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ASSESSMENT OF PREVAILING FEAR OF CORONA VIRUS DISEASE - 19 IN THE INDIAN POPULATION TOFACILITATE LOCKDOWN RELAXATIONS USING THE FEAR OF COVID-19 SCALE-A STATISTICAL APPROACH.

Medical Science

Siva Surya Narayan.S.T.G Bioinformatics – SRET, Sri Ramachandra Institute of Higher Education and Research [DU],Chennai.

Padmini Sekar Biomedical Sciences, FBMS&T Sri Ramachandra Institute of Higher Education and Research [DU], Chennai.

Venkatesan S* Bioinformatics – SRET Sri Ramachandra Institute of Higher Education and Research[DU],Chennai. *Corresponding Author

KEYWORDS

INTRODUCTION

The ongoing Coronavirus Disease–2019 (COVID-19) pandemic was declared a global health emergency by the World Health Organisation (WHO, 2020).

According to reports, by 26 May 2021, there have been 167,492,769 confirmed cases of COVID-19 globally and 3,482,907 deaths due to this infection globally (WHO COVID-19, 2021). The virus has spread to over 200 countries and most of these countries imposed national lockdown to curb the spread of the disease. Despite efforts, there have been a significant number of COVID-19 cases and a large number of patients have succumbed to the infection that has thus resulted in an increase in fear levels among people globally.

The virus is transmitted by respiratory droplets and aerosols between individuals. It has been understood that that the Angiotensin converting enzyme-2 (ACE-2) receptor is the functional site for the binding of SARS-CoV2 virus after which the viral spike protein is activated by a two-step protease cleavage process. The first cleavage is understood to stabilise the S2 subunit at the site of viral attachment to the host cell and the second cleavage is presumed to activate the spike protein inducing conformational changed that allows the fusion of the viral and host cell membrane.

Post fusion, viral entry into the alveolar epithelial cells is facilitated and the viral contents are deposited into the host cell. The viral RNA now acquires the ability to integrate with the host genome and replicates further, indicating the start of the infective phase during which it can spread via respiratory droplets (Prasher 2021).

The primary transmission of COVID-19 virus among people is via aerosols occurring due to close proximity sneezing and coughing which directly infects the mucosal surfaces of the nose, eyes and mouth (Li, 2020). There have been reports of transmission via aerosols mostly in cases of medical procedures like bronchoscopy, endotracheal intubation, open suctioning, oxygen nebulisation, tracheostomy or cardiopulmonary resuscitation (Ong, 2020). The incubation period of the virus in the host can vary anywhere between 5 to 14 days and this is referred to as the presymptomatic phase. Later, patients present with body pain, fever, malaise, breathlessness and cough depending on the severity of infection (Young, 2020). Some patients have also shown to present with gastrointestinal symptoms such as vomiting, abdominal pain and loose stools (Cheung, 2020). Currently the diagnostic modalities for COVID-19 include RT-PCR test of oropharyngeal and nasopharyngeal swabs, blood tests and chest CT (Cascella, 2020).

Despite many efforts and lockdown restrictions, it has been difficult to control the spread of infection and most countries have encountered the second wave of the infection by May 2021. With over a year of global shutdown, the pandemic has caused devastating healthcare and economic crisis with increase in fear of populations with respect to the disease. By 27 May 2021, there have been 27,369,093 confirmed cases of COVID-19 and 315,235 deaths in India alone (WHO, India 2021).Fear of the ongoing pandemic is common among the general population and many studies have been performed to analyse its impact on mental health in children, adults and healthcare professionals. Therefore, in this study we aim to statistically analyse the prevailing fear of COVID-19 in the Indian population to face lockdown relations using the FCV-19S scale.

MATERIALS AND METHODS:

The current work received ethical approval from the Institutional Ethics Committee (IEC) at Sri Ramachandra Institute of Higher Education and Research in Chennai, India.

To collect data for this study, convenient snowball sampling technique was applied. Questionnaire for data collection was prepared using Google Forms to gather appropriate demographic information and the data pertaining to the existing fear of the COVID-19 disease and was circulated by email and WhatsApp to the general population 5 months post lockdown (February-March 2021). Participants involved in this study were over 18 years of age and participation in this study was purely voluntary. Responses were collected from participants who had access to email and WhatsApp and these individuals had a good understanding of the English language to respond to the questionnaire.

Sample size justification:

The sample size was arrived with nMaster software Version 2.0 with the precision of 5% the calculated sample size is 153 and by considering the data loss of 20% the sample size of 153+30.6≈184 samples was calculated,but to find the better outcome of the study 327 responses were included in the study.

Demographic information for this study included age, gender, marital status, educational qualification, and work status. Additionally, information was collected to analyse whether the respondent was a healthcare professional or not. To choose the state of residence, a drop-down option with all the states in India was provided from which the participants could choose. After receiving the consent, the COVID-19 Scale (FCV-19S) seven-item fear scale established by Ahorsu et al. was used to assess the prevalence fear in the population due to COVID-19(Ahorsu, 2020) which recorded responsesusing five-point Likert scale that ranges from Strongly disagree (1) to Strongly agree (5). The minimum possible for each response was (1) and the maximum score was (5). It can be inferred that greater the score, higher was the fear of COVID-19. Data analysis for this study was performed using SPSS 16.0 version software.

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was used to perform factor analysis to determine the usefulness and suitability of the collected data(Snedecor 1989, Cerny 1977). Descriptive statistical analysis was performed to interpret the number and percentage of response. For the data analysis, item mean score and overall mean score was calculated for the demographic variables using t-test and analysis of variance (ANOVA) for three or more variables. Based on the analysis, severity of fear prevailing in the population could be analysed. The scores less thanor equal to the mean will be considered as low fear and scores above the mean as high fear score. Acomparison of lowand high levels of fear and a multiple logistic regression analysis of levelsof fear with demographic variables were conducted. $p<0.05$ was considered statistically significant.

After that, the obtained data were subjected to structural equation modelling (SEM), a statistical modelling technique which combines multivariate multiple regressions and factor analysis.This enables the estimation of complicated and interdependent dependency

relationships, as well as the representation of unobserved concepts within these relationships and the accounts for the measurement error in the estimation process (Hair et al., 1998). SEM can be used to understand the model consisting of a succession of connected dependent relationships between a collection of dormant (unobserved) constructs, each of which is quantified by one or more manifest (observable) variables. No single statistical significance test on matching indices should be performed to define an acceptable sample data model (Schumaker and Lomax, 1996). Numerous goodness of fit (GOF) indices are available for comparison, allowing for an assessment of 'fitness from a variety of fitness measures' (Campbell et al., 1995:6). To assess the quality of this hypothesis model, the overall fitness metric, the goodness-of-fit statistic (GFI), the adapted goodness-of-fit statistic (AGFI), the root mean squared residual (RMR), and the standard fit index are all used (Bentler&Bonett, 1980). Absolute fit indicators quantify the degree to which the sample data fits the preceding model (McDonald and Ho, 2002). CFA is a widely used technique for determining the validity of an instrument that has been developed (Hair et al., 2006). This methodology, in comparison to the EFA methodology, provides a more precise depiction of dimensionality (Diana, 2006). CFA can be used to interpret model fit indices (Schumaker and Lomax, 1996).

RESULTS:

The KMO (Kaiser-Meyer-Olkin) and Bartlett's tests of sphericity were performed to determine whether the data are suitable for further factor analysis and also to determine the variance (common variance) among the predictors included in the data set (Snedecor, 1989). The values between 0.8 and 1 and the Bartlett's test of sphericity value of 0.05 indicate that the sampling is adequate (Cerny, 1977). The KMO value obtained in this dataset was 0.859 and the Bartlett's test of sphericity value was 0.0001, indicating that the data are sufficient for further analysis as represented in Table 2.For this study, a total of 327 responses from participants in India were recorded. Table 3 represents the demographic distribution of the data collected from all the participants. From the total number of responses, 60.9% were females and 39.1% were males and 33% participants were below 20 years of age, 56% were between 21-40 years, 10.1% were between 41-60 years and 0.9% was over 60 years of age. Major proportion of the respondents were single (81.7%) and only 18.3% were married. On analysing the educational status of the participants, 50.8% were graduates, 31.5% were post-graduates and 17.7% had completed up to higher education. However, it was also recorded that 58.7% of these participants were currently unemployed and out of the 41.3% employed participants, 46.5% of them were healthcare professionals. Responses from different states of India were recorded: Tamilnadu (82.9%), Puducherry (5.5%), Karnataka (5.2%), Telangana (2.4%), Andhra Pradesh (1.2%), Kerala (1.2%), Delhi (0.9%), Maharashtra (0.3%) and Jammu and Kashmir (0.3%).

Table 1. Demographic distribution of the study population

Demographic variable	N(%)
Gender	
Male	128(39.1)
Female	199(60.9)
Age groups	
Up to 20 yrs	108(33.0)
21–40yrs	183(56.0)
41–60yrs	33(10.1)
Morethan60yrs	3(0.9)
Marital status	
Married	60(18.3)
Un-married	267(81.7)
Educational status	
High school	58(17.7)
Graduation	166(50.8)
Post-graduation	103(31.5)
Health care worker	
Yes	152(46.5)
No	175(53.5)
Work status	
Employed	135(41.3)
Unemployed	192(58.7)
Stateofresidence	
Andhra Pradesh	4(1.2)
Delhi	3(0.9)
Jammu and Kashmir	1(0.3)
Karnataka	17(5.2)
Kerala	4(1.2)
Maharashtra	1(0.3)
Puducherry	18(5.5)
Tamil Nadu	271(82.9)
Telangana	8(2.4)
Total	327(100)

Table: 2. Item-wise distribution of responses

	Items					
		(1)	(2)	(3)	(4)	(5)
I1	Your heart races or palpitates when you think about Covid19	29	72	93	111	22
		(8.9)	(22.0)	(28.4)	(33.9)	(6.7)
I2	You cannot sleep because you are worrying about getting Covid19	33	102	70	102	20
		(10.1)	(31.2)	(21.4)	(31.2)	(6.1)
I3	When watching news and stories about Covid19 on social media do you become nervous or anxious	84	143	56	38	6
		(25.7)	(43.7)	(17.1)	(11.6)	(1.8)
I4	Are you afraid of losing your life because of Covid19	70	111	56	60	30
		(21.4)	(33.9)	(17.1)	(18.3)	(9.2)
I5	Do your hands become clammy when you think about Covid19	56	112	53	92	14
I6	Does it make you uncomfortable to think about Covid19	(17.1) 140	(34.3) 131	(16.2) 35	(28.1) 17	(4.3) 4
I7	Are you most afraid of Covid19	(42.8) 115	(40.1) 138	(10.7) 47	(5.2) 23	(1.2) 4
		(35.2)	(42.2)	(14.4)	(7.0)	(1.2)
1 – Strongly disagree,2-Diagree,3- Neither disagree/agree,4-Agree , 5- Strongly agree						

Item-wise responses of all participants are represented in Table 4. Low fear was recorded in 26.3% of respondents, moderate fear in 45.3% respondents and high fear in 28.4% respondents. Analysis was performed to understand fear levels with respect to different demographic variables. Evaluation of fear status with respect to age showed that out of the 33% respondents under the age of 20, 20% had low fear, 31.8% had moderate fear and 46.2% had high fear; out of respondents between 21-40 years (56%) of age, 67.4% had low fear, 54.1% had moderate fear and 48.4% had high fear; out of respondents over 40 years (11%) of age 11.6% respondents had low fear, 14.2% had moderate fear and 5.4% had high fear. From these responses it was also seen that out of the 60.9% females, 57%, 60.8% and 64.5% respondents had low, moderate and high fear levels respectively and out of the 39.1% male respondents, 43%, 39.2% and 35.5% respondents had low, moderate and high fear levels respectively. Taking into consideration the marital status, higher proportion of married respondents (87.1%) had high fear levels compared to unmarried respondents (12.9%). On analysing the relationship between educational status and the fear of COVID-19 among the participants, it was found that 24.7% postgraduates, 49.5% undergraduates and 25.8% participants who completed higher education had a high fear status. Among the participants, 72% respondents of the unemployed category and 28% respondents of the employed participants had very high fear regarding COVID-19 and among the employed subset of participants, 58.1% of healthcare professionals experienced high fear.

Variable		N(%)		p value	Mean ± SD	p value
	Low fear	Moderate fear	High fear			
Gender						
Male	37(43.0)	58(39.2)	33(35.5)	0.587#	17.05±5.965	0.575#
Female	49(57.0)	90(60.8)	60(64.5)		17.41±5.254	
Agegroups						

Upto 20 yrs	18(20.9)	47(31.8)	43(46.2)	0.003**	18.87±5.500	0.005**
21–40yrs	58(67.4)	80(54.1)	45(48.4)		16.70±5.492	
Above 40yrs	10(11.6)	21(14.2)	5(5.4)		15.36±4.782	
Maritalstatus						
Married	70(81.4)	116(78.4	81(87.1)	0.234#	17.58±5.621	0.034*
Un-married	16(18.6)	32(21.6)	12(12.9)		15.90±4.960	
Educationalstatus						
Highschool	10(11.6)	24(16.2)	24(25.8)	0.101#	19.31±5.601	0.006**
Graduation	44(51.2)	76(51.4)	46(49.5)		17.04±5.350	
Post-graduation	32(37.2)	48(32.4)	23(24.7)		16.49±5.575	
Healthcareworker						
Yes	29(33.7)	69(46.6)	54(58.1)	0.005**	18.34±5.660	0.001**
No	57(66.3)	79(53.4)	39(41.9)		16.34±5.268	
Work status						
Employed	40(46.5)	69(46.6)	26(28.0)	0.009**	16.16±4.869	0.002**
Unemployed	46(53.5)	79(53.4)	67(72.0)		18.05±5.850	

Table 5. Levels of fear and mean score comparison based on variables. p>0.05 not statistically significant, **p<0.001 highly statistically significant and *p < 0.05 statistically significant.

The mean item score (Table 5) for items 1 to 7 were 3.08, 2.92, 2.20, 2.60, 2.68. 1.82 and 1.97, respectively. The FCV-19S analysis revealed that 28.4% of the total respondents had high fear, 45.3% and 26.3% respondents had moderate and low fear levels, respectively.

Table 6. Comparative Fit Index

Fit Indices		Suggested values
Chi-square	14.221	P-value >0.05
Chi-square/degree of freedom (χ2/d.f.)	1.293	≤ 5.00 (Hair et al., 1998)
p-value	0.221	> 0.05 (Hair et al., 1998)
Comparative Fit index (CFI)	0.996	>0.90 (Hu and Bentler, 1999)
Normated Fit Index (NFI)	0.984	≥ 0.90 (Hu and Bentler, 1999)
Incremental Fit Index (IFI)	0.996	Approaches 1
Tucker Lewis Index (TLI)	0.993	≥ 0.90 (Hair et al., 1998)
Root mean square error of approximation (RMSEA)	0.03	< 0.08 (Hair et al., 2006)

According to the data in the table above, the calculated P value is 0.221(greater than 0.05) indicating a perfectly fit. The estimated CFI (Comparative Fit Index) value is 0.996, indicating a perfect fit, while the RMSEA (Root Mean Square Error of Approximation) value is 0.03 (less than 0.10), indicating a perfect fit.

Questions	Estimates
Your heart races or palpitates when you think about Covid19	0.719
You cannot sleep because you are worrying about getting Covid19	0.657
When watching news and stories about Covid19 on social media do you become nervous or anxious	0.663
Are you afraid of losing your life because of Covid19	0.699
Do your hands become clammy when you think about Covid19	0.719
Does it make you uncomfortable to think about Covid19	0.600
Are you most afraid of Covid19	0.608

Table 7. The fitted model's standardised estimates are shown in Table 7. Standardized estimates can be used to determine the relative contributions of each predictor variable to each outcome variable.

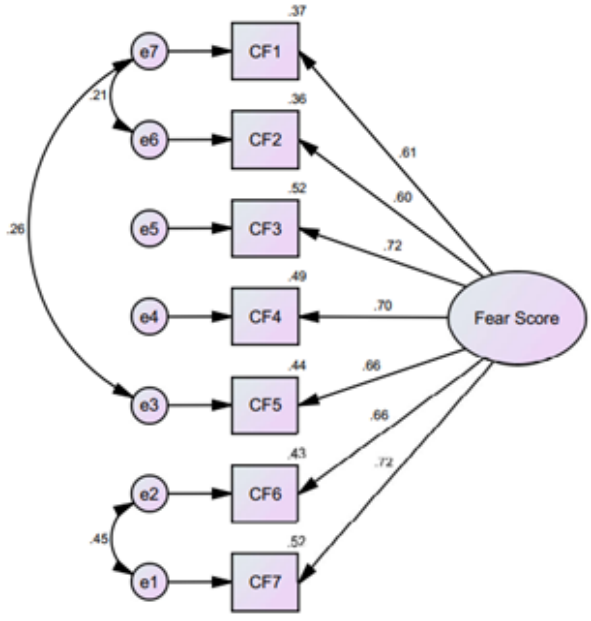

Figure 1. COVID-19 fear structural model.

The COVID-19 fear structural model is represented in Figure 1. A confirmatory factor analysis was performed on seven questions. As illustrated in Figure 1, all of the questions contribute to the fear of the COVID-19. Additionally, confirmatory factor analysis is referred to as measurement model. The root mean square error of approximation depicts how well the model fits the population covariance matrix when parameter estimates are unknown (Byrne, 1998).

DISCUSSION:

The world is currently witnessing the global COVID-19 pandemic that began in December 2019 that has caused severe healthcare and economic burden to every country. By the end of 2020, more than 200 countries were affected, and most countries imposed national lockdown to curb the spread of disease. Despite the restrictions aimed at controlling the ongoing pandemic, there were more than 160million confirmed cases of COVID-19 and over 3 million deaths globallyreported by the WHO (WHO Coronavirus, 2021). With a considerable reduction in the number of cases, India is now considering partially lifting lockdown restrictions after the second wave of the disease spread. At this point, we found it was important to understand the fear levels prevailing in the Indian population which plays an important role in understanding how people feel about the ongoing pandemic and their ability to cope with it during lockdown relaxation.There have been many studies reporting the impact of COVID-19 not only in the affected individuals but also the general population (Pfefferbaum 2020, Zhai 2020, Torales 2020, Hossain 2020). It has now become very important to understand psychological health as an important factor and one way to assess this is by using the FCV-19S. Using this scale, psychometric propertieswith demographic details can be analysed to assess the levels of prevailing fear in the general Indian population to face lockdown relations during the COVID-19 pandemic.

For this study, convenient snowball sampling method was used and 327 responses were collected that were used for further analysis. All participants of the study were from India and were grouped based on demographic details (gender, age, marital status, educational status, healthcare profession, work status, status of residence) and severity of fear. Comparatively, 64.4% females and 35.5% males had high fear status and a higher proportion of married participants(87.1%) were facing a fear on a higher scale compared to single participants. Also, a higher degree of fear was recorded in undergraduates and postgraduates compared to those with a higher secondary education which could be because of their better understanding of the infection, public health status and economic burden. It is also to be noted that among the working participants, healthcare professionals faced high levels of fear which could possibly be because of direct interaction with COVID-19 patients, long working hours, stress and the disease itself. On the whole, there was a considerable number of respondents

with high to moderate fear levels about the COVID-19 infection. It is required that individuals with high fear levels seek support and adopt healthy behaviours to keep mind and body healthy at the same time to overcome this pandemic.

It is important to understand the prevailing psychological health status of the population during the pandemic especially after lockdown for so many months. This study was restricted to the literate population and to individuals who had internet connectivity which can be one of the limitations of the present study. However, the usage of a standardised questionnaire to evaluate the fear levels of the participants is the strength of the study because it gives a representation of a sector of the society whose fear levels can statistically analysed to understand behavioural responses to lockdown relaxations.From the fit indices it was found that the calculated p value is 0.221(greater than 0.05) indicatinga perfect fit. The determined CFI (Comparative Fit Index) value is 0.996, indicating a perfect fit, while the RMSEA (Root Mean Square Error of Approximation) value is 0.03 (less than 0.10), likewise indicating a perfect fit.

According to Kline, CFI, RMSEA, and the ChiSquare test can be used in conjunction with the ChiSquare test to determine the measurement model's fit (Kline, 2005). As an alternative to the Chi-square test, Jöreskog's (1993) goodness-of-fit statistic (GFI) can be used to assess the percent of variance (Tabachnick a, 2007). The Normed fit index can be used to evaluate the model by comparing the model's Chi-square value to the null model's Chi-square value (Bentler, 1980). CFI is a key statistic in all SEM programmes since it is least affected by sample size (Fan, 1999). According to McDonald and Ho, the CFI and NFI are the most often used fit indices in structural equation modelling (2002).

CONCLUSION

This statistical approach to understanding the fear status of general population about the COVID-19 disease shows the requirement of nationwide analysis to understand the fear of people regarding the disease and the lockdown relaxation. This is also important to understand how to deal with the mental health status of the general population and correspondingly design relaxations according to the severity of disease across the nation. This statistical approach can be used as a preliminary analysis and state-wise and nationwide analysis to understand fear regarding COVID-19 can further be performed.

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