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Original Research Article

Post-traumatic stress disorder and resilience among flood affected farmers of Kerala, India

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ABSTRACT

Background: In mid-August 2018, Kerala witnessed the worst floods since 1924 due to abnormally high rainfall and simultaneous release of water from its dams, resulting in extreme flooding in 13 of the 14 districts in the State. The large-scale flooding impacted millions of people and caused nearly 400 deaths as well as immense damage to property. This was followed by flooding yet again in August 2019, thereby triggering further damage. Farmers whose crops got completely wiped out were one group that were severely affected. This study investigated the presence of post-traumatic stress disorder (PTSD) in farmers and also checked the relationship between PTSD and resilience.
Methods: The sample consisted of 100 farmers from the Alappuzha and Pattanamtitta districts of Kerala which were severely affected by the flood. Data was collected through the PTSD-8, Brief Resilience Scale (BRS) along with sociodemographic data and flood related information.
Results: 74% of the farmers scored high on the test indicating the presence of PTSD. The farmers of interior Pathanamthitta had significantly higher incidence (84%) of PTSD than coastal Alappuzha farmers (66%). The level of damage due to the flood did not have significant correlation with PTSD. There was significant negative correlation between PTSD and resilience (r=-0.64).
Conclusions: There was high incidence of PTSD among the farmers of central Kerala post the 2018 and 2019 floods and it was higher in interior Pathanamthitta than in coastal Alappuzha which is more used to the vagaries of the waters. Resilience helps to combat PTSD.

Keywords: PTSD, Resilience, Flood, Kerala

INTRODUCTION

Flood is one of the most severe of natural disasters, accounting for up to half of all-natural disasters.[1,2] During mid-August 2018, Kerala State experienced abnormally high rainfall resulting in extreme flooding in 13 of 14 districts in the State due to the heavy rains, the dams filled up and 34 of the 54 dams of Kerala were opened adding to the flooding. It was the worst flood in Kerala in nearly a century and was labeled as a level 3 calamity, or "calamity of a severe nature".[3] Over one-sixth of the population of Kerala were directly affected by the flood and related incidents and there were 488 deaths, and 140 missing.[4]

The floods left the people of Kerala quite scarred and just as they were getting back to the normal after a year, there was heavy rainfall and flooding again in August 2019, leading to the death of 121 and affecting over 2 lakh people, thereby reopening afresh the fears dormant in the people.[5] This study conducted in the latter part of 2019 looks at how the two floods together mentally affected the people of Kerala, especially the farmers whose cultivation were close to the rivers that got flooded. The most commonly diagnosed psychiatric condition in people

affected by severe flood or sudden natural disasters include PTSD, depression and anxiety.[6]

PTSD is a psychiatric disorder that may occur in people who have experienced or witnessed a traumatic event such as a natural disaster, a serious accident, a terrorist act, war/combat, or rape or who have been threatened with death, sexual violence or serious injury. The DSM-5 symptom groups for PTSD are intrusion, avoidance, negative alterations in cognition and mood, and alterations in arousal and reactivity. Patients typically have a negative emotional state, characterized by anger, guilt, fear, or grief. They often will refrain from engaging in previously pleasurable activities, detach from others, and display an inability to experience positive emotions. Several studies have shown the high incidence of PTSD after natural disasters in India during the tsunami in Tamil Nadu cyclones in Orissa, and flooding in Kashmir.[7-12] While a few studies have shown the mental health impact of the Kerala flood in terms of stress, depression, anxiety, emotional stability there have not been any studies on PTSD after the Kerala floods.[13-15]

The impacts of natural disasters on mental health can be influenced by the level of resilience of the survivors as well as personal characteristics such as education, and personality.[16] Resilience can be defined in a variety of ways, including the ability to bounce back or recover from stress, to adapt to stressful circumstances, to not become ill despite significant adversity, and to function above the norm in spite of stress or adversity.[17,18] Resilience could have an impact on the incidence and level of PTSD among those who went through trauma of the two floods in Kerala.[19]

In this study, the group of interest were farmers near riverbanks, whose efforts for the year were wiped out during these floods. The impact of these disasters on mental health can be severe especially when the damage is high and when it is quite unexpected. Alongside these external factors of damage and displacement, the impact of the flood may be mediated by the level of resilience of those affected.

Those farmers in the locality which were more prone to flooding could have higher levels of resilience due to past experience. This study aims to find out 1. The incidence of PTSD among the flood affected farmers, 2. The relationship between PTSD and the severity of damage and 3. The relationship between resilience and PTSD in those affected by the disaster.

METHODS

For this cross-sectional correlational study, the researchers visited two districts in Kerala through which the river Pamba flows-Alappuzha and Pathanamthitta-and which experienced severe flooding during the 2018 monsoon floods as well as in 2019. The researchers obtained details of the participants from the local department of agriculture and the majority of the participants were met individually when they came to visit the agricultural officer and remaining participants were contacted by visiting their farming land. In view of ethical practices, the farmers were briefed about the nature of the study and its relevance. They were assured of the confidentiality of their responses to the test, voluntary nature of participation and consent was obtained after these explanations, from those who agreed to participate.

Sample

The study was conducted on a purposive sample of 100 farmers, 50 from Alappuzha and 50 farmers from Pathanamthitta district of Kerala. All the farmers were males, 98.96% of them owned their own land, and 96% were married, living in nuclear families. Among them 60% were within the age range of 46-60 years, 31% below 45 and 9% above 60 years. About 10% were degree holders, while 90% were high school or +2 pass. The majority of them were Hindus (76.7) and the rest were Christians (20.8%) and Muslims (3%), which roughly matched the 2001 Indian census distribution of Hindu population 69.1%, Christian 20.9, and Muslim.

Materials

The following standardized scales were used to gather data for the study.

The PTSD-8:

It is of eight items spread across the symptom factors of PTSD- four items measure intrusion, two items for avoidance and emotional numbing and two items measure hypervigilance.[20] The items are to be answered on a four-point scale ranging from ‘not at all’ (1), to ‘all the time’ (4). The summed response points of all the items provides a total score for symptom severity. The PTSD-8 was translated to the local language Malayalam for the sample who were from villages, by two language cum subject experts through the forward translation followed by backward translation method.

Brief Resilience Scale (BRS):

It is with 6 items rated on a 5-point Likert scale, was used to assess resilience or the ability to bounce back or recover from stress.[21] This unidimensional scale has demonstrated adequate validity.[21] The questionnaire too was translated to Malayalam through forward and backward translation.

A socio demographic schedule was used to collect the demographic details of the participants as well as to capture the details of the damage and severity of the flooding.

RESULTS

The information collected from the farmers was coded and analyzed using SPSS-25. The aim of the study was divided into three hypotheses and each of them were tested. The Kolmogorov-Smirnov test for normality indicated that the data was not normally distributed for the sample for PTSD-8 (p=0.003; p>0.05) and the brief resilience scale (p=0.007; p>0.05).

H1-there will be high incidence of PTSD in flood affected farmers of Kerala

Table 1 shows the distribution of the total score of the farmers on the PTSD scale. The scores of the scale were divided into 3 levels to gauge the severity of PTSD. Those with scores above 24 were classified with severe PTSD, between 18-24 as moderate PTSD and below 18 as without PTSD.

Table 1: PTSD among the farmers of the Alappuzha and Pathanamthitta districts in Kerala.

PTSD score	Total (%)	Alappuzha (%)	Pathanamthitta (%)	Interpretation
Above 24	25	20	30	Severe PTSD
Between 18-24	49	44	54	Moderate PTSD
Less than 18	26	36	16	No PTSD

Mean PTSD-8 score-20.4, 19.5, 21.4.

Considering the spread of PTSD scores between the farmers of the two districts, a t test (normally distributed sample, K-S test statistic=0.116, p=0.121) was conducted to check if the farmers from the two localities were different in the prevalence of PTSD in their locality. The t test results indicated that there was significant difference between the two groups (t=1.80, p=0.037).

H2-severity of damage suffered will have a significant relationship to PTSD level

The Table 2 below gives a picture of the loss of the farmers of this sample. Agricultural loss was the highest and also mentioned as the one that affected them the most, followed by damage or loss of electronic items (TV, refrigerators, etc.), furniture, clothes as well as house walls and wiring. Other significant financial damage was loss of domestic animals, two wheelers and jewelry.

Table 2: Nature of damage among the farmers who responded.

Loss in kind	% of respondents
Agricultural loss	91
Electronic item damage	82
Furniture loss/damage	71
Clothes loss/damage	60
Damage to house (paint, wiring)	41
Domestic animals	37
Two-wheeler	14
Valuable documents	8
Jewelry and money	1

The respondents were also asked to rate their perception of the severity of their damage on a scale from 1 to 10, with 10 being the highest. Spearman's correlation coefficient calculated between this rating of severity of damage and the level of PTSD was 0.166, as seen in Table 3, which was not statistically significant.

Table 3: Correlation between PTSD level and perception of severity of their damage.

Variable	Level of damage
PTSD	0.166

Hypothesis 3-resilience of respondents will be related to level of PTSD experienced

The mean resilience score was 2.74 (SD=0.71, maximum score 5) for the whole sample while it was 2.68 for the Pathanamthitta farmers and 2.79 for the Alappuzha group. The mean resilience of the Alapuzha farmers who were used to mild flooding were higher than those of the other group. The distribution of both the resilience and PTSD scores were normal (K-S=105, p=0.196). T test revealed that the two groups were not significantly different in their resilience scores (t=-.803, p=0.211).

Pearson's correlation was conducted between the scores of resilience and PTSD, resulting in a significant negative correlation of -0.64 (p<0,01) between the two scores, and 0.41, coefficient of determination or R^2. Among the subscales of PTSD, resilience had the highest correlation with the intrusion factor 0-0.59, followed by the hypervigilance factor (-0.54) and avoidance (-0.50).

Table 4: Correlation between scores of PTSD-8 and resilience.

Variables	Total brief resilience scale
PTSD	-0.650**

**Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

The data for this study was collected during September 2019, when Kerala was once again experiencing very heavy and erratic rain, landslides in some locations, and mild levels of flooding, making the general population

worried about the possibility of yet another calamity similar to the 2018 monsoon floods.

Hansen et al recommend a cut off score of 18 and above on the PTSD-8 scale to indicate the presence of PTSD.[2] In this group, 74% of the respondents scored above 18 indicating the high incidence of PTSD in these farmer communities. The mean score of 20.4 falls above this cut off. On checking the difference between the two localities, it was seen that in Alappuzha which is more coastal and used to occasional flooding 66% of farmers had scores indicating PTSD, while in Pathanamthitta, which is further inwards and not used to flooding, the prevalence of PTSD was severe in 84% of the sample. While both groups displayed high levels of PTSD in their farmers, the farmers from inland Pathanamthitta who were not used to flooding or expecting flooding had a higher incidence of PTSD than farmers of Alappuzha, indicating that previous direct or indirect experience seems to result in lower incidence of PTSD.

However, the results of higher PTSD in one group of farmers could also indicate that those further in land, as in Pathanamthitta, could have experienced higher levels of damage. During the flooding of 2018, water rushed into the locality, destroying the crops and entering houses. The height of water inside the houses of most of the respondents were from 4-6 ft while in the houses of 2 respondents, it was more than 6 ft. These farmers were displaced from their homes from 4-18 days. However, it was seen that the PTSD-8 score did not correlate significantly with the perception of severity of damage.

While the perception of the damage severity was not correlated to PTSD scores, it was seen that resilience level as measured by the scale was very significantly negatively correlated to the PTSD scores. As this data was collected soon after the flooding, before the possible nurturing of resilience, it does suggest that existing resilience level is an important factor in the manifestation of PTSD. Undertaking and mastering difficult tasks has been seen to be effective in increasing resilience. Previous experience does help in building resilience, as shown by the higher resilience levels among the farmers of Alappuzha which in turn results in lower PTSD.[22,23]

The incidence of high PTSD scores among the farmers is a matter of concern, but it could be because the data was collected soon after the second flooding in August 2019. A follow up study after 6 months would have help to see if the heightened stress reaction had reduced but that was not possible because of the pandemic.

CONCLUSION

The current study explores post-traumatic stress disorder and resilience among the flood affected farmers of Kerala, India during September 2019 when Kerala was going through flooding in its second consecutive year. It was found that there was a high prevalence of PTSD (74%) among them. It was found that the stress scores were not significantly correlated to the severity of damage due to the flood. However, it was found to be highly correlated to the resilience of the farmers.

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