Psychological Assessment using Modified DASS-21 Scale during COVID-19 Pandemic

K. Bharathi Priya [a*#], Alwin Anilkumar [b†], Sona Elsa E Alexander [b†], T. Dinesh [b†] and S. Akash [b†]

[a] *Department of Pharmacy Practice, C. L. Baid Metha College of Pharmacy, Chennai, India.*
[b] *C. L. Baid Metha College of Pharmacy, Chennai, India.*

Authors' contributions

This work was carried out in collaboration among all authors. Author KBP designed the study, read and approved the final manuscript. Author AA prepared the abstract, designed the methodology, managed the literature searches and participated in acquisition of data. Author SEEA made all the results, relevant references and acquisition of data. Author TD did the data analysis, interpretations and participated in acquisition of data. Author SA prepared the introduction, discussion and participated in acquisition of data. All authors read and approved the final manuscript.

Article Information

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ABSTRACT

Aims: To assess the levels of stress, anxiety, depression among the general population during COVID-19 pandemic and to compare the levels of psychological morbidities, between two different geographical locations in India.
Study Design: Cross-sectional observational study
Place and Duration of Study: Kerala and Tamil Nadu, between March 2021 and August 2021.
Methodology: A total of 522 participants got enrolled for the study, while 505 participants comprising 256 males and 249 females were selected, based on inclusion and exclusion criteria. Depression, Anxiety and Stress Scale (DASS-21) was used to assess the level of distress experienced by the study population.
Results: The sample size was calculated to be around 385 fixing a 95% confidence interval, 5% margin of error with a population proportion of 50% and of unlimited population size. Depression level among male (38%) was slightly higher than female population (37%). Anxiety levels were

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Associate Professor;
† *Pharm. D Interns;*
Corresponding author: E-mail: priybharathi@gmail.com;

similar among the male (42%) and female (42%). Stress level was found to be slightly higher in female (22%) than in male (19%). State wise comparison showed that the people of Tamil Nadu had slightly higher level of depression (44%), anxiety (49%) and stress (26%) than the people of Kerala. The parameter of anxiety seemed to be higher when compared with depression and stress. 38% of the population suffered from all the 3 mental health conditions. 32% had at least 2 mental health related trouble. 11% had no mental health issue.

Conclusion: The study reveals that COVID pandemic had definitely created a lot of psychological instability amongst the general public. Our findings propose that constructing a sense of self-management among the general population through providing proper awareness about psychological morbidities and develop necessary interventions that can improve the mental health of vulnerable groups which may be crucial in ensuring preparedness for high contesting environments and adjustments during such pandemic experiences.

1. INTRODUCTION

1.1 Coronavirus

Coronavirus represents the large family of positive-sense ssRNA virus belonging to the order Nidovirales. These usually cause diseases of the upper respiratory tract in birds and mammals, including humans. SARS-CoV-2 is the cause of the ongoing pandemic in the world. The COVID-19 infection is highly contagious due to its affinity for binding to the ACE2 (Angiotensin converting enzyme-2) receptors [1].

1.2 Origin and Structure of SARS-CoV-2

Human coronavirus was derived from bats. The first COVID-19 case was reported in December 2019 in Wuhan, a city in Hubei province in China. Coronaviruses have a large genome, with size ranging from 26 to 32 kilobase. Corona, is a Latin word meaning the crown, with the spike on its surface.

1.3 Psychological crises due to COVID-19

COVID-19 can have serious effect on the mental health of the people. Anxiety and nervousness in a society affect everyone to a larger extent. Recent evidence suggested that people who were kept in isolation and quarantined experienced significant levels of anxiety, anger, confusion and stress [3]. Many studies reported that the affected individuals showed several symptoms of mental trauma, such as emotional distress, depression, stress, mood swings, irritability, insomnia, attention deficit hyperactivity disorder, post-traumatic stress and anger. Research has also shown that frequent media exposure may cause distress [4].

Depression is a mood disorder, characterized by short-term emotional responses to a serious health condition that is associated with impaired daily functioning accompanied by symptoms such as sadness, frustration, insensibility, feelings of guilt and loss of interest [5].
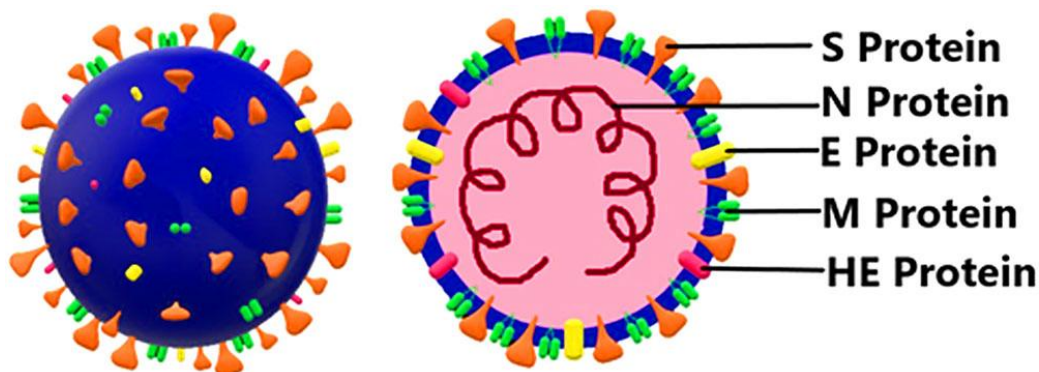
Fig. 1. Structure of SARS-CoV-2 and its cross-section [2]
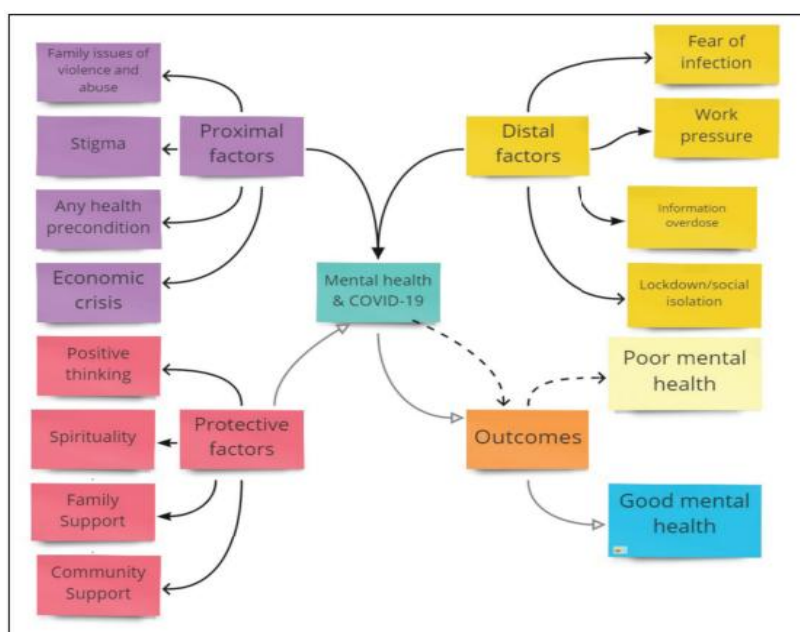
Fig. 2. Conceptual framework of the Causal and Protective factors affecting mental health [8]

Anxiety could be defined as apprehension, tension or uneasiness that stems from the anticipation of danger, which may be internal or external [6].

Stress could be defined as a process in which environmental demands strain in one's adaptive capacity resulting in both psychological demands as well as biological changes [7].

The Fig. 2 shows a conceptual framework of the causes and its interrelationships of outcomes of mental health of individuals in terms of a pandemic. Risks to mental health are an outcome of interaction of both proximal and distal factors. The proximal factors act directly to cause the disease and the distal causes act indirectly via many intermediary causes. There are a number of protective factors which may help in overriding these stressors and may be helpful in maintaining good mental health amongst families and communities.

A survey conducted by the Indian Psychiatry Society indicated a 20% rise in patients suffering from mental illness [9]. Reports of people emptying supermarkets and panic buying were indicative of how anxious people were in times of the pandemic [10]. Students all over the world also experienced distress due to uncertainty of examinations in their schools and colleges and with regards to availability of jobs, etc. All students were not able to afford online platform

and smooth transition from the regular physical presence to online was also not possible. This has caused anxiety among students during COVID-19 [11].

The World Health Organization (WHO) has also expressed its concern over the pandemic's mental health and psycho-social consequences. It speculated that new measures such as self-isolation and quarantine could have affected usual activities, routine and livelihood of people that may lead to an increase in loneliness, insomnia, anxiety, depression, harmful alcohol use, drug use and self-harm or suicidal behavior [12].

Mental health issues of home quarantine or isolation includes health-related anxiety, depression, low mood, fear, nervousness, irritability, anger, frustration, boredom, emotional exhaustion, feeling stressed, numbness and insomnia, substance withdrawal, end-of-life crisis, etc [13]. These are not only a direct consequence of the pandemic but also largely driven by the effects of prolonged social isolation that is the objective lack of interactions with others. Prolonged isolation can adversely affect physical and emotional health, altering sleep and nutritional rhythms, as well as reducing opportunities for movement. As a result, the natural channels of human expression and pleasure become depressed, with attendant impacts on mood and subjective well-being [14].

The GBD (Global Burden of Disease) 2020 estimated that the COVID-19 pandemic has led to a 27.6% increase in cases of major depressive disorder and a 25.6% increase in cases of anxiety disorders worldwide in 2020 [15].

Salari N, et al. conducted a systemic review and meta-analysis on 'Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic' and reported in their study that the prevalence of stress in 5 studies with a total sample size of 9074 was obtained as 29.6% the prevalence of anxiety in 17 studies with a sample size of 63,439 as 31.9% and the prevalence of depression in 14 studies with a sample size of 44,531 people as 33.7% [4].

The purpose of our study was to assess the levels of stress, anxiety and depression among the general population during COVID-19 pandemic and to compare the level of psychological morbidities, between two different geographical locations in India.

2. MATERIAL AND METHODS

A cross-sectional web-based online survey was conducted using modified DASS-21(DASS-21; Lovibond & Lovibond, 1995) questionnaire. A specially designed Google form containing all the relevant information was designed to collect data from the participants. Willingness to participate in the survey was obtained through the Informed consent. The Google forms which were designed for the survey purpose were circulated through WhatsApp media platform. The forms were initially distributed to all the phone contacts and then got randomly distributed to general population through 'snowball sampling' technique. The time period given to the participants for providing response was, within 24-48 hours. The response was collected from the Google forms. All the responses were downloaded to a 'Google Sheet'. A total of 522 participants got enrolled for the study. 505 participants were selected for the study based on the inclusion and exclusion criteria fixed.

2.1 Inclusion Criteria

1. Age - 18 to 65 years, which includes both male and female.
2. Study site - Kerala and Tamil Nadu
3. Language – English

2.2 Exclusion Criteria

1. Age - Below 18 and above 65

2. Language - regional languages
3. People with mental illness, pregnant women, Asthma, Hypertension, Diabetes Mellitus, Cancer.

The online survey form had five sections in which the first section contained the Consent form, the second section included the Socio-demographic details, third section contained 7 depression related questions, fourth section contained 7 anxiety related questions and the fifth section contained 7 stress related questions. The questionnaire was designed with closed-ended questions. All the 21 questions in the survey form contained the same options (Sometimes, Frequently, Always, Never).

2.3 DASS-21

The Depression, Anxiety and Stress Scale (DASS-21) is a set of three self-reporting scales designed to measure the emotional states of a person like depression, anxiety and stress [16]. Modified DASS-21 scale has questions or statements on the depression, anxiety and stress. Each of the three DASS-21 scales contains 7 questions each for depression, anxiety and stress. The reliability of DASS-21 showed that it has excellent Cronbach's alpha values of 0.81, 0.89 and 0.78 for the subscales of depressive, anxiety and stress respectively. It was found to have excellent internal consistency, discriminative, concurrent and convergent validities [17]. The DASS‑21 questionnaire is standardized to use in India. It appears to be culturally appropriate, reliable, and psychometrically valid tool for evaluation of the psychological burden (depression, anxiety, and stress) [18].

2.4 Scoring of the Scale

0 - Do not apply to me at all (Never)
1 - Applied to me to some degree, or some of the time (Sometimes)
2 - Applied to me to a considerable degree or a good part of time (Frequently)
3 - Applied to me very much or most of the time (Always)

2.5 Development of Questionnaire

The modified DASS-21 questionnaire was made by modifying the original DASS-21 questionnaire with the permission and suggestion from professor 'Peter Lovibond', who created the original DASS-21 scale.

The questionnaire was designed by changing or altering some of the DASS-21 questions with respect to the DASS-21 scale. These modified questions specify the depression, anxiety and stress during a COVID-19 pandemic point of view.

Similar to the original DASS-21 questionnaire, modified DASS-21 questionnaire has questions or statements on the stress, anxiety and depression. The modified DASS-21 questionnaire was developed by converting the 21 questions that can measure variables such as whether people have lost their jobs or lost a close friend or relative and correlate these variables with DASS scores.

Pilot study was conducted with a total of 20 participants. As per the response collected from the pilot study participants, the forms were adequate and under-standable.

2.6 Statistical Analysis

The sample size was calculated to be around 385 fixing a 95% Confidence interval, 5% Margin of error with a Population proportion of 50% and of unlimited Population size. Snowball sampling technique was applied for selecting the individuals for the study. After receiving the response from each of the participant, data was entered in the MS Excel work sheet and statistical analysis was done. The response for the 21 questions from individual participant was converted into scores as per the rating scale. Then sum of these scores were calculated for depression, anxiety and stress. Scores on the DASS-21 was multiplied by 2 to calculate the final score. These final scores were compared with DASS severity ratings scale to assess the stress, anxiety and depression levels among the study participants. Data was expressed in percentage as a response to each question. After collecting the response from the participants, e-pamphlets were distributed to them to the email address provided by the participant at the time of data collection. The e-pamphlet was designed specifically for providing awareness to the general population about stress, anxiety and depression during COVID pandemic. It also provides information on self-management of depression, anxiety and stress related symptoms during COVID-19 pandemic.

2.7 Interpretation of Results

Scores for depression, anxiety and stress are calculated by summing the scores for the relevant items.

The score interpretation is as follows:

2.7.1 Depression

0-9 = Normal
10-13 = Mild Depression
14-20 = Moderate Depression
21-27 = Severe Depression
28+ = Extremely Severe Depression

2.7.2 Anxiety

0-7 = Normal
8-9 = Mild Anxiety
10-14 = Moderate Anxiety
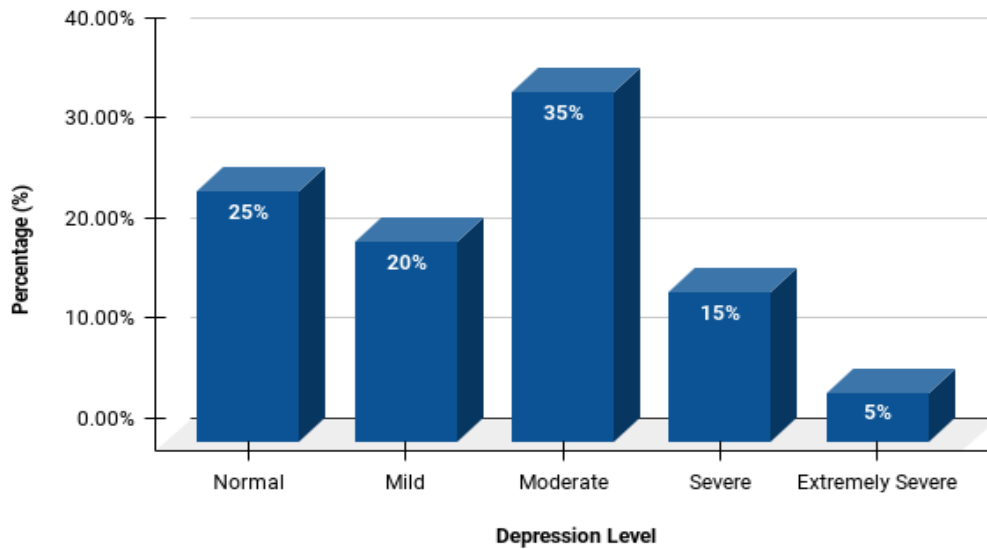15-19 = Severe Anxiety
20+ = Extremely Severe Anxiety

2.7.3 Stress

0-14 = Normal
15-18 = Mild Stress
19-25 = Moderate Stress
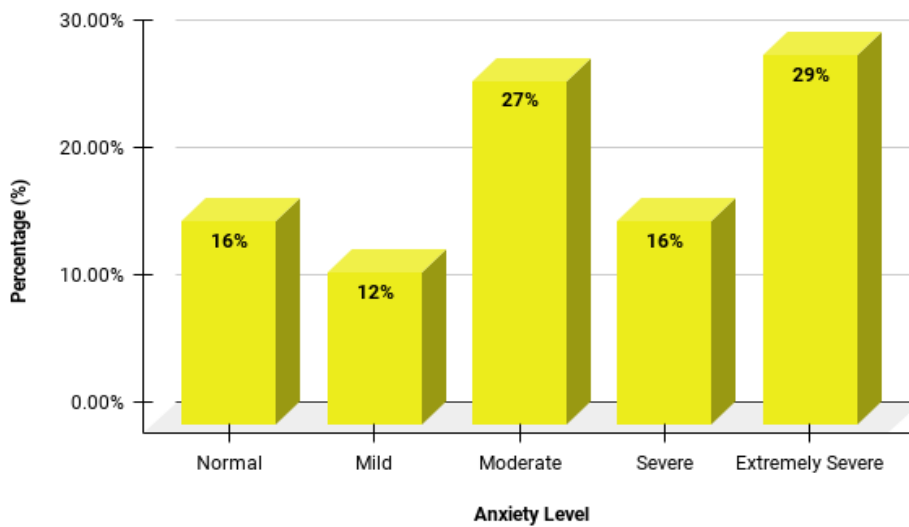26-33 = Severe Stress
34+ = Extremely Severe Stress [16]

3. RESULTS AND DISCUSSION

A total of 505 participants enrolled for the study of which 51% and 49% were males and females respectively. 57% of the participants were from Kerala and 43% of the participants were from Tamil Nadu got enrolled in the study. The study population included people between the age 18 to 65 years old. Those between 22-26 years accounted for the highest percentage of participants (70%).The social history showed that the majority of the population had no history of smoking or alcohol consumption. Only a very small percentage (6%) reported lifetime use of tobacco or alcohol.

The survey conducted in these two different ethnic groups indicated a mild variation in the degree of the mental health status. The depression scale evaluated the state of depression. The data interpretation showed 35% had moderate depression amongst the study population (Fig. 3).

Fig. 3. Depression level (n = 505)

Fig. 4. Anxiety level (n = 505)

The anxiety scale had 7 different questions, based on the response obtained, 29% of the selected population had extremely severe anxiety and 27% exhibited moderate anxiety levels (Fig. 4).

The stress scale also had 7 questions and response obtained from the survey indicated that maximum (59%) had no stress. A small proportion of subjects had mild to moderate stress levels as indicated in the Fig. 5).

A comparison was made amongst the 2 different ethnic groups in the south Indian states of Kerala and Tamil Nadu. Both the states did not show much of a notable variation in the level of depression, anxiety and stress. Only moderate variation in terms of depression was noted amongst the two groups. Severe and extremely severe depression levels were slightly higher amongst the people belonging to the state of Tamil Nadu. Mild and moderate depression was slightly higher amongst Kerala participants compared with Tamil Nadu participants (Fig. 6).
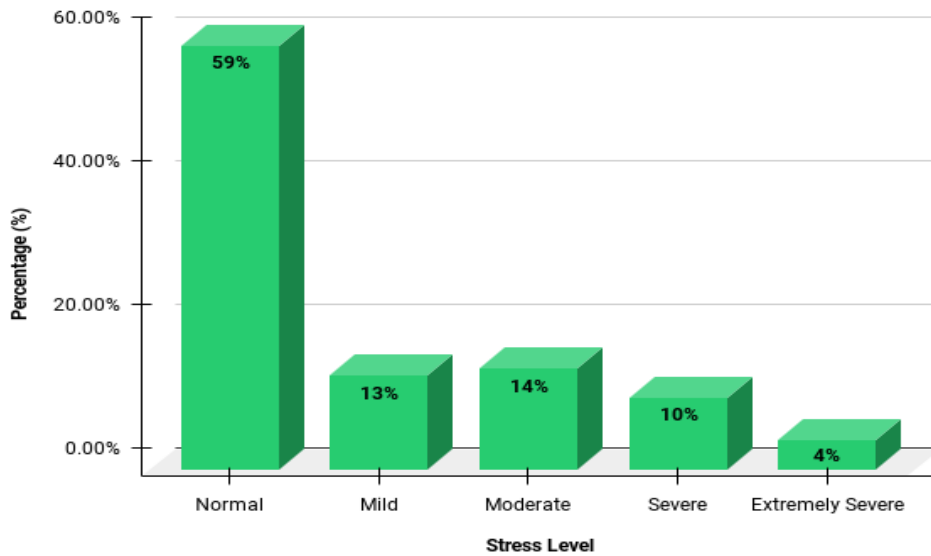
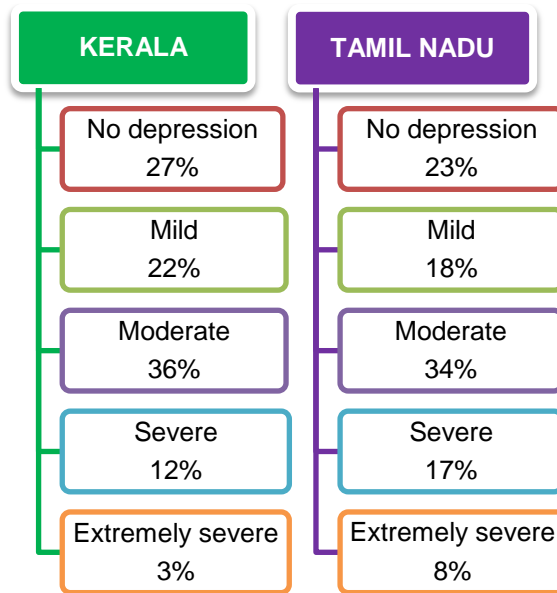**Fig. 5. Stress level (n = 505)**

Fig. 6. Comparison of depression level between Kerala & Tamil Nadu participants

Based on the comparison made between Tamil Nadu and Kerala, moderate anxiety levels were high amongst Kerala people while severe anxiety levels were greater in Tamil Nadu group. Not much of a significant variation in extreme severe anxiety status was observed amongst both the study population (Fig. 7).

Stress levels were identified to be more amongst the Tamil Nadu group compared with the Kerala group. More cases of moderate and severe stress were observed amongst Tamil Nadu group. Mild stress was noticed more amongst the Kerala population. Majority of them did not show any stress in both the groups (Fig. 8).

While making a comparison between males and females, much significant variation was not observed in depression and anxiety level, but the moderate stress level was significantly high amongst females (Table 1).
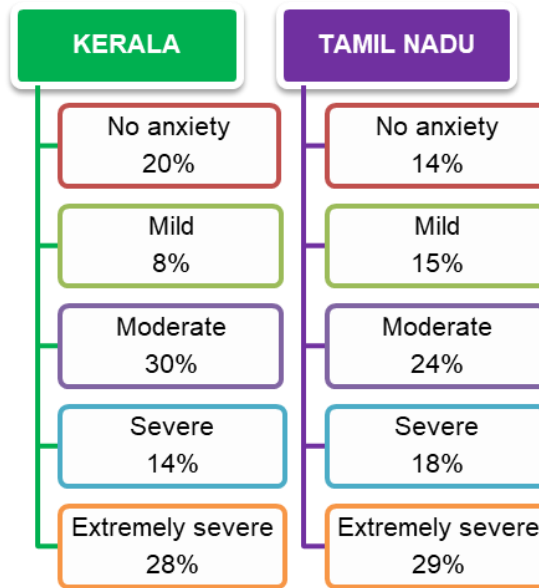
Fig. 7. Comparison of anxiety level between Kerala & Tamil Nadu participants
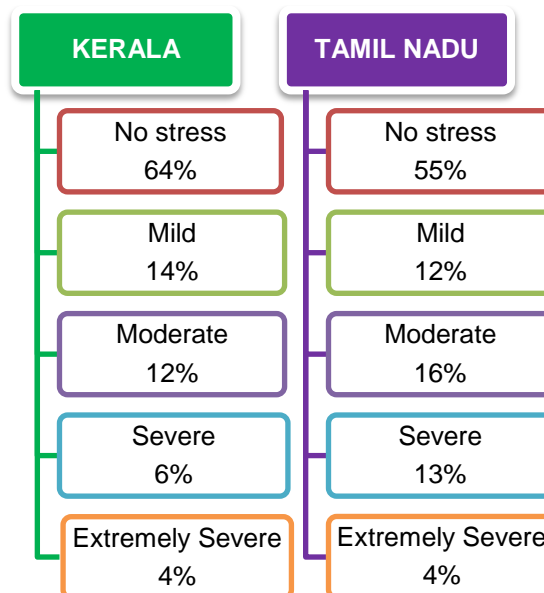
Fig. 8. Comparison of stress level between Kerala & Tamil Nadu participants

Over all mental health indicated that 38% of the study population had all 3 conditions, 32% had at least depression and anxiety together. Only 11% were normal. (Fig. 9)

Anxiety level was higher, followed by depression and stress. Majority of the population had all the 3 conditions depression, anxiety and stress which accounted to about 38% of the population followed by depression and anxiety which was

32%. 11% of the total population was considered to be normal. 5% had depression, 11% had anxiety, 1% and stress, 1% had depression and stress, 2% had anxiety and stress.

The depression level among male (38%) was slightly higher than female population (37%). Anxiety level among male (42%) and female (42%) was equal. Stress level in female (22%) was slightly higher than male population (19%).

Table 1. Comparison of depression, anxiety and stress between male & female

Mental status	Gender	
	Male	Female
Depression		
No depression	25%	25%
Mild	21%	18%
Moderate	33%	37%
Severe	15%	15%
Extremely Severe	6%	5%
Anxiety		
No anxiety	18%	15%
Mild	11%	13%
Moderate	28%	26%
Severe	18%	14%
Extremely Severe	25%	32%
Stress		
No stress	62%	56%
Mild	13%	12%
Moderate	12%	17%
Severe	10%	10%
Extremely Severe	3%	5%
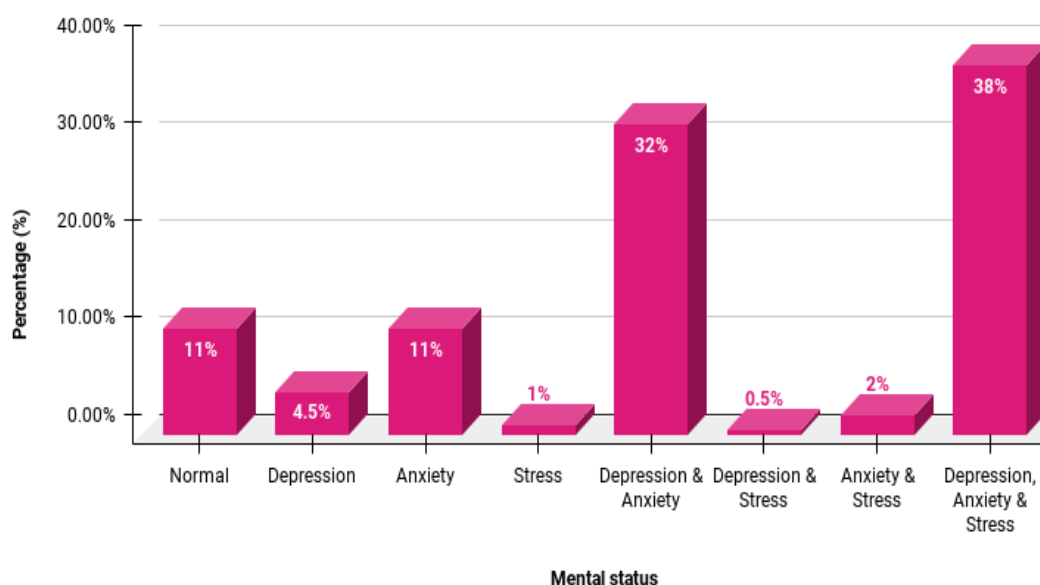
Fig. 9. Overall mental health

Tamil Nadu participants had higher level of depression (44%), anxiety (49%) and stress (26%) than Kerala participants, which was (31%), (35%), (15%) respectively.

4. DISCUSSION

In our study, both male and female had moderate depression level, anxiety level in female was slightly higher than male and stress level in female was higher than male. Similar reports had been observed in the study conducted by Usama Rehman et al. showed that males and females did not differ significantly on stress, anxiety and depression. Both male and female reported mild stress, moderate anxiety, mild depression in their study [8].

In our study, age group of 22-24 was mostly affected with depression, anxiety and stress. Similarly, Mark Shevlin et al., reported that age group of 18-24 was mostly affected with anxiety and depression [19].

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We conducted our study in two states of India (Kerala and Tamil Nadu). This study revealed that anxiety and depression were highest in Tamil Nadu. Similarly, Catherine Porter et al., conducted their study in four countries Ethiopia, India (Andhra Pradesh and Telangana), Peru and Vietnam. Their study revealed that anxiety and depression were highest in Peru [20].

In our study, majority of the population had all the 3 conditions depression, anxiety and stress which accounted to about 38% of the population followed by people having both depression and anxiety which was 32%. 15% had depression, 11% had anxiety. Similarly, Grover S et al., reported that about two-fifth (38.2%) had anxiety and 10.5% of the participants had depression. Overall, 40.5% of the participants had either anxiety or depression [21].

In our study, participants had mild to moderate stress levels and moderate to severe anxiety levels. Similarly, Wakode N et al., reported in their study that participants had moderate to severe levels of perceived stress and moderate to severe levels of anxiety [22].

5. CONCLUSION

The study reveals that COVID pandemic had definitely created a lot of psychological instability amongst the general public. Our findings propose that constructing a sense of self-management among the general population through providing proper awareness about psychological morbidities and develop necessary interventions that can improve the mental health of vulnerable groups which may be crucial in ensuring preparedness for high contesting environments and adjustments during such pandemic experiences.

CONSENT

Informed consent was obtained from all participants included in the study.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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