Probable Post-Traumatic Stress Disorder and Its Predictors in Disaster-Bereaved Survivors: A Longitudinal Study After the Sichuan Earthquake

Xiuying Hu [a],[*],[1], Xiaoyi Cao [b],[1], Heng Wang [a], Qian Chen [a], Maoqiong Liu [c], Aiko Yamamoto [d]

[a] Department of Nursing, West China Hospital/West China School of Medicine, Sichuan University, Chengdu, Sichuan Province, China
[b] Hemodialysis Center, Department of Nephrology, West China Hospital/West China School of Medicine, Sichuan University, Chengdu, Sichuan Province, China
[c] Department of Nursing, Dujiangyan Second People's Hospital, Dujiangyan, Sichuan Province, China
[d] Research Institute of Nursing Care for People & Community, University of Hyogo, Japan

ABSTRACT

This study examined the trajectory of probable PTSD prevalence and severity, and analyzed the predictors for PTSD severity in bereaved survivors at 6 months and 18 months after the 2008 Sichuan earthquake. This was a longitudinal study with 226 bereaved survivors sampled at 6 months and 18 months post-earthquake. The instrument used in the study was the revised version of the Impact of Event Scale. The results showed that the prevalence of probable PTSD in bereaved survivors decreased significantly from 38.9% at 6 months to 16.8% at 18 months post-earthquake. Loss of a child, being directly exposed to the death of family members and property loss during the earthquake, and mental health services utilization after the earthquake were significant predictors for PTSD severity at both assessments. These findings can contribute to post-disaster psychological rescue work. The bereaved survivors at high risk for more severe PTSD should be particularly targeted.

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Natural disasters such as earthquakes, hurricanes and floods can lead to short-term and long-term physical and mental disorders such as somatic symptoms, insomnia, anxiety, depression and post-traumatic stress disorder (PTSD) in disaster survivors (Heo et al., 2008; Mason, Andrews, & Upton, 2010; Papanikolaou, Adamis, Mellon, & Prodromitis, 2011; Zhang, Shi, Wang, & Liu, 2011). Among these, PTSD is regarded as one of the most common and severe psychological symptoms and can result in a range of psychiatric and behavioral problems such as suicidal ideation, sleep problems, aggressive and addictive behaviors, and poor health-related quality of life (Beaudoin, 2011; Scott, Lapré, Marsee, & Weems, 2014; Wen, Shi, Li, Yuan, & Wang, 2012; Ying et al., 2015; Zhou, Wu, An, & Fu, 2014).

PTSD is defined as a series of symptoms that is composed of disturbing recurring flashbacks, avoidance or numbing of memories of the event, and hyperarousal that continue for more than a month after the occurrence of a traumatic event (American Psychiatric Association, 2013). Current evidences showed that PTSD symptoms are common in disaster survivors (Altindag, Ozen, & Sir, 2005; Wu et al., 2006; Xu & Song, 2011). Moreover, the findings from previous longitudinal studies have demonstrated the great variability in the prevalence of PTSD symptoms among disaster survivors as time passed. For instance,

Altindag et al. (2005) showed that the prevalence of PTSD at 1 month after the Turkey earthquake was twice as much as that at 13 months (Altindag et al., 2005). Jia et al. (2013) reported that no significant change was found on the prevalence of PTSD (ranging from 12.4% to 10.7%) in child survivors at 15 months and 36 months after the Sichuan earthquake (Jia et al., 2013). Similarly, the prevalence of PTSD in secondary school students was the highest (36.5%) at 3 months after the 2008 Sichuan earthquake, then, declined gradually from 24.8% to 22.2% at 9 months and 12 months after the earthquake (Hou et al., 2011). In addition, it was reported that, as compared to the PTSD prevalence at 3 months after the Sichuan earthquake (16.9%), the estimated rate of PTSD in adolescents declined significantly at 17 months post-earthquake (12.1%) (Zhang, Liu, Jiang, Wu, & Tian, 2014).

Bereavement related to natural disasters can result in a range of serious short-term and long-lasting psychiatric disorders in disaster-affected populations. Being bereaved during disasters has been demonstrated as a risk factor significantly related to the occurrence of PTSD in disaster survivors. For example, Cheng et al. (2015) reported that bereaved survivors were 5.51 times more likely to report PTSD than non-bereaved survivors at 1 year after the Sichuan earthquake (Cheng et al., 2015). The prevalence of PTSD in bereaved Norwegians at 2 years after the 2004 Tsunami was 34.4% (Kristensen, Weisaeth, & Heir, 2009). Similarly, Chan et al. (2012) found that the rate of PTSD in bereaved survivors (65.6%) at 1 year after the 2008 Sichuan earthquake was significantly higher than those in non-bereaved survivors (27.1%), and loss of a child was a significant predictor for psychopathological symptoms (Chan et al., 2012). Furthermore, the findings from previous

* Corresponding Author: Xiuying Hu. Department of Nursing, West China Hospital/West China School of Medicine, Sichuan University, No 37 Guoxue Road, Chengdu, Sichuan Province, China.
E-mail addresses: hu_xiuying@126.com (X. Hu), cao_xiaoyi@126.com (X. Cao).
[1] Xiuying Hu and Xiaoyi Cao contributed to this paper equally.

literatures indicated that known risk factors for PTSD in bereaved survivors included female gender, being directly exposed to the disaster, loss of a child, loss of a parent, loss of friends or neighbors, house damage or collapse, proximity to the epicenter, psychosocial stressors and initial feelings of guilt (Chan et al., 2011; Chan et al., 2012; Kristensen et al., 2009).

On May 12, 2008, an 8.0-magnitude earthquake occurred in Sichuan province of China. As the second deadliest and strongest earthquake in China over the past 100 years, the Sichuan earthquake has resulted in 69,227 deaths, 374,643 individuals injured and 17,923 individuals missing in the disaster-exposed areas (Central People's Government of the People's Republic of China, 2008). Many disaster survivors lost their close family members, and bereavement is a devastating experience for bereaved survivors. Although previous studies have addressed the high prevalence of PTSD in bereaved survivors after disasters, limited longitudinal studies have examined the trajectories of PTSD symptoms and the longitudinal changes in predictors for PTSD symptoms in bereaved individuals after disasters. Such information is important for health care professionals for early intervention to prevent or reduce psychiatric disorders in bereaved survivors. Therefore, the aims of our study were to examine the longitudinal changes in probable PTSD prevalence and severity, and to explore the longitudinal changes in associated predictors for probable PTSD symptoms in bereaved survivors at 6 months and 18 months after the 2008 Sichuan earthquake.

METHODS

Ethical approval was obtained from the Human Subjects Ethics Subcommittee of Sichuan University prior to the study. Written informed consent was obtained from each participant who was assured of anonymity, confidentiality and their rights to withdraw from the study at any time.

Participants

A multi-stage stratified sampling method was used in our study. First, two cities were randomly selected from the 10 hardest-hit cities in the earthquake. Second, two villages were randomly chosen from each of the two selected cities. Third, two communities in each village were randomly selected. Finally, all the bereaved survivors were chosen in the selected communities. The randomization procedure was achieved by a computer random number generator according to the names of the selected cities, villages and communities which were arranged in alphabetical order independently. The inclusion criteria were as follows: (1) aged 18 and older; (2) personally experienced the earthquake; (3) lost biological family members during the earthquake such as spouse, children, parents, siblings, grandchildren and grandparents; (4) agreed to participate in the study. Participants who had visual or hearing impairment, or cognitive impairment were excluded. Cognitive impairment was evaluated by the Chinese Mini-Mental State Examination (MMSE). Three cut-off scores were used according to the different educational levels of the participants with a score < 17 (illiteracy), <20 (primary school), and < 24 (junior high school or above) suggesting cognitive impairment (Zhang et al., 1990). In conclusion, 18 potential participants were excluded due to their visual or hearing impairment, and 24 potential participants were excluded according to their MMSE scores. Of 308 potential participants who were eligible to take part in the study, 266 participants volunteered to complete the survey (86.4%).

Measures

The Revised Version of the Impact of Event Scale (IES-R) (Weiss & Marmar, 1997)

The measure is generally used to evaluate the symptoms of probable post-traumatic stress disorder. It is composed of 22 items and 3 dimensions: intrusion (8 items), avoidance (8 items) and hyperarousal symptoms (6 items) (Weiss & Marmar, 1997). Participants are required to score the severity of each symptom over the past 7 days on a 5-point Likert scale ranging from 0 ("not at all") to 4 ("extremely") with higher scores indicating more severe post-traumatic stress symptoms. Previous studies show a high degree of inter-correlation of the 3 subscales (r ranges from 0.52 to 0.87) (Creamer, Bell, & Failla, 2003). Cronbach's alpha of each subscale ranges from 0.79 to 0.94, and the test–retest reliability ranges from 0.89 to 0.94 (Weiss & Marmar, 1997). Participant with a mean IES-R score greater than 1.5 or a total IES-R score over 33 is classified as a probable PTSD case (Creamer et al., 2003). The Chinese version has been demonstrated as a reliable and valid measure (Guo, Xin, & Geng, 2007). In the present study, Cronbach's alpha for each subscale ranged from 0.87 to 0.92.

In addition, demographic variables in the study included gender, age, marital status and educational level. Earthquake-exposed variables included property loss, personal physical injury, being directly exposed to the death of family members or not, and types of dead family members during the earthquake (spouse, children, parents, siblings, grandchildren and grandparents). Post-earthquake variables included house conditions, self-reported health status and mental health services utilization (group intervention, family therapy, individual counseling or psychopharmacology treatments from health care professionals) after the earthquake.

Data Collection

Prior to the study, two research assistants each with a master's degree in medical science were selected and trained for the data collection procedure. Participants were told the importance and purposes of the study, and were requested to complete the questionnaires independently and anonymously according to their actual feelings after each written inform consent was obtained. As for the illiterate participants, the research assistants read the questions and answers and recorded their responses. With regard to those participants who could not complete the questionnaires due to physical injuries, the research assistants recorded their answers. These questionnaires were collected immediately after completion and checked for incomplete items. The data collection process was conducted at 6 months (November 2008) and 18 months (November 2009) after the earthquake, respectively.

Data Analysis

The statistical analysis software used in the study was SPSS 16.0 (SPSS Inc., Chicago, IL, USA). Continuous variables were described as means with standard deviations, and categorical variables were presented as frequencies with percentages. Chi-square tests (Fisher's exact tests) or two independent samples t-tests were used to evaluate differences in demographic data, and earthquake-exposed and post-earthquake variables between the followed up participants and the missed participants. Chi-square tests were performed to identify difference in probable PTSD prevalence between two waves of survey. The multivariate linear regression analyses were used to detect significant predictive effects of demographic characteristics, earthquake-exposed variables and post-earthquake variables on PTSD severity at both assessments. Among these independent variables, types of dead family members in the earthquake were included in the regression equation as dummy variables (reference group: other family members: grandparents, siblings and grandchildren). P value < 0.05 was considered statistically significant (two-tailed).

RESULTS

Characteristics of Participants

During the first assessment, 266 subjects were investigated at 6 months after the earthquake. Then, 40 of 266 subjects (15.0%) dropped out during the second assessment. Dropouts can be ascribed to the poor compliance to remain in the study (14 subjects), to the relocation to another place (18 subjects), and to death of the participants (8