Original Article

Post-Traumatic Stress Disorder and associated factors among adolescents after 2015 Nepal Earthquake

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Abstract

Background: On April 25, 2015 at 11:56 local time, a great earthquake of massive magnitude-7.8 trembler was experienced in Nepal. Along with the physical and economical loss, such disasters can have devastating consequences in adolescent's mental health. The purpose of this study is to determine the prevalence of Post-Traumatic Stress Disorder and associated factors among adolescents after 2015 Nepal Earthquake.

Methods: A total of 140 adolescents from grade 8, 9 and 10 of two higher secondary schools were recruited in this study. Post-Traumatic Stress Disorder CheckList-5 (PCL-5) of DSM-V criteria was used for the diagnosis of Post-Traumatic Stress Disorder. Chi-square test was used to assess the association.

Results: Among 140 adolescents, the age range was 12 to 19 years with a mean age of 14.8 (SD=1.1) where 27.1% of the participants had Post-Traumatic Stress Disorder. A statistically significant association was found between Post-Traumatic Stress Disorder and grade (χ^2 = 9.324, $p<0.01$), earthquake exposure (χ^2 =32.251, $p<0.001$) and death of someone close in earthquake (χ^2 = 9.535, $p<0.01$). Majority of the respondents reported symptoms of avoiding memories, thoughts, or feelings related to the stressful experience (58.57%).

Conclusions: This study hopes to assist the therapist, psychiatrists and planners in the design and implementation of effective and appropriate intervention programs that can help reduce the impact of Post-Traumatic Stress Disorder on adolescents, aid in psychological reconstruction and decrease the long term negative mental health consequences of such disasters especially for those who are at lower grade, were exposed to earthquake and lost their close people in the earthquake.

Key words: adolescent; earthquake; Nepal; post-traumatic stress disorder.

Introduction

On April 25, 2015 at 11:56 local time, a great earthquake of massive magnitude-7.8 trembler was experienced in Nepal.[1] The earthquake was followed by powerful aftershocks which resulted further devastation.[1, 2] According to The National Center for PTSD, U.S., PTSD is an anxiety disorder that can occur following the experience or witnessing of a traumatic event.[3]

Along with physical and economic loss, disasters can have devastating consequences on adolescents' mental health and PTSD is the most commonly studied and most frequently experienced psychological disorder after disasters.[4-14]

Previous studies have found that significant number of adolescents who were exposed to the trauma of earthquake had PTSD.[10,15] Adolescents and adults were among the most studied populations with high prevalence rates for PTSD.[16]

This study aims to explore the prevalence of PTSD among adolescents after earthquake, factors associated with PTSD and describe PTSD symptoms.

Methods

This study was conducted in two government higher secondary schools inside Kathmandu metropolitan city. A cross-sectional study design using multi-stage cluster sampling was used to select the study participants. A total of 140 adolescents were computed to participate in this study based on following assumptions: prevalence (p) =8.94%, sampling error (d) =5%, 95% confidence interval, 10% of non response rate. In first stage, government higher secondary schools inside Kathmandu metropolitan city were selected from the list of government schools obtained from District education Office and in second stage, two higher secondary schools were randomly selected and in the third stage, 140 adolescents were purposively selected from grade 8, 9 and 10 of selected schools. The inclusion criterion was adolescents studying in grade 8, 9 and 10 of selected schools who were willing to participate. Adolescents with pre-psychological condition and incomplete forms were excluded from the study.

The study period was from June 1 to September 30, 2015. Self-administered structured questionnaire was developed for collecting the data which took about 15-20 minutes. The standard PTSD Checklist for DSM-5 (PCL-5), 20-item self-report measure was used to assess the prevalence of PTSD with a cut-off point of 38.[17] The questionnaire was pre-tested with adolescents attending similar grade. Data was analyzed using the SPSS v20 software. Statistical analysis included descriptive statistics (mean, S.D., frequency, and percent) of data. Chi-square test was used to assess the association between PTSD and different variables.

Eligible participants were explained about the purpose of the survey, their willingness for participants was prioritized before conducting interview and complete anonymity was maintained. Approval for this study protocol was obtained from Institutional Review Committee (IRC), Manmohan Memorial Institute of Health Sciences. Written informed consent was obtained from the respondents before information collection.

Results

Data were collected from 140 adolescents of selected government schools. Table 1 illustrates the general characteristic of the respondents. This shows that the mean age of respondents was 14.8 years (S.D= 1.1) among which majority (60.7%) were of 15-19 years.

Table 1. General characteristics of Respondents

	Total (N=140)	
	(n)	(%)
Age category in years		
12-14 years	55	39.3
15-19 years	85	60.7
Mean	14.8	
Std. Deviation	1.1	
Sex		
Female	78	55.7
Male	62	44.3
Ethnicity		
Brahmin	38	27.1
Chhetri	29	20.7
Janajati	67	47.9
Dalit	6	4.3
Grade		
Eight	28	20.0
Nine	67	47.9
Ten	45	32.1
Number of siblings		
One	38	27.1
Two	47	33.6
Three	33	23.6
More than Three	21	15.0
None	1	0.7
Type of family		
Nuclear	105	75.0
Joint	29	20.7
Extended	6	4.3

On the basis of earthquake associated factors, findings revealed that a majority of the respondents had witnessed people buried in earthquake or death (57.9%) as shown in Table 2.

Table 2. Earthquake related characteristics

	Total (N=140)	
	(n)	(%)
Earthquake exposure by respondent		
Being Buried	1	0.7
Being injured	15	10.7
Being handicapped	1	0.7
None	123	87.9
Death of someone close in earthquake		
Close friend	5	3.6
Relative	7	5.0
None	128	91.4
Loss of House and property		
Mild	19	13.6
Moderate	21	15.0
Severe	6	4.3
None	94	67.1
Witness of any bury or death		
Yes	81	57.9
No	59	42.1

The estimated rate of PTSD among the total respondents (when using a cutoff of 38 for PCL-5) was found to be 27.1% which is shown in figure 1.

Figure 1. Prevalence of PTSD

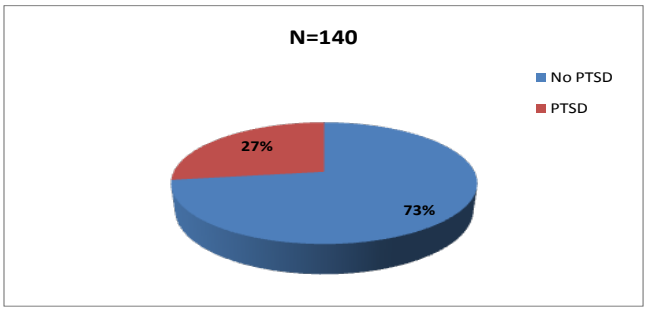

Table 3 illustrates PTSD prevalence rate according to risk variables. It discloses a statistically significant association between PTSD and grade (χ^2 = 9.324, p<0.01),

earthquake exposure (χ^2 = 32.251, p<0.001) and death of someone close in earthquake (χ^2 = 9.535, p<0.01).

NOTE: In Chi-square analysis, value of Fisher's Exact Test is considered in case of expected count in any cells are less than 5.

Table 3. PTSD by General Characteristics

General characteristics	Prevalence of PTSD (N=140)		Total N	X^2	P value
	No PTSD (n=102) %(n')	PTSD (n=38) %(n')			
Age category in years					
12-14 years	43.1% (44)	28.9% (11)	55	2.337	0.126
15-19 years	56.9% (58)	71.1% (27)	85		
Sex					
Female	56.9% (58)	52.6%(20)	78	0.201	0.654
Male	43.1%(44)	47.4%(18)	62		
Ethnicity					
Brahmin	26.5% (27)	28.9% (11)	38	2.256	0.545
Chhetri	23.5% (24)	13.2% (5)	29		
Janajati	45.1% (46)	55.3% (21)	67		
Dalit	4.9%(5)	2.6% (1)	6		
Grade					
Eight	13.7% (14)	36.8% (14)	28	9.324	0.009**
Nine	51.0% (52)	39.5% (15)	67		
Ten	35.3% (36)	23.7% (9)	45		
Number of siblings					
One	27.5% (28)	26.3% (10)	38	1.082	0.932
Two	33.3% (34)	34.2% (13)	47		
Three	24.5% (25)	21.1% (8)	33		
More than Three	13.7% (14)	18.4% (7)	21		
None	1.0% (1)	0.0% (0)	1		
Type of family					
Nuclear	78.4% (80)	65.8% (25)	105	3.655	0.145
Joint	16.7% (17)	31.6% (12)	29		
Extended	4.9% (5)	2.6% (1)	6		
Earthquake exposure					
Being Buried	0.0% (0)	2.6% (1)	1	32.251	0.000***
Being injured	2.0% (2)	34.2% (13)	15		
Being handicapped	0.0% (0)	2.6% (1)	1		
None	98.0% (100)	60.5% (23)	123		
Death of someone close					
Close friend	2.0% (2)	7.9% (3)	5	9.535	0.005**
Relative	2.0% (2)	13.2% (5)	7		
None	96.0% (98)	78.9% (30)	128		
Loss of House and property					

General characteristics	Prevalence of PTSD (N=140)		Total N	X^2	P value
	No PTSD (n=102) %(n')	PTSD (n=38) %(n')			
Mild	12.7% (13)	15.8% (6)	19	2.608	0.461
Moderate	12.7% (13)	21.1% (8)	21		
Severe	3.9% (4)	5.3% (2)	6		
None	70.6% (72)	57.9% (22)	94		
Witness of any bury or death					
Yes	52.0% (53)	73.7% (28)	81	5.358	0.210
No	48.0% (49)	26.3% (10)	59		

***p<0.05; **p<0.01; ***p<0.001**

Also this study found that among the 20 different symptoms of PTSD, most of the total PCL-5 scores for the whole sample regarding each symptom ranged from 17.68% to 58.57%. Majority of the respondents reported symptoms of avoiding memories, thoughts, or feelings related to the stressful experience (58.57%) following avoiding external reminders of the stressful experience (54.46%) while the least occurring was having strong negative beliefs about themselves, other people, or the world (17.68%). Similarly taking too many risks or doing things that could cause you harm i.e. self harm behavior\symptom was found to be 42.32% which is shown in table 4.

Table 4. PTSD Symptoms

PTSD Symptoms	Scores (%)
Repeated, disturbing, and unwanted memories of the stressful experience	41.43
Repeated, disturbing dreams of the stressful experience	31.07
Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)	43.21
Feeling very upset when something reminded you of the stressful experience	36.07
Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)	32.14
Avoiding memories, thoughts, or feelings related to the stressful experience	**58.57 (max)**
Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)	54.46
Trouble remembering important parts of the stressful experience	39.64
Having strong negative beliefs about yourself, other people, or the world	**17.68 (min)**

PTSD Symptoms	Scores (%)
(for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)	
Blaming yourself or someone else for the stressful experience or what happened after it	30
Having strong negative feelings such as fear, horror, anger, guilt, or shame	28.21
Loss of interest in activities that you used to enjoy	26.25
Feeling distant or cut off from other people	28.21
Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)	34.82
Irritable behavior, angry outbursts, or acting aggressively	18.57
Taking too many risks or doing things that could cause you harm	42.32
Being “superalert” or watchful or on guard	31.07
Feeling jumpy or easily startled	20.35
Having difficulty concentrating	32.32
Trouble falling or staying asleep	34.64

Discussion

To our knowledge, this was the first study to investigate the prevalence of PTSD among adolescents in Kathmandu who experienced earthquake. The majority of the respondents were 15-19 years old, studying in grade nine, came from a nuclear family and were Janajatis. Result shows that about 32.9% of respondents had suffered loss of house and property ranging from mild to severe. More than a half (57.9 %) had witnessed people buried in earthquake or death bury or death.

In this study, we noticed that within the three months periods following the earthquake, 27.1% of the respondents met the criteria for a diagnosis of PTSD which was higher than some earthquake studies among adolescents[11-13] however lower than the prevalence in other various studies.[4, 8, 10]

A study conducted among Turkish child and adolescent trauma survivors found that almost 60% of Turkish child trauma survivors suffered from moderate to very severe levels of PTSD symptoms even 3 years after the 1999 earthquake.[4]

In a study conducted among adolescents three years after an 8.0 magnitude earthquake in China, Tian et al. revealed that that the prevalence rate of PTSD was 5.7% which is significantly lower as compared to this study.[13] In another study conducted among Children 8 Months after the 2011 Japan Earthquake and Tsunami, PTSSC-15 score was significantly higher in females than in males among 4th to 6th grade students in elementary schools and among junior high school students but this study found no significant difference between PTSD and gender. In terms of traumatic symptoms and environmental damage conditions, with the exception of kindergartners, children who had their houses damaged or experienced separation from family members had a significantly higher PTSSC-15 score than children who did not experience environmental damage which is unlike from the findings of this study.[13]

Significant difference was marked for grade ($\chi^2 = 9.324$, $p<0.01$). It signifies that respondents studying in lower grade are more likely to develop symptoms of PTSD than those in higher grade which is similar to a previous study. Moreover our study indicated that there is no significant difference between gender and ethnicity with PTSD which supports the finding of previous research.[7] Also, the death of someone close to them as a consequence of the earthquake ($\chi^2 = 9.535$, $p<0.01$) indicates that those respondents who had lost someone close to them (either relatives or friends) in the earthquake were more likely have PTSD symptoms which is consistent with previous studies.[9, 13] With respect to earthquake exposure ($\chi^2 =32.251$, $p<0.001$), the people who were exposed to earthquake either by being buried, being injured or being handicapped are more likely to develop PTSD than those who just experienced the disaster while not being directly negatively affected the disaster which supports previous finding of preceding study.[13] Moreover our study indicated that there is no significant difference between gender and ethnicity with PTSD which supports the finding of previous research. [7]

This study found that the most frequently occurring symptoms reported by majority of the respondents were avoiding memories, thoughts, or feelings related to the stressful experience (58.57) following avoiding external reminders of the stressful experience (54.46%) while the least occurring was having strong negative beliefs about you, other people, or the world (17.68%). These findings are somehow similar to other various studies. In a study conducted among adolescents three years after an 8.0 magnitude earthquake in China, Tian et al. found that the most commonly occurring symptoms of PTSD were distress at reminders (64.5%), difficulty concentration (59.1%) and being easily startled (58.6%).[13]

A study conducted among adolescent Survivors of Bam Earthquake revealed that most of the participants had at least one of the re-experience symptoms, among which psychological distress at exposure to trauma cues, intrusive recollections of the event and flash backs were

the most frequent. The most frequent avoidant symptoms were restricted range of affect, markedly diminished interest and feeling of detachment which is different from the findings of our study. [10]

Conclusions

The results of the present study confirm the persistent effects of a disaster, such as an earthquake, on the mental health of the adolescents exposed to it. Younger adolescents appear particularly vulnerable to PTSD and reported more PTSD symptoms.

Adolescents with higher levels of exposure reported a higher number of PTSD symptoms. Therefore, these adolescents are more likely to require close attention and careful monitoring following an earthquake. Further, taking too many risks or doing things that could cause you harm i.e. self harm behavior symptom was found to be 42.32% which is a quite vital issue. There is an immediate need for psychosocial interventions that target adolescents along with their special needs.

Also, studies in a more representative and larger sample are needed to substantiate these results, in order to promptly identify high risk behaviors subsequent to earthquake exposure. Future studies should examine the longitudinal PTSD course among adolescents and other vulnerable groups as well.

In conclusion, this study provides comprehensive information about adolescents' post-earthquake experiences with regard to PTSD. Furthermore, this study also defines the associations between an individual's level of education, earthquake exposure and loss of someone close to them in the earthquake on the subsequent development of PTSD. This study amplifies the existing PTSD literature by focusing on adolescents and their PTSD symptoms regardless of the limitations mentioned below.

In addition, findings from this study is supposed to assist the therapist, psychiatrists and planners in the design and implementation of effective and appropriate intervention programs to help in reducing the affliction of adolescents, aid in psychological reconstruction and prevent the long term consequences of such disasters more focusing to those who are at lower grade, who were exposed to earthquake and who lost their close people in the earthquake.

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References

1. BBC news [updated 25 April 2015; cited 2015 16 November]. Available from: http://www.bbc.com/news/world-asia-32461019.
2. Earthquake death toll reaches 8,567 [updated May 17, 2015; cited 2015 16 November]. Available from: http://kathmandupost.ekantipur.com/news/2015-05-17/earthquake-death-toll-reaches-8567.html.
3. PTSD NCf. What is PTSD? U.S Department of Veterans Affairs: National Center for PTSD. Available from: http://www.ptsd.va.gov/public/pages/what-is-ptsd.asp.
4. Bal A, Jensen B. Post-traumatic stress disorder symptom clusters in Turkish child and adolescent trauma survivors. European child & adolescent psychiatry. 2007;16(7):449–57.
5. Dogan A. Adolescents' posttraumatic stress reactions and behavior problems following Marmara earthquake. European journal of psychotraumatology. 2011;2.
6. Jia X, Ying L, Zhou X, Wu X, Lin C. The effects of extraversion, social support on the posttraumatic stress disorder and posttraumatic growth of adolescent survivors of the Wenchuan earthquake. PloS one. 2015;10(3):e0121480.
7. Jin Y, Wang G. Individual Risk Factors for PTSD in Adolescents from the 2010 Earthquake in Yushu: The Predictor Effect of Rumination. J Psychiatry 2014;17(6):14-108.
8. Kar N, Mohapatra P, Nayak K, Pattanaik P, Swain S, Kar H. Post-traumatic stress disorder in children and adolescents one year after a super-cyclone in Orissa, India: exploring cross-cultural validity and vulnerability factors. BMC psychiatry. 2007;7(8).
9. Lafta R, Aziz Z, AlObaidi A. Posttraumatic Stress Disorder (PTSD) among Male Adolescents in Baghdad. Journal of Psychological Abnormalities in Children 2014;3(3).
10. Mousavi S, Mahmoudi-gharaei J, Bina M, Gholampur E, Eisar S. Post Traumatic stress Disorder and General Symptoms of Anxiety in Adolescent Survivors of Bam Earthquake. Iran J Psychiatry 2006;1:76-80.

11. North C, Adams Z, Sumner J, Danielson C. Studying the prevalence and predictors of psychiatric disorders among adolescent disaster survivors. J Child Psychol Psychiatry. 2014;55:1047–55.

12. Roussos A, Goenjian AK, Steinberg AM, Sotiropoulou C, Kakaki M, Kabakos C, et al. Posttraumatic Stress and Depressive Reactions Among Children and Adolescents After the 1999 Earthquake in Ano Liosia, Greece. The American journal of psychiatry. 2005;162:530–7.

13. Tian Y, Wong TK, Li J, Jiang X. Posttraumatic stress disorder and its risk factors among adolescent survivors three years after an 8.0 magnitude earthquake in China. BMC public health. 2014;14:1073.

14. Uemoto M, Asakawa A, Takamiya S, Asakawa K, Inui A. Kobe earthquake and post-traumatic stress in school-aged children. International journal of behavioral medicine. 2012;19(3):243-51.

15. Dell'osso L, Carmassi C, Massimetti G, Conversano C, Emidio GD, Stratta P, et al. Post-traumatic stress spectrum in young versus middle-aged L'Aquila 2009 earthquake survivors. Journal of Psychopathology 2012;18:281-9.

16. Hong C, Cao J, Efferth T. Posttraumatic stress disorder among earthquake survivors of the Wenchuan area (Sichuan, China). European journal of psychotraumatology. 2014;5:26531.

17. Posttraumatic Stress Disorder Checklist. Traumadissociation.com. [Retrieved Jul 9, 2017] Available from http://traumadissociation.com/pcl5-ptsd.