender. Similarly Roy et al. (2020) reported the

<sup>1</sup>Assistant Professor, Dept. of Psychology, MMV, BHU, India

\*Corresponding Author

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prevalence of psychological problems of paranoia about virus infection (37.8%), distress (36.4%), and sleep difficulty (12.5%) in health care educated professionals.

A review of research published during the pandemic showed that people's overall health and well-being was affected by covid-19, including fear and phobia, anxiety, distress, depressive symptoms, loneliness, low physical activities, stress, academic stress, disruptive social behavior, life satisfaction and quality of life (Ferreira et al. 2021; Smith, Twohy, and Smith 2020; Nikčević et al. 2020; Singh 2021; Lee 2020; Zhang, Wang, & Wei. 2020; Yang, Chen, & Chen 2021). However, studies conducted in India with specific covid-19 anxiety scales are scarce (Chandu et al. 2021; Nasir, Adil, & Kumar 2021). During the planning of this study, only one scale found in the review was a *brief coronavirus anxiety scale* (Lee, 2020). This scale is the most validated and adapted in other countries and languages (Koc & Arslan, 2021; Lathabhavan 2021; Vally & Alowais 2021; Singh 2021; Magano et al. 2021). Besides this, there are a growing no. of scale has developed purposefully for different populations, e.g., in 'fear of covid-19 scale' (Ahorsu et al. 2020), 'perceived coronavirus threat questionnaire' (Encyclopedia, 2019), 'covid stress scale' (Taylor et al., 2020), and 'covid-19 anxiety syndrome scale' (Nikcevic & Spada 2020). In India, Nasir et al. (2021) developed a phobic covid-19 disorder scale that captures the fear, anxiousness, and distress caused by covid-19. Similarly, Chandu et al. (2021) developed a covid -19 psychological burden scale for the health care educated professionals.

### **Current study**

The study aimed to develop a covid-19 anxiety scale to screen the people suffering from fear of getting an infection with coronavirus. The shortage of empirical studies on the Indian population call for more studies to develop and validate the covid-19 scale for Indian people and examine its association with various psychological, social and physical health effects. Studies advocated the importance of contextual screening tools and reviewing the anxiety-affected people to design effective remedies and preventive strategies for problems.

Item-writing started after the interview and observation of 5 participants. The interview was analyzed by following the content analysis in which words and sentences have counted. Two independent psychologists also checked the face validity of extracted ten items in Hindi and English. Then after the some modifications in sentence structure, a total of 9-items were selected. All nine items were analyzed following item-analysis (item-discrimination index), factor analysis (principal component analysis), and reliability analysis. This scale assessed the psychological and behavioral aspects of anxiety caused by coronavirus. Many anxiety scales have measured the physiological aspects of fear and anxiety associated with coronavirus (Lee, 2020). In the present scale (table-1), items 1 and 3 assessed worry about virus infection. Items 2 and 4 measured the worry about the infection to family members. Items 5 and 6 measured symptoms checking behavior and death anxiety due to virus infection, respectively. Item 7 assessed the mood level, and items 8 and 9 measured healthy preventive behaviors to protect from disease.

**Table-1: Presenting the 9-items of covid-19 anxiety scale.**

SN	Items
1.	Frightened and invasive by the thought of corona infection (कोरोना हो जाने के ख्याल से भयभीत और आक्रांतिक)
2	Thought of an infection from corona to family is bothering you (परिवार जन के संक्रमण हो जाने का विचार)

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3	Repeated thoughts of getting an infection from corona while sleeping (रात में सोते वक़्त कोरोना से संक्रमण होने का विचार)
4	Afraid that you or your family may not get corona virus infection (आपको या आपके परिवार वालों को कोरोना वायरस संक्रमण ना हों जाने का भय)
5	Test the symptoms of infection by yourself or family members eg temperature, breath or heartbeat, etc.(करोना संक्रमण के लक्षणों का परिक्षण स्वयं पर या परिवार जन पर करते हैं -जैसे तापमान, सांस या दिल की धड़कन जांचना इत्यादि)
6	Does the fear of death from corona infection disturb you (करोना से मृत्यु होने का भय आपको विचलित कर देता है)
7	Mind is not feeling as it used to be before the arrival of Corona (मन उतना नहीं लग रहा है जितना कोरोना के आने से पहले लगता था)
8	Increased the spices used in cooking more these days than before (घर में इस्तेमाल होने वाले मसलों का प्रयोग पहले से ज्यादा बढ़ा दिए हैं)
9	Paying more attention to your health these days than before (आप अपनी स्वास्थ्य पर पहले से ज्यादा ध्यान दे रहे हैं)

## METHODS

### Participants

Participants of this study were 253 participants. The purposive and snowball sampling methods were used for data collection. Age of participants were categorized as 18-25 (83.9%), 26-40 (11%), 40-55 (4.3%) and above to 55 years olds (0.81%). Few participants (6.4%) suffered from some chronic illness and 79.5% performed some physical activities (yoga, walk, exercise). Among them 92.5% were students. Their education levels were undergraduate (63.4%), postgraduate (16.9%), Ph.D (6.7%), other professional degrees (3.1%), and 1-12th grade (9.8%). Family income of participants was 10-20 thousand (27.6%), 21-35 (18.9%), 36-50 (18.9%), 51-75 (11%), 76-100 (5.9%), and above to 100 thousand (17.7%) in Indian rupees. Sample consisted of 92.1% Hindu, 2% Muslim, 1.6% Sikhs, and 1.2% Christian. Among them 79.5% was female and 12.2% was male.

### Measures

- **Covid-19 anxiety scale:** This scale was developed purposely for the present study. Respondents were instructed to rate their frequency of experiences and thoughts on 5 response option ranged from not at all (1) to mostly (5). Reliability of scale (Cronback alpha) has been found good in analysis which was 0.815.
- **General health questionnaire:** GHQ-28 was developed by Goldberg in 1978 (Sterling, 2011). It consisted of 28-items, scored on 4-point rating scale ranges not at all (1) to always (4). High scores indicated a poor general health on four domains (somatic complaints, anxiety/insomnia, social dysfunctions, and severe depression). Alpha coefficient ( $\alpha = 0.9 - 0.95$ ) and test-retest reliability (0.78 - 0.9) of this scale reported good in studies. Two sub-scales, anxiety/insomnia and depression were used in present study. Reliability of both scale 0.861 and 0.90 were found on present sample.

### Procedures

Data of study collected after the informed consent of participants through offline and online methods. A Google form was prepared, which was shared in what's up group of students, colleagues, teachers and friends. Before the test administration, students were briefed about

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the purpose of study and instructions to answer the each questionnaire. They were instructed to be honest in answer. Confidentiality and privacy of data were assured to participants. It was informed that they would be acknowledged about their personal data in request. All included data were collected between from July to October 2020. Data processed in MS excel and SPSS version 24 for analysis.

### RESULTS

Results of descriptive analysis (table-2) indicated the mean, SD, skewness and kurtosis of each items of newly developed scale. It also indicated the item-discrimination index of individual item which suggest that item 3 has low discrimination index that other items. Item –total correlation value show the correlation of individual item with total scale.

**Table-2 Results of descriptive statistics, item-discrimination index, and item total correlation of covid-19 anxiety scale**

Item	Descriptive statistics			Item-discrimination			Item-total correlation
	Mean (SD)	Skewness	Kurtosis	Upper mean	Lower mean	Item discrimination	
1	1.96(.90)	1.29	1.892	38.60	19.80	18.80	.739**
2	2.54(1.10)	.80	-.120	51.20	22.60	28.6	.791**
3	1.40(.70)	2.59	9.268	27.40	14.20	13.20	.653**
4	2.32(1.07)	1.0	.425	47.80	21.20	26.60	.777**
5	1.92(1.04)	1.31	1.389	36.6	18.20	18.40	.605**
6	1.72(1.03)	1.57	1.832	37.00	15.20	21.80	.716**
7	2.51(1.26)	.551	-.842	46.20	25.80	20.40	.516**
8	2.79(1.25)	.079	-1.030	49.20	23.20	26.00	.573**
9	3.07(1.27)	-.008	-1.062	51.20	29.80	22.00	.501**

NOTE:  $p < .05$  and  $p^{**} < .01$

**Table-3. Results of principal competent analysis of covid-19 anxiety scale.**

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.03	44.85	44.85	4.04	44.85	44.85	3.60	40.03	40.03
2	1.14	12.67	57.53	1.14	12.67	57.53	1.57	17.49	57.53
3	.880	9.778	67.308						
4	.727	8.079	75.387						
5	.625	6.942	82.329						
6	.566	6.287	88.616						
7	.440	4.891	93.507						
8	.361	4.012	97.519						
9	.223	2.481	100.000						

Extraction Method: Principal Component Analysis with varimax rotation

Additionally, factor analysis (PCA) with varimax rotation (Andy field, 2013) was done to see the factor structure of scale. Results (table-3) reported two factor solutions (eigenvalue>1). Test of KMO measure of sampling adequacy (.843), Bartlett's test of sphericity –  $\chi^2$  (df)= 724.342 (36),  $P < 0.001$ . Results of table-4 revealed the two factors in which items one to seven loaded on one factors (worriedness) and items 8 and 9 loaded on another factor (preventive measures). Internal consistency of scale was examined by

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calculating the cronbach's alpha ( $\alpha$ ) which was 0.815 and 0.833 based on standardized items. Mc Donald's omega values were .817.

**Table 4: Results of factor loading after rotation with varimax method.**

Components	Items								
	1	2	3	4	5	6	7	8	9
1	.813	.792	.748	.802	.504	.762	.486		
2								.768	.849

Subsequently, mean, SD and correlation was calculated, which presented in table-5. Results indicated that covid-19 significantly associated with anxiety and depression. Anxiety significantly associated with depression, income and chronic disease. Depression associated with age, occupation, religion. Test of analysis of variance also performed to see the role of all categorical variables for covid-19 anxiety. Each F-test value was found insignificant, so has not been reported in any table.

**Table -5 Descriptive statistics of variables and correlation among the variables.**

	2	3	4	5	6	7	8	9	10	Mean	SD
1.Age	-.08	.51**	.51**	.19**	-.05	-.36**	-.073	-.10	-.14*	1.206	.5320
2.CD	1	-.04	-.08	-.09	.06	.10	-.03	-.11*	-.02	1.937	.2439
3.Occupation		1	.26**	.13*	-.05	-.47**	.05	-.08	-.11*	1.340	1.1282
4.Education			1	.08	-.02	-.17**	-.10	-.05	-.09	2.292	.8691
5.Income				1	.05	.11*	.07	.14*	-.05	3.028	1.8004
6.Religion					1	.02	-.02	.012	.11*	1.170	.6949
7.Gander						1	.03	.038	.06	1.877	.3285
8.Covide-19							1	.251**	.204**	20.281	6.2262
9.Anxiety								1	.639**	11.478	4.37
10.Depression									1	10.42	4.42

*Significant at  $p < .05$ ,  $p < .01$ ,  $p < .001$*

Results of regression analysis (table-6) revealed that covid-19 anxiety significantly predicted the anxiety and insomnia symptoms. Significant beta value of income and covid-19 suggested that these two variables are significant predictor of anxiety/insomnia. However, model of step 1 was not significant (adjusted  $R^2 = .021$ ,  $F=1.779$ ,  $df=245$ ,  $p > .09$ ). Model of step -2 found significant which added covid-19 anxiety explained the additional variance of 5.40% (adjusted  $R^2 = .073$ ,  $F=14.814$ ,  $df=244$ ,  $p < .001$ ).

Table-6 further reported that covid-19 significantly predicted the depressive symptoms. Significant regression coefficient ( $\beta$ ) indicated that when covi-19 anxiety added in model, it explained additional 4.1% of variance (adjusted  $R^2 = .047$ ,  $F=10.727$ ,  $df=245$ ,  $p < .001$ ).

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**Table -6 Results of hierarchical regression analysis using covid-19 as a predictor of anxiety and depression**

	Anxiety				Depression			
	B (SE)	$\beta$	R <sup>2</sup>	R <sup>2</sup> change	B (SE)	$\beta$	R <sup>2</sup>	R <sup>2</sup> change
Step 1 (Constant)	15.118 (3.094)		.048	.048	13.018(3.148)		.036	.036
AGE	-.989(.683)	-.120			-.797(.695)	-.096		
CD	-1.861 (1.134)	-.104			-.811(1.154)	-.045		
OCCUP	-.144(.300)	-.037			-.172(.305)	-.044		
EDUC	.005(.367)	.001			-.182(.374)	-.036		
INCOME	.386(.155)***	.159			-.069(.158)	-.028		
RELIGION	.014(.396)	.002			.700(.403)	.110		
GANDER	.081(.955)	.006			-.013(.971)	-.001		
Step 2 (Constant)	11.568 (3.148)		1.03	.054***	9.919(3.229)		.077	.041***
AGE	-.811(.666)	-.098			-.641(.684)	-.077		
CD	-1.703(1.104)	-.095			-.674(1.132)	-.037		
OCCUP	-.261(.294)	-.067			-.274(.301)	-.070		
EDUC	.113(.358)	.022			-.089(.367)	-.017		
INCOME	.337(.152)*	.138			-.112(.156)	-.046		
RELIGION	.048(.385)	.008			.729(.395)	.114		
GANDER	-.096(.930)	-.007			-.167(.954)	-.012		
covide-19	.167(.043)***	.237			.146(.044)***	.205		

*Value significant at p<.05, p<.01, p<.001*

### DISCUSSION

The aim of present study was twofold. First the development of covid-19 scale and second was examine its association with anxiety/insomnia and depressive symptoms. Results of item-analysis, factor analysis and internal consistency revealed and supported the initial factor solution and reliability of present new covide-19 anxiety scale. Results of factor analysis (principal component analysis) extracted two factors which are named as worriedness and preventive measures to protect self and family members from getting infection. Worriedness dimension of scale present the apprehensive thought of infection to coronavirus, while preventive measures dimension contained the items related to causations of health and installing protective health measures which are helpful to boost immunity like uses of spices, and homemade medicine 'kadha'. During the pandemic peoples were shifting toward the local Indian culture of daily routine and followed the some practices which were described in Ayurveda. People who were more anxious have followed these rules and practices very strictly with other preventive measure instructed by governments. Screening the worriedness and preventive measures/behavior are very reasonable in scanning of people suffering from covid-19 anxiety. Developing covid-19 anxiety screening tool is the demand of clinical and health practitioners (Silva, Brito, & Pereira, 2020). Studies after the post normal of covid-19 indicated that some people still afraid with covid-19, and cases of OCD and other psychological problems are still increasing (Méndez et al. 2021;Shanbehzadeh et al. 2021; Guzick et al. 2021) So a reliable and valid local based screening tool for covid-19 anxiety would help in screening of people and plan the intervention or remedies for the people suffering with this problems (Nasir, et al, 2021; Silva, Brito, & Pereira, 2020). Replication and more studies on covid-19 anxiety scale needed to be confident in widespread use of this scale would help in understanding of anxiety and thought change during or due to covid-19.

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Present study also tested the relationship between covid-19 anxiety, anxiety / insomnia and depressive symptoms. Results of regression suggested that covid-19 significantly predicted the anxiety/insomnia and depressive symptoms. Previous studies supported the findings of this study (Rodríguez-Hidalgo et al. 2020; Rehman, Yıldırım, & Shahnawaz, 2022). A study by Nikčević et al. (2020) showed that covid-19 psychological distress predicted the generalized anxiety and depressive symptoms. Similarly Yıldırım, Akgül, and Geçer (2022) reported that covid-19 is associated with the low general health and coping strategies.

Findings also revealed that income found significant in anxiety prediction. It indicated that income or financial conditions played significant role in anxiety / insomnia. It was a common concern during covid-19 due to lockdown, physical and outing restriction, which created a panic among the common people especially for labor class, small to medium business person, and in private sectors people. Studies reported that financial well-being affected during covid-19 that was associated with anxiety and mental health problems (Lathabhavan 2022).

### **Limitation**

This study tested the reliability and factor structure of new covid-19 anxiety scale, which is initially supported. More study for dimensionality and item structure, test-retest reliability and other type of validity would be required to be present developed scale a reliable and valid scale. Further initial validation done on a sample which is not sufficient enough. A fresh large heterogeneous comprehensive sample would be need for scale validation and norms preparation. In present study, mostly participants were students and belonged to urban areas, so future sample must include the participants belong to rural and other profession. This research work included anxiety and depression variables, more no of variables should be included in studies with covid-19 anxiety scale to see the behavior pattern and psychology of affected people with covid-19.

## **CONCLUSION**

Results of present study initially supported the factor structure, and reliability of items and scale. More studies are required to support and further validation of newly developed covid-19 anxiety scale, which would be helpful to assess the covid-19 related anxiety levels (Silva et al., 2020) Finding of this study also revealed that due to covid-19 anxiety, problems of insomnia/ anxiety and depression increased in people, which indicates the urgent need for preventive and safety measures to affected people.

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### **Conflict of Interest**

The author(s) declared no conflict of interest.

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