

Post-Traumatic Stress Disorder Among Senior Victims of Tsunami-Affected Areas in Southern Sri Lanka

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Background: On 26 December 2004, a large earthquake occurred off the coast of Sumatra, and a devastating tsunami struck surrounding countries. Sri Lanka was seriously affected, with more than 31,000 deaths and 4,000 people missing.

Objective: To elucidate the relationship between factors of tsunami-related exposure and mental health conditions among the senior residents of tsunami-affected areas in southern Sri Lanka.

Subjects: A total of 90 subjects (43 men, 47 women) aged 60 years or older who were living in the Matara district at the time of the tsunami attack.

Methods: A survey by interview using a structured questionnaire was conducted in 2008. The collected information included demographic factors, tsunami-related exposure and mental health conditions. The Impact of Event Scale-Revised (IES-R) was used to assess their post-traumatic stress disorder symptoms.

Results: The median of the IES-R score was significantly higher in those who were situated at home; those who saw anyone the dead or injured; those whose evacuations were delayed; those whose family member or friend was injured; those who were injured; those who lost their children, spouse or family members; those whose family member was missing; those who lost livelihood, compared with those who were not or those who did not. Multiple linear regression analysis showed that younger age and loss of or injury to family members due to the tsunami were significantly associated with an increase in IES-R score.

Conclusion: The results indicate that tsunami-related exposures have affected elderly survivors' mental health.

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Introduction

On 26 December 2004, the tsunami catastrophe which occurred off the coast of Sumatra caused a large number of deaths, displaced many families, and damaged numerous properties and infrastructures of the surrounding countries. Sri Lanka was the second most seriously affected country after Indonesia, with more than 31,000 deaths, nearly one

million people left homeless and 4,000 children left without parents.¹ Millions of children and adults were exposed to traumatic events and suffered morbidity primarily resulting from near-drowning and traumatic injuries. Human, physical, social, and economic resources in Sri Lanka, especially in the southwest coastal belt, were hugely affected after the tsunami.

While physical health was of primary concern in the early

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recovery phase, the mental effects of tsunami-related exposure have begun to receive much attention.²⁻⁴ The majority of people exposed to natural disasters have been found to be resilient, and show few mental sequelae. However, previous studies also suggest that serious mental health problems prevail among a substantial proportion of those exposed.⁵⁻⁷ For example, post-traumatic stress disorder symptoms in Sri Lankan teenagers have been shown to be related to the level of pain and suffering experienced during the tsunami.^{8,9} However, studies on the mental effects of tsunami exposure in elderly residents have been limited. Also, according to those studies that have been done, the prevalence of post-traumatic stress disorder (PTSD) among the tsunami-exposed elderly varies across a wide range.^{10,11} Older people are assumed to be more vulnerable to stress in general and thus tend to react more severely to disastrous events.^{12,13} The tsunami-affected elderly may continue to exhibit severe level of traumatic reactions following the disaster exposure. The need to focus on the mental health consequences of the tsunami-exposed elderly has been emphasized.¹⁴⁻¹⁶

The purpose of the present study was to elucidate the relationship between factors of tsunami-related exposure and mental health conditions among the senior residents of tsunami-affected areas in southern Sri Lanka. A survey by interview using a structured questionnaire was conducted to investigate mental health conditions among the affected residents.

Methods

Study area

The present study was conducted in the Matara district, a southern area of Sri Lanka. The three villages of Thotamuna, Polhena and Madiha, which were severely damaged by the tsunami, were selected for the survey. Since the villages are located in coastal areas, inhabitants rely heavily on fishing as their main occupation.

The University of Ruhuna, located in the Matara district, conducted a survey on tsunami victims. According to the survey, the total number of tsunami affected families in the Matara District was 7648. Polhena, Thotamuna, and Madiha East are included in the region where the damage was most severe. In each of these areas more than 200 families were reported to have been affected. Polhena was one of the most affected villages in the district. The number of victims was 707 in Polhena alone. Polhena was a densely populated area in the Matara district where a considerable number of

families depended on tourism. Most of the tourist resorts, restaurants, and hotels were completely or partially damaged by the tsunami. Thotamuna was another village seriously affected in the Matara district. The number of affected families in the village was 409. Since Thotamuna is located close to the estuary of the Nilwala River, the tsunami waves came through the estuary and easily inundated the village. Like Polhena, the Madiha East village is very close to the beach. The absence of a natural barrier to break the tsunami wave attacks allowed severe damages to the village. The number of people affected by the tsunami was 491.

Survey

A structured questionnaire was designed to collect information from individuals about the damage caused by the tsunami. The questionnaire included questions about demographic factors, tsunami-related exposure and mental health conditions. The questionnaire was translated from English into Sinhalese and back-translated into English by native Sri Lankans who can speak both languages. The students of Ruhuna University carried out the interviews under the supervision of the academic staff from April to June, 2008. The interviews were administered in Sinhalese to assess tsunami-related exposure, mental health conditions and influencing factors of mental health problems.

Study subjects

Since the random sampling was unable to implement, a convenience sample was selected in the present study. A total of 90 subjects (43 men, 47 women) who were living in the Matara district at the time of the tsunami and aged 60 years or older at the time of the survey were included. The subjects who were not able to respond to questions because of their cognitive impairment were excluded. The number of subjects in Thotamuna, Polhena and Madiha was 36, 18 and 36, respectively. The mean age of the subjects was 70.5 (SD 6.7) years.

Instruments

We assessed the mental health condition of the tsunami-affected elderly using the Impact of Event Scale-Revised (IES-R).^{17,18} The IES-R is a 22-item self-report measure that

assesses subjective distress caused by traumatic events. It is a revised version of the older 15-item IES.¹⁹ The IES-R contains 7 additional items related to the hyperarousal symptoms of PTSD, which were not included in the original IES. Respondents are asked to identify a specific stressful life event and then indicate how much they were distressed or bothered during the past seven days by each "difficulty" listed. Items are rated on a 5-point Likert-scale ranging from 0 ("not at all") to 4 ("extremely"). The total IES-R score is defined as the sum of the 22 item scores. The IES-R score thus takes an integer from 0 to 88 with a higher IES-R score indicating a higher level of PTSD.

Ethical considerations

The present study was approved by the Institutional Review Board of the Department of Sociology, University of Ruhuna. The survey was anonymous, and informed consent was obtained verbally from every participant with communication occurring in the potential participants' native language.

Data analysis

To investigate the effects of tsunami-related experiences and exposure on post-traumatic stress disorders, the distribution of IES-R score was compared among tsunami-related factors by using the Wilcoxon rank-sum test. Furthermore, simultaneous effects of tsunami-related factors on post-traumatic stress disorders were analyzed using a multiple linear regression model with these factors as well as sex and age as covariates. We selected the most appropriate model on the basis of Akaike's information criteria (AIC).²⁰ NPAR1WAY and REG procedures in the SAS[®] system, version 8.2 (SAS Institute Inc., Cary, NC, USA) were used for the calculations.

Results

Table 1 shows the characteristics of 90 subjects in the present study. Nearly all of the subjects were Buddhists (97%) and most of their homes were destroyed (17%) or partially damaged (68%). Their educational background was mainly primary school or junior high school with at least a few illiterate (data not shown). Nearly all of the subjects were living with their family (93%), and the median

of family size was 5 people. While the proportion of those who rated their health as poor was 29%, the proportion of those who rated their health as intermediate or fair was 70%.

Table 1. Characteristics of the subjects in this study

Factors	Number	%
Age (years)		
-65	25	27.8
66-70	20	22.2
71-75	22	24.4
76-	23	25.6
Sex		
Male	43	47.8
Female	47	52.2
Religion		
Buddhist	87	96.7
Christianity	1	1.1
Unknown	2	2.2
Damages to house		
Destroyed	15	16.7
Partly damaged	61	67.8
No damaged	12	13.3
Unknown	2	2.2

Table 2 shows the relationship between tsunami-related traumatic experiences and the IES-R score. The median of the IES-R score was significantly higher in those who were situated at home; those who saw anyone the dead or injured; those whose evacuations were delayed; those whose family member or friend was injured; those who had sustained injury; those who lost their children; those who lost their spouse; those who lost their family members; those who were injured; those whose family member was missing; those who lost their livelihood, compared with those who were not or those who did not.

The factors of 'injury to family member or friend', 'loss of children', 'loss of spouse', 'loss of family member', 'injury to yourself' and 'being family member missing' were highly correlated each other. To avoid multicollinearity in the multiple linear regression model, we created a factor of 'loss of or injury to family members due to the tsunami' by combining the above factors of tsunami-related exposure. 'Loss of or injury to family members due to the tsunami' was coded as 0 for no experience of the tsunami-related exposure and 1 for one or more experience of the tsunami-related exposure.

The factors included in the model selected as the most

Table 2. Relation between tsunami-related traumatic experiences and IES-R score

Factors	Number	IES-R score		P
		Quartiles	(range)	
Sex	Male	43	24.5,31,35.5	0.282
	Female	47	27,33,37	
Place you were situated at the time of tsunami				
	At home	41	31,34,38	0.001
	Other	48	23,29,33.5	
Saw anyone the dead or injured				
	Yes	31	33,36,38	<0.001
	No	59	23,29,33.5	
Delayed evacuation				
	Yes	43	32,34,38	<0.001
	No	47	23,29,33.5	
Felt one's own or a family member's life to have been in danger				
	Yes	51	26,32,36	0.987
	No	38	25,33,37	
Felt unable to escape				
	Yes	8	23.5,30,33	0.371
	No	82	26,33,37	
Family member or friend injured				
	Yes	29	33,34,37	<0.001
	No	61	23,29,35	
Sustained injury				
	Yes	33	33,35,38	<0.001
	No	56	23,29,34	
Lost children during the tsunami disaster				
	Yes	34	33,37,38	<0.001
	No	55	22,28,32	
Lost spouse during the tsunami disaster				
	Yes	34	33,37,38	<0.001
	No	55	22,28,32	
Lost family members during the tsunami disaster				
	Yes	35	33,37,38.5	<0.001
	No	55	22,28,32	
Self injured due to the tsunami disaster				
	Yes	31	33,35,37.5	<0.001
	No	59	23,29,34	
Family member missing due to the tsunami disaster				
	Yes	32	33,35.5,37.5	<0.001
	No	58	23,28.5,33	
Lost livelihood due to the tsunami disaster				
	Yes	28	33.5,37,38	<0.001
	No	61	23,29,33	

appropriate were age and loss of or injury to family members due to the tsunami (Table 3). Younger age and loss of or injury to family members due to the tsunami were significantly associated with an increase in IES-R score. The findings presented in Table 3 indicate that the IES-R score was approximately 0.27 points lower with every 10-year increase in age, and was approximately 6.12 points higher in those whose family members were lost or injured due to the tsunami compared with those whose family members were not.

Table 3. Multiple linear regression analysis: variables influencing IES-R score

Factor	Comparison	Regression coefficient (standard error)	P
Age	By 10-year increase	-0.27(0.13)	0.04
Loss of or injury to family members due to the tsunami	Any loss or injury vs. no loss or injury	6.12(1.74)	<0.001

Discussion

The present study indicates that catastrophic experiences at the time of the tsunami disaster caused post-traumatic stress disorders among the elderly residents of southern Sri Lanka.^{4,8,9,21} The victims had experienced numerous traumatic events and suffered from the tsunami, and they continue to face uncertainty about their health and future.^{11,21} Unexpectedly, however, the psychiatric damage was worse for younger residents compared to older residents. Previous studies reported that elderly people were more vulnerable to traumatic events and had higher risk of psychiatric disorders.^{10,22} Among the victims of the Hanshin-Awaji Earthquake in Kobe, Japan, there were senior citizens living alone whose "lonely deaths" became a serious social problem.²³⁻²⁷ Since most of the subjects in the present study were not living alone, they may have received support from their family members and thus were somewhat sheltered from traumatic events. Actually, the median of IES-R score was significantly lower among the elderly living in larger family (5 or more family members), compared to the elderly living in smaller family (30 and 34.5, respectively; $p=0.014$). Moreover, younger people lost their livelihoods due to the tsunami disaster and had higher prevalence of PTSD, compared to elderly people.²

The findings of the present study indicate that there is a significant association between PTSD and traumatic tsunami-related experiences, such as loss or injury of family

members, delayed evacuation and loss of livelihood. Hollifield et al.²¹ reported that the prevalence of PTSD, depression and anxiety was 21%, 16% and 30%, respectively, 20-21 months after the tsunami disaster. It was also found that thinking that one's life was in danger was the most strongly associated experience with psychiatric symptoms.²¹ Another survey conducted among residents of tsunami-affected areas in southern Thailand revealed that displacement was significantly associated with higher prevalence of PTSD, depression and anxiety.²⁸⁻³⁰ In the present study, the median of the IES-R score was significantly higher in those who had delayed evacuation compared with those who did not. Those with delayed evacuation would be more likely to feel their lives were in danger and exhibit mental health problems.

The present study had some limitations. First, since the survey was conducted more than three years after the tsunami disaster, the subjects' mental states may have changed from what they had been soon after the disaster. Information about their tsunami-related exposure was also based on their memory. Some recall bias might have occurred in the study. Second, the Sinhalese version of the IES-R used in the present study was not validated for its accuracy in determining a diagnosis of PTSD. Further validation studies to verify the sensitivity and specificity of the Sinhalese version of the IES-R, and to find the cut-off point to determine a PTSD diagnosis should be needed.

In conclusion, the findings of the present study indicate that tsunami-related exposure continues to affect elderly survivors' mental health. Intervention programs for their psychosocial and mental health are important. Furthermore, a prospective study to assess the effectiveness of intervention program is needed.

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