

Post Traumatic Stress Disorder and Coping Strategies among Adult Survivors of Earthquake, Nepal

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ABSTRACT

Background: Post traumatic stress disorder (PTSD) is the most frequently reported psychiatric morbidity among the survivors of natural disasters that hinders the effort to rehabilitate their life. However its prevalence particularly in Nepal is largely unknown.

Aims and objectives: To investigate the prevalence of post traumatic stress disorder and use of coping strategies among the adult survivors of earthquake.

Methods: A cross-sectional descriptive study was carried out on a sample of 291 adult survivors of Nepal Earthquake on April 25, 2015. Study setting was Nuwakot district with multistage sampling (cluster sampling and systematic random sampling) method. PTSD checklist-5 was used to measure PTSD, and adapted and modified cope scale was used to assess coping strategies. Data were analyzed using descriptive and inferential statistics (independent t-test and one-way ANOVA) were used at 5% level of significance.

Results: Study findings revealed that PTSD was prevalent among 24.10% of adult survivors with highest intrusion symptoms (3.24±0.71). It was significantly associated with age ($p=.017$), sex ($p=.013$), education ($p<.0001$) and injury to self ($p=.003$). Elderly, females, illiterates and those who were injured during earthquake are at more risk for PTSD. Highest used coping strategy was active coping (2.92±0.51). Survivors not having PTSD scored more on active coping ($p<.0001$) and self distraction coping ($p=.006$) while those with PTSD mostly used passive coping ($p<.0001$), religious coping ($p<.0001$) and substance use coping ($p<.0001$).

Conclusion: Earthquake poses significant impact on mental health of the survivors. After ten months of devastating earthquake, prevalence of PTSD among the survivors is high. Maladaptive coping strategies further increase possibility of PTSD. Effective screening and awareness program regarding promotion of positive coping strategies among the vulnerable groups should be reinforced for prevention of psychiatric morbidity among the survivors of earthquake.

Keywords: Earthquake, PTSD, Coping strategies, adult survivors

INTRODUCTION

On April 25, 2015 (Baisakh 12, 2072), a huge earthquake measuring 7.8 Richter scale was experienced in Nepal with epicenter, Barpak VDC in Gorkha district, 80 km northwest of Kathmandu. Another big aftershock of 7.3 magnitude again hit

Nepal on 12th May, 2015. These two major earthquakes caused massive losses of lives and infrastructure in many districts. ^[1] As the consequence, 8,702 people were died while 22,493 people left seriously injured. ^[2] A disaster disrupts the normal condition of existence and causes the suffering that

exceeds the capacity of adjustment of the affected community and imposes short and long term impacts on ecological, political, economic, developmental, social, physical and psychological dimensions. [3] While physical problems are addressed consequently, many of the mental problems remain undetected. [4]

Trauma after earthquake is experienced by more than two thirds of general population at some point in their life resulting in wide range of mental and physical health consequences. [5] Studies suggest that fifty percent or more of the victims may develop chronic depression, pervasive anxiety and post-traumatic stress disorder (PTSD) which may cause long lasting suffering, disability and loss of income. [6] Post traumatic stress disorder (PTSD) has been found to be the most prevalent psychiatric morbidity after disaster. [7] Several study suggest higher burden of PTSD after natural disasters. According to systematic review on mental health and psychosocial consequences of natural disasters in Asia, the reported rates of PTSD symptoms following natural disasters in Southeast Asia range widely from 8.6% to 57.3%. [4] Studies suggest that determinants of PTSD are physical injury, property destruction, death in family, older age, female gender, low educational level and lack of social support. [8-11] Earthquake affected survivors try to cope with trauma in different ways. The adaptive mechanisms include use of religious, family and social support, exerting self-distraction and helping others. The less adaptive coping mechanisms that may need interventions include expression of stress in somatic form, denial, avoidance, blaming, helplessness, dependency and substance use Maladaptive coping strategies further increase survivors' vulnerability to PTSD. [6]

Therefore, it is clear that the victims of earthquake undergo tremendous psychological consequences which largely depend upon the coping abilities of the survivors. The issue of psychiatric morbidity after the earthquake needs to be

explored as early as the physical problems in order to promote positive mental health among the earthquake affected victims. [4] In developing countries like Nepal, which is in high risk for natural disaster, many of the emotional and mental health problems after disaster go unrecognized leading to long term psychiatric morbidity. Thus present study aims to

- assess the prevalence of PTSD among the adult survivors of earthquake.
- identify the coping strategies used by adult survivors of earthquake.
- find out the association between PTSD and socio-demographic and earthquake related variables.
- compare difference in subscale scores of coping strategies according to socio-demographic variables and PTs SD stat

MATERIALS AND METHODS

A descriptive cross sectional research design was used to assess the posttraumatic stress disorder and coping strategies among the adult survivors of earthquake, 2015. According to Government of Nepal [GON], [12] 2015, Nuwakot was one of the most affected districts of Nepal in 2015 earthquake with 93.24% of households fully damaged. Sample size was 291 based on sample size estimation formula taking 12.7% prevalence of adult survivors of earthquake in Tamil Nadu India. [4] Multistage sampling technique (cluster sampling and probability proportional to size) was used to select the earthquake affected households of Nuwakot, Nepal. At first cluster random sampling was used to select three wards from three selected VDCs of Nuwakot. Then the sample number was determined by proportionate allocation according to the number of households in each selected wards according to the database provided by secretaries of each VDCS. Finally, samples were selected from the households by using systematic random sampling. At the household where more than one affected adults were present, random selection was done by lottery method. Only the adult survivors of age

twenty years and above who had experienced the earthquake in Nepal on April 25, 2015 were included in the study.

Data were collected by using Nepali version, pre-tested self administered questionnaire. Questions regarding socio-demographic characteristics and earthquake related characteristics were developed after the extensive literature review on the similar subject matter. PTSD was measured by standard PTSD symptoms checklist according to DSM-5 criteria developed by National Centre for PTSD. It is a self report rating scale for measuring PTSD caused by traumatic event comprising 20 items. Coping strategies was measured by brief cope scale developed by Khalid and Malik [13] to use for earthquake survivors of Kashmir earthquake, 2005. The instrument consists of 41 items further sub grouped into six subscales representing specific coping styles namely religious coping, passive coping, active coping, social coping, substance use coping and self distraction coping.

Validity and reliability of both tools have been documented. For the use of tool in Nepalese context, first forward translation (from English to Nepali) and then backward translation (Nepali to English) was done by two independent bilingual translators. To identify accuracy, clarity and consistency of the tool, pretesting of the tool was conducted on 29 samples in the similar setting and necessary modification was done. Chronbach's alpha value of PCL-5 checklist was 0.89 and that for cope scale was 0.79 showing higher degree of internal consistency of the tool.

Data was collected at the place convenient for respondents in their residence by face to face interview using the Nepali version of Interview Schedule. Informed verbal and written consent was obtained from the respondents prior to the data collection with information about the nature of the study and their role in research. They were also informed about the purpose of the study, their voluntariness in participation and no any foreseeable risk

and harm in the study. The average time taken for the questionnaire was about 20-30 minutes. About 12-14 respondents were interviewed in a day and data was collected from March 3, 2016 to March 26, 2016.

Statistical Analysis

Data were analyzed using statistical Package for Social Science 16 (SPSS 16). For PTSD checklist, total score was obtained by summing up the responses of each item. Then the score was classified as those participants getting the score of 38 and more as having PTSD and less than 38 as not having PTSD. This classification was done according to the criteria given by National Centre for PTSD. [14] For coping scale, analysis was performed by obtaining the sum as well as mean value of each subscale. The mean score was obtained by adding the score of all items as well as each item of all subscales in order to attain a comparable figure. Data were interpretative as higher the mean score, higher the use of specific coping style.

The normality test of the data revealed normal distribution of the data. In descriptive statistics, frequencies, percentages, mean and standard deviations were calculated. For inferential statistics, chi-square test was used to assess association between PTSD and socio-demographic variables and earthquake related variables. The difference in scores of each subscale of coping strategies in relation to different socio-demographic variables and PTSD status of the adult survivors was examined by independent *t*-test and one way ANOVA. The level of significance was considered at 5% with *p* value <.05 and 95% confidence interval.

RESULTS

Characteristics of the respondents

Table 1 and 2 shows the socio-demographic and earthquake related characteristics of the adult survivors

Table 1 Socio-demographic characteristics of the respondents

n=291		
Characteristics	Frequency	Percentage
Age group^a in Years^b		
20-39	127	43.64
40-59	113	38.83
60 and more	51	17.53
^b mean age: 43.60 ± 14.40; (Min-20; Max-82)		
Sex		
Male	166	57.04
Female	125	43.06
Marital status		
Married	255	87.63
Unmarried	26	8.93
Widow/Widower	10	3.44
Educational Status		
Illiterate	147	50.52
Literate	144	49.48
Occupation		
Farming	35	24.30
Homemaker	27	18.75
Service holder	63	43.75
Student	19	13.20
Business	172	59.11
Laborer	55	18.90
Living Arrangement (n=291)		
Living in temporary home	245	84.20
Living in own home	46	15.80

^aAge group according to Erik Erikson Developmental stage

^bLiteracy category according to MOE, 201

Prevalence of PTSD and Coping strategies used by the respondents

The overall mean score on PTSD checklist was 25.80±14.75 (min-0; max-68). 24.10% of the respondents met the criteria for PTSD (Table 3). The intrusion symptoms were high among the adult survivors with PTSD with mean score 3.24±0.71 (Table 4). The mean score of

overall cope scale was 2.30±0.28. Survivors' mean score was highest on active coping (2.92±0.51) strategy followed by social coping (2.69±0.52). Substance use coping was lowest used coping strategy with mean score (1.55±0.67) (Table 5)

Table 2 Earthquake -related Characteristics of the Adult Survivors

n=291		
Characteristics	Frequency	Percentage
Injury to respondent		
Injured	7	2.41
Not injured	284	97.59
Type of injury		
Mild	1	14.28
Moderate	6	85.72
Injury to family members		
Injured	14	4.81
Not injured	277	95.19
Type of injury		
Mild	3	21.42
Moderate	8	57.16
Severe	3	21.42
Extent of damage to house		
Partially damaged	20	6.87
Fully damaged	271	93.13
Loss/ damage to property		
Lost/damaged	62	21.30
No loss/damage	229	78.70

Table 3 Prevalence of PTSD

PTSD Status	Frequency	Percentage
PTSD Present (PCL-5 score 38 and above)	70	24.10
PTSD Absent (PCL-5 score less than 38)	221	75.90
Total	291	100.00

Overall mean score on PTSD checklist: 25.80±14.75 (min-0; max-68)

Table 4 PTSD symptoms score among the respondents

Domains of PTSD	Mean	S.D	S.E	Confidence Interval
Intrusion Symptoms	3.24	0.71	.08	(3.07, 3.41)
Avoidance of Stimuli	1.29	0.89	0.10	(1.08, 1.50)
Negative alteration in cognition and mood	2.16	0.70	.08	(1.99, 2.33)
Alteration in arousal and reactivity	2.13	0.60	.07	(1.98, 2.27)

Table 5 Coping Strategies score among the respondents

Coping Strategies	Mean	S.D
Overall Cope score	2.30	0.28
Religious Coping	2.35	0.67
Passive coping	1.70	0.64
Active coping	2.92	0.51
Social coping	2.69	0.52
Self distraction coping	1.86	0.76
Substance abuse coping	1.55	0.67

Association between Respondent's Characteristics and PTSD

Significant statistical association was observed between age (p=.017), sex (p=.013) and educational status (p<.0001) of the respondents (Table 6). PTSD was significantly higher among the survivors who were inside the home during the earthquake (p<.0001) and those who were injured because of earthquake (p=.003). (Table 7)

Table 6 Association of PTSD with socio-demographic variables

Variables	PTSD		p- value
	Present Frequency (%)	Absent Frequency (%)	
Age			
20-39	22 (17.3)	105 (82.7)	.017*
40-59	29 (25.7)	84 (74.3)	
≥60	19 (62.7)	32 (37.3)	
Sex			
Male	31 (18.7)	135 (81.3)	.013*
Female	39 (31.2)	86 (68.8)	
Educational Status			
Illiterate	65 (25.5)	190 (74.5)	0.127
Literate	5 (13.9)	31 (86.1)	
Living Arrangement			
Living in own home	14 (30.4)	32 (69.6)	0.270
Living in temporary home	56 (22.9)	189 (77.1)	

*p value significant at ≤0.05 level of significance

Table 7 Association of PTSD with Earthquake-related Variables

Variables	PTSD		p- value
	Present Frequency (%)	Absent Frequency (%)	
Death in family			
Died	2 (66.7)	1 (33.3)	0.291
Not died	68(23.6)	220 (76.4)	
Injury to self			
Injured	5 (71.4)	2 (28.6)	.003*
Not injured	65(22.9)	219 (77.1)	
Injury to family members			
Injured	3 (21.4)	11 (78.6)	0.814
Not injured	67(24.2)	210 (75.8)	
Damage to house			
Partially damaged	4 (20.0)	16 (80.0)	0.660
Fully damaged	66(24.4)	205 (75.9)	
Loss/damage to property			
lost/damaged	20 (28.6)	42 (71.4)	.088
No loss/damage	50 (19.0)	179 (81.0)	

*p value significant at ≤0.05 level of significance

Table 8 Association between respondent's characteristics and coping strategies

Demographic variables	Coping Strategies (mean Scores)					
	RC	PC	AC	SC	SDC	SUC
Age						
20-39	2.09	1.66	3.00	2.64	2.30	1.35
40-59	2.42	1.71	2.89	2.73	1.54	1.64
≥60	2.85	1.80	2.70	2.75	1.50	1.90
^a p value	<.0001*	0.381	.022*	0.258	<.0001*	<.0001*
Sex						
Male	2.28	1.52	3.02	2.72	1.94	1.61
Female	2.45	1.95	2.78	2.58	1.75	1.48
^b p value	.033*	<.0001*	<.0001*	.075	.033*	.092
Educational Status						
Illiterate	2.64	1.90	2.78	2.68	1.50	1.77
Literate	2.05	1.51	3.06	2.70	2.23	1.33
^b p value	<.0001*	<.0001*	<.0001*	0.716	<.0001*	<.0001*

Higher score indicates higher coping mechanism

RC Religious coping, PC Passive coping, AC Active coping, SC Social coping, SDC Self Distraction Coping, SUC Substance Use Coping

^a anova test, ^b t-test *p value significant at ≤0.05 level of significance

Association between respondent's characteristics and coping strategies

Regarding coping strategies and respondents socio-demographic variables, study findings revealed that there was difference in religious coping score according to age, sex and educational status of the adult survivors. Religious coping was found to be significantly high in elderly adults,

illiterates and unmarried survivors compared to their counterparts. Significant difference in passive coping was found according to sex and educational status of the respondents. Passive coping was high in females and among the illiterates. Conversely, active coping was significantly high among the younger adults and males. Moreover, self distraction coping score was

significantly higher among young adults, males and illiterates. Significant difference was observed between substance use coping with age and educational status of respondents. It was higher among elderly adults and those survivors who were illiterate (table 8).

Coping Strategies according to PTSD Status

Respondents having PTSD had significantly higher score on religious coping, passive coping and substance use coping and on the other hand survivors with no PTSD had significantly higher scores on active coping and self distraction coping (Table 9).

Table 9 Coping Strategies according to PTSD Status

PTSD Status	Coping Strategies (mean Scores)					
	RC	PC	AC	SC	SDC	SUC
Present	2.73	2.33	2.70	2.61	2.65	1.86
Absent	2.24	1.50	2.98	2.72	1.93	1.46
p-value	<.0001*	<.0001*	<.0001*	0.135	.006*	<.0001*

Higher score indicates higher coping mechanism

RC Religious coping, PC Passive coping, AC Active coping, SC Social coping, SDC Self Distraction Coping, SUC Substance Use Coping

*p significant at ≤ 0.05 level of significance

DISCUSSION

The primary finding of current study reveals that after 10 months of devastating earthquake, PTSD is prevalent among 24.10% of the earthquake affected adult survivors. It signifies the fact that PTSD symptoms are experienced by the earthquake affected survivors even almost a year after the traumatic event and need specific diagnosis and intervention in order to prevent long term psychiatric morbidity.

The study findings highlight that PTSD was significantly associated with age of the adult survivors of earthquake. PTSD was present in more than half (62.7%) of the elderly adult survivors. This finding suggests that as age increases, risk for PTSD also increases. This vulnerability can be attributed to physical impairment, chronic health condition, low level of coping and decreased adaptation to stress among the elderly adults. This finding was supported by studies conducted in China and Italy. [11,15] However, many other studies revealed that age was not associated with PTSD after the earthquake. [10,16,17]

PTSD was present in more than half (68.8%) of the total female survivors whereas only 18.7% of total male survivors met criteria for PTSD which signifies that females are more vulnerable for PTSD in comparison with males. This may be

possibly because males are more confident with their capabilities for handling the problem and to face the difficulties and challenges in relation to their counterparts. On the other hand females, living with fear of losing loved ones and worrying about life after loss report poorer mental health executing higher level of PTSD. Consistent finding were revealed by almost all other evidences of PTSD in relation to gender. [8,15-18] A study by Shrestha [19] after Nepal Earthquake, 2015 also reported higher PTSD among female medical personnel.

Study findings depicted that PTSD was prevalent in only 9.7% of the literate survivors. Conversely, illiterate accounted for 38.1% prevalence of PTSD. Higher educational level enhances the individual's trauma understanding ability, which could improve confidence in physical as well as mental health recovery thus preventing the stress disorder. Many others studies also reported low educational attainment as a risk factor for development of PTSD after natural disaster. [8,5,18,16] Contrary to this, study done in China revealed no significant association of PTSD in relation to educational status. [16]

Use of Coping Strategies by Adult Survivors

Among the overall coping strategies used by the adult survivors of earthquake,

the highest used coping strategies was active coping (2.92 ± 0.51) followed by social coping (2.69 ± 0.52). Conversely, lowest used coping strategy was substance abuse coping with mean score (1.55 ± 0.67). This finding is in line with the study done in Italy by. [17] It reveals the fact that adults, though largely affected by earthquake, more frequently adopted positive coping strategies by actively involving in changing their circumstances and problem solving activities and socializing more than before. However, contradictory finding was revealed in a study after South-Asian earthquake which suggested that higher percentage of survivors reported negative coping adjustment like denial, self blame and substance use. [20]

Furthermore average survivors also utilized religious coping practice like praying and worshiping, believing in god's help, doing charity in the name of god as their strategy to overcome the stress. This may be possibly because Nepalese people are more religious with strong belief on god's help at both good and bad times. Moreover, people regard natural disasters as 'act of god' and practice religious rituals in order to please god so that this traumatic event would not occur in future. This corresponds to the findings by many studies revealing use of religious coping for their positive adjustment after the earthquake. [8,10,21]

Relationship of Subscale Score of Coping Strategies with Socio-demographic Variables

Study findings depicted that elderly adults were more devoted towards religious coping practice compared to their counterparts. This can be linked with the fact that elderly people in Nepal believe that god always help people at good or bad time. Young and middle aged adults scored higher in active coping and self distraction coping. Study done in Italy also suggests consistent findings. [17]

Gender difference was also noted in use of different coping strategies by the earthquake affected individuals. Female

adult survivors were more devoted towards religious coping and passive coping whereas male survivors more frequently used active coping, social coping and self distraction coping. Men are more likely to deal with the event by deemphasizing what has happened and actively facing the situation to solve their problems. Women, by contrast, are more likely to deny what happened to them and being passive to keeping themselves away from dealing with the situation. Evidences also revealed gender differences in use of coping styles. [10,22,23] Illiterate adult survivors more frequently used religious and passive strategies whereas literates most frequently used active coping and social coping. This signifies the fact that in natural disasters, people with higher educational levels might have better understanding of traumatic event, and they might use positive coping methods and they are capable of identifying alternative resources in comparison to illiterate people. This finding is consistent with the study conducted by Roohafza et al. [24]

Relationship of Coping Strategies with PTSD Status of Adult Survivors

The study findings reveals that adult survivors with PTSD often employed maladaptive coping strategies for dealing with earthquake and had significantly higher scores in the domains of passive coping and substance use coping. Religious coping was also higher among those with PTSD. In contrast, survivors without PTSD generally employed adaptive coping mechanisms like active coping, social coping and self distraction coping strategies. Thus, the presence of adaptive coping in survivors who did not develop PTSD after the earthquake and maladaptive coping in those who manifested disorder suggests the existence of a relationship between the two variables. Previous studies also reveal similar findings. [17,20]

Limitations

Present study was conducted only among the adult earthquake survivors of Nuwakot district during four weeks of data

collection period thus it may not represent the whole survivors of earthquake in Nepal, 2015. This study only used the cut off score of self report PCL-5 checklist without considering the DSM-5 diagnostic cluster severity score for diagnosis of PTSD thus providing only the provisional diagnosis.

CONCLUSION

In conclusion, the problem density of PTSD after ten months of earthquake is high among the adult survivors. Vulnerable groups for PTSD are elderly, females, illiterates and those injured in the earthquake. Though largely affected by earthquake, survivors are likely to use positive coping strategies. However, elderly and females employ more maladaptive coping strategies. Maladaptive coping strategies further increase possibility of PTSD. The results of this study provide an empirical basis for acknowledging the existence of poor mental health among the adult survivors of earthquake suggesting the need for effective screening and promotion of positive coping strategies among the vulnerable groups. Study findings recommend executing further larger surveys in other settings for better generalization of the findings. Targeted preventative psychological and supportive interventional studies focusing on adaptive coping measures in the highly affected areas can be conducted.

Conflicts of Interest

The authors declare that they have no conflicts of interests

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