The predictors and outcome of psychiatric disorders among survivors post-earthquake: survey from Sichuan China

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KEYWORDS
Psychiatric disorders; disasters; earthquake

ABSTRACT

Objective
The aims of the study were to investigate predictors and outcomes of psychiatric disorders among survivors post-earthquake.

Design
Cross-sectional design survey.

Setting
Government-aided communities with temporary shelters.

Subjects
A multistage stratified and cluster sampling strategy was employed to select participants via face-to-face interviews, and a total of 1,297 survivors participated in the research.

Main outcome measure
Psychiatric disorders were measured with self-reporting questionnaire-20 (SRQ-20), and quality of life was measured with medical outcomes study 36-item short form health survey (SF-36) and a series of problems were made to evaluate the demographic characteristics of survivors.

Results
The findings of the present study show that psychiatric morbidity was very prevalent among survivors (76.6%). Negative correlation was found between the total score of SRQ and PCS (r_s= -0.525, p<0.001), and MCS(r_s= -0.679, p<0.001) by Pearson correlation analysis. The multivariate logistic regression analysis demonstrated that female, aged 60 or older, having financial burden and having >2 chronic diseases were significant risk factors for psychiatric disorder. While married, monthly income > ¥1,500, and with medical insurance were significant protection factors against psychiatric disorders.

Conclusions
The psychiatric morbidity was very prevalent among survivors two years after the earthquake. The survivors with psychiatric disorders tend to have poor quality of life. Appropriate public health and medical interventions should put an emphasis on survivors who are female, aged 60 or older, having financial burden and having >2 chronic diseases because they are at heightened risk for psychiatric disorders.

INTRODUCTION

At 14:28 PM on 12 March 2008, an earthquake measuring 8.0 on the Richter scale struck the Wenchuan in South West China. The earthquake resulted in a high death toll, injuries and damage. Approximately, 69,229 people lost their lives, 374,643 people were injured and 17,923 people missing. Experiencing a disaster can profoundly affect one's psychological well-being. Over the years, the subject of the mental health of survivors of natural disasters has attracted much attention from researchers, and many studies have provided evidence of psychological sequelae post-earthquake (Zhou et al 2013; Priebe et al 2011;Procter and Crowley 2011).

One study (Aziz and Aslam 2012) examined psychiatric morbidity after a natural disaster among survivors who were extricated from under the rubble in a severely earthquake affected area eight months after the earthquake, found that 52.0% of survivors filled the criterion for major depression, 32.5% were diagnosed with Post-traumatic Stress Disorder (PTSD), 15.0% with dysthymia, and 25.0% with agoraphobia. Moreover, 77.0% of the respondents had been diagnosed with at least one psychiatric disorder.

A study in Peru (Cairo et al 2010) assessed 298 adults five months after an earthquake in 2007 found 25.2% had at least one symptom of psychiatric morbidity. The study (Chou et al 2007) in Taiwan on the impact of Chi-Chi earthquake involving 301 survivors two years after the disaster also found 4.2% had been diagnosed with at least one psychiatric disorder, suicidality were 5.6%, and drug abuse/dependence were 5.1%.

It is known that the predictors of psychiatric disorders in various post-disaster stages differ, little research has been done to examine the predictors of psychiatric disorders long-term after the disaster. A study by Zhou et al (2013) showed the risk factors for psychiatric disorders included old age, female gender, low school education and witnessing death in an earthquake. Chou et al (2007) found that sleep disturbance was the only statistically significant factor for psychiatric disorder two and three years after the disaster. These studies on psychiatric disorders among disaster survivors indicated that several inconsistencies still remain with regard to its determinants. Therefore, more study is warranted to find factors influencing psychiatric disorders.

In addition, earthquake survivors showed a wide range of psychosocial problems, including extended grief, deteriorated quality of life and withdrawal. Chinese survivors reported decreased quality of life (Ke et al 2010), and 32 months after 1999 Parnitha earthquake in Greece, adolescents reported a negative impact on their psychological and social well-being, and decreased academic performance (Goenjian et al 2011).

In recent years, an increasing number of studies have been published indicating several psychosocial consequences of disasters. But little research has been done to examine both the predictors and outcome of psychiatric disorders two years after the disaster. Therefore, the present cross-sectional study was conducted to assess the psychiatric disorders of the survivors in 10 shelters in Sichuan province, south-west China. The aim of the present study was twofold: (1) to investigate levels of psychiatric disorders two years after the earthquake; and (2) to identify risk factors and the outcome of psychiatric disorders among survivors.

METHODS

Design

This study used a cross-sectional design. The purpose of this study was to identify the levels, risk factors and the outcome of psychiatric disorders among survivors two years after an earthquake in Sichuan province, south-west China.

Sample

A multistage stratified and cluster sampling strategy was employed to select participants from zones within the area proclaimed by the State Council as an earthquake hit region. The earthquake-affected region was

classified into three zones: Zone One referred to the region situated in a fracture zone of the earthquake, with devastating casualties and collapse of many buildings; Zone Two referred to the region adjoining Zone One, but with fewer collapsed buildings and casualties than in Zone One; Zone Three referred to other affected areas. Three counties were randomly selected from each of the classified zones. A systematic sampling approach was adopted from these nine counties to randomly select 10 shelters, three in Zone One, four in Zone Two, and two in Zone Three. Inclusion criteria were as follows: (a) personally experienced this earthquake; (b)clear consciousness, without obvious language barrier; (c) voluntary participation in the study. Study exclusion criteria were: (a) cannot communicate verbally or in writing; (b) cognitive disorders. Initially 1,522 individuals were surveyed, but 225 individuals showed insufficient responses or did not complete the questionnaire. Therefore, the final sample included 1,297 participants (response rate =85.2%).

Data collection

The data for the research were collected by interviewers from staff of the Department of Social Medicine at Sichuan University. Prior to this study, three training conferences were held to train the interviewers. The aim and procedure of the research was explained to the interviewers. They were taught interview techniques to avoid causing any further or additional upset to the interviewees.

After contact with local government and a community service organisation, this survey was carried out on two government-aided communities with temporary shelters for Wenchuan earthquake survivors between1 June 2010 and 31 August 2010. Respondents were required to fill in the questionnaires independently according to their actual feelings. Each participant was interviewed by a trained interviewer in a private place at the shelter. The questionnaire took 30 minutes to complete. The interviewer read each question verbatim to respondents with a low level of education. The respondent then selected the appropriate response.

The first 134 completed questionnaires were re-administered by a different interviewer. The inter-rater reliabilities ranged from 0.85 to 0.90. The results indicated that the data collection method was feasible and all of the participants can easily understand the content of the questionnaires.

Measures

The personal characteristics was self-designed based on literature reviews. It was composed of age, employment status, marital status, monthly family income, marital status, years of education, medical insurance, number of chronic diseases, type of housing now living and so on.

Self-Reporting Questionnaire-20 (SRQ-20) was used to measure psychiatric disorders. SRQ-20 developed by the World Health Organization has been used to detect the prevalence rate of psychiatric morbidity of community-dwelling population in developing countries. This scale is a common psychiatric assessment tool which has been translated into various versions (Scholte et al 2011; Richardson et al 2010). It includes 20 neurotic items which reflect depression symptom, anxiety symptom and psychosomatic complaints with score 0 indicating 'no symptom' and score 1 'having symptom'. The total score ranged from 0 to 20,with a higher score indicating a higher level of psychiatric distress. The optimal cut-off point for SRQ-20 is 7/8. Individuals with scores higher than the cut-off point are identified as having psychiatric disorders. The Chinese version of SRQ-20 was developed in 2008, Cronbach'α is .91, test-retest reliability is 0.94, item-total correlation ranges from .51 to .69 and the optimal cut-off point is defined as 6/7 yielding sensitivity of 93% and specificity of 62% (Hu et al 2008). Cronbach'α in this study was .80. According to the optimal cut-off point of the Chinese version of SRQ-20, participants with scores > 7 were identified as having a psychiatric disorder and scores <6 were identified as without psychiatric disorder (0 = without psychiatric disorder; 1 = psychiatric disorder).

Quality of life was measured by the Short Form 36 (SF-36).The SF-36 is designed to measure quality of life among the general population, which contains 36 items, measuring eight domains of quality of life: physical

functioning (PF, 10 items), role-physical (RP, 4 items), bodily pain (BP, 2 items), general health (GH, 5 items), vitality (VT, 4 items), social functioning (SF, 2 items), role-emotional (RE, 3 items), mental health (MH, 5 items). Another health indicator reported health transition evaluating the changes of health status over the past year. The scale is composed of two dimensions which are defined as physical component summary (PCS) and mental component summary (MCS), PCS is composed of PF, RP, BP and GH, MCS is composed of VT, SF, RE and MH. The score in each domain of the SF-36 was transformed into a standard score, ranging from 0 to 100 (Brazier et al 1992). Cronbach'α of each subscale ranges from .73 to .96, test-retest reliability ranges from .69 to .81. Internal consistency reliability of the Chinese version ranges from .66 to .88 and test-retest reliability ranges from .66 to .94 (Li et al 2003). In this study, internal consistency reliability of eight subscales of SF-36 ranges from 0.85 to 0.96.

Ethical considerations

Prior to the study, ethical approval was obtained from the Human Subjects Ethics Sub-committee of Sichuan University. In addition, before the investigation, each participant was told the study goals, data collection procedure before they signed written informed consent. They were assured that anonymity and confidentiality would be guaranteed and the right to withdraw from the study at any time with no penalty. No pressure or inducement of any kind was applied to encourage students to participate in the research.

Data Analysis

The mean scores of psychiatric disorders and quality of life were described by mean and standard deviation. The prevalence rate of psychiatric disorder was described by frequency and percentage. The differences of scores SRQ between different gender, age, marital status, monthly income, number of chronic diseases were compared by single sample t-test or ANOVA. Pearson correlation analysis was performed to explore the relationships between psychiatric disorders and physical/mental health. Additionally, multivariate logistic regression analysis were performed to identify the independent predictors of SRQ scores. P value < 0.05 (two-tailed) was considered statistically significant. To ensure that appropriate statistical analyses were used for, tests of central tendency, the distribution of SRQ score were examined first. Data were analysed using Statistical Package for the Social Sciences (SPSS) version 17.0.

RESULTS

Characteristics of Participants

60.4% (n=784) of the respondents were female, the mean age was 50.61 years (SD=17.67), ranging from 0 years to 90 years. Additionally, 11.4% (n=148) of the respondents were <30 years old, 24.1% (n=312) were >60 years old, and the majority of participants were unemployed. 78.3% (n=1016) of the respondents were married. 48.7% (n =632) of the respondents were illiterate or only graduated from primary school. The monthly income of 69.5% (n=901) respondents was lower than ¥1,500, 39.0% (n=506) of the participants suffered from >2 types of chronic diseases (table 1).

SRQ of respondents

The mean score of psychiatric distress was 4.68 (SD=1.71). 76.6% (n=994) of the respondents reported psychiatric morbidity. A marked higher score on SRQ was found among survivors who were female, above 60 years old, single/divorced/widowed, ethnicity minority, and the monthly family income <¥1,500, had financial burden, with >2 chronic diseases, and without medical insurance. However, there were no statistically significant differences on scores on SRQ among different levels of education, employment status and people who they lived with (table 2).

Influencing factors of SRQ

The results of Pearson correlation analysis between PCS, MCS and SRQ showed that negative correlation was found between total score of SRQ and PCS (r_s=-0.525, n = 1297, p <0.001), and MCS (r_s=-0.679, n = 1297, p <0.001).

The results of multivariate logistic regression analysis demonstrated that females, aged 60 or older, having financial burden and with >2 chronic diseases were risk factors for psychiatric disorder. While married, monthly income >¥1,500, and with medical insurance were protective factors for psychiatric disorder (table 3).

DISCUSSION

The findings of the present study showed that psychiatric morbidity was very prevalent among survivors two years following Sichuan earthquake. This study's results were consistent with previous studies (Irmansyah et al 2010; Onder et al 2006). In addition, according to Myers et al (2005) views, the duration of psychiatric disorders among survivors who experienced devastating natural disasters sustained for two years or more. These observations indicate that the mental health needs of disaster survivors are so great that mental health relief programs should be set up even two years after the disaster.

The results in the present study showed that female survivors tended to have a higher score on SRQ. These results were consistent with the prior studies (Viswanath et al 2013; Hyodo et al 2010). Female vulnerability to psychiatric disorder has been attributed to biological markers and their inferior social status in many societies (Liu et al 2012). Firstly, females are more sensitive to disasters and traumatic events than males and are therefore more likely to be affected by mental health problems. Secondly, biological markers were considered to be responsible for the difference. Ressler et al (2011) found that the gender-specific difference may occur via oestrogen regulation of ADCYAP1R1, which predicts psychiatric disorders diagnosis and symptoms in females only. Porter et al (2008) found that the genotype A218C of TPH-1 in females may be associated with the

Table 1: Characteristics of Participants (n = 1297)

Social-demographic Characteristics	n	%
Gender		
Male	513	39.6
Female	784	60.4
Age (years)		
<30	148	11.4
30~	278	21.4
40~	249	19.2
50~	310	23.9
60~	312	24.1
Marital status		
Married	1016	78.3
Single/divorced/widowed	281	21.7
Education levels		
Illiteracy	173	13.3
Primary school	459	35.4
Junior/high school	622	48.0
Diploma or above	43	3.3
Employment status		
Employed	251	19.4
Unemployed	981	75.6
Full time student	65	5.0
Ethnicity		
Han	589	45.4
Ethnicity minority	708	54.6
Religion		
No	74	5.7
Yes	1223	94.3
People who they live with		
Alone	234	18.0
Partner	589	45.4
Parents	341	26.3
Other	96	7.4
Monthly family income		
<¥1,500	901	69.5
>¥1,500	396	30.5
Financial burden		
No	897	49.9
Yes	403	51.1
Number of chronic diseases		
0 or 1	791	61.0
2 or more	506	39.0
Medical insurance		
No	904	69.7
Yes	393	30.3

Table 2: Univariate analysis of psychiatric disorders among survivors (n = 1297)

Variables	N	SRQ	t/F	P
Gender				
Male	513	4.39(0.59)	41.58	0.000**
Female	784	5.90(0.67)		
Age (years)				
<30	148	4.23(0.64)	30.34	0.003**
30~	278	4.13(0.45)		
40~	249	3.95(0.63)		
50~	310	4.44(0.42)		
60~	312	4.86(0.57)		
Marital status				
Married	1016	4.53(1.21)	18.75	0.000**
Single/divorced/widowed	281	5.99(0.93)		
Education levels				
Illiteracy	173	4.55(0.65)	1.12	0.070
Primary school	459	4.51(0.87)		
Junior/high school	622	4.63(0.95)		
Diploma or above	43	4.61(0.34)		
Employment status				
Employed	251	4.12(0.35)	2.34	0.162
Unemployed	981	4.14(0.67)		
Full time student	65	4.10(0.81)		
Ethnicity				
Han	589	4.34(0.12)	58.58	0.000**
Ethnicity minority	708	5.67(0.54)		
Religion				
No	74	4.35(0.76)	1.41	0.158
Yes	1223	4.43(0.45)		
People who they live with				
Alone	234	4.31(0.56)	1.76	0.234
Partner	589	4.32(1.45)		
Parents	341	4.34(0.56)		
Other	96	4.28(0.86)		
Monthly family income				
<¥1,500	901	5.89(0.54)	33.85	0.000**
>¥1,500	396	4.43(0.78)		
Financial burden				
No	897	4.95(0.56)	18.65	0.000**
Yes	403	5.82(1.12)		
Number of chronic diseases				
0 or 1	791	4.87(1.23)	2.51	0.013*
2 or more	506	5.03(0.94)		
Medical insurance				
No	904	4.94(0.73)	5.57	0.000**
Yes	393	4.71(0.56)		

*p<5; **p<01

regulation of peripheral tryptophan levels and therefore availability of tryptophan to the brain, which may have relevance to a range of psychiatric conditions. Additionally, above 60 years old, single/divorced/widowed, with two or more chronic diseases, monthly family income <¥1,500, with financial burden and without medical insurance survivors showed much higher score of SRQ ,which were in parallel to previous studies (Tsuchida et al 2009; Kloner et al 1997). On the other hand, we know emotional support from a spouse was regarded as the most important social support system which would be helpful in coping with stressful events efficiently and recovering from disaster crisis quickly. In the study, the mean scores for MCS of single, divorced or widowed people were lower than those of the married. That result was a supplement for previous studies (Aziz and Aslam 2012; Kulkarni and Pole 2008). Additionally, the ethnicity minority populations also have higher score of SRQ than Han, which was consistent with previous research (Chen et al 2012; Liu et al 2012). A reasonable explanation could include that they tend to live in a more vulnerable situation before a disaster, suffer from great loss during the earthquake, have inadequate social support systems, and that probably increases the negative psychosocial impact after the disaster.

Table 3: Logistic regression analysis of psychiatric disorders among survivors (n = 1297)

Variables	B	P	OR	95%CI (OR)	
Gender (0= male; 1= female)	1.04	0.001**	2.82	1.46	5.44
Age(years) (0=<30 ,30~, 40~,50~;1= ≥ 60)	1.32	0.001**	3.75	2.04	6.87
Marital status (0=Single/divorced/widowed; 1= married)	-0.07	0.036*	0.62	0.48	0.92
ethnicity minority	0.00	0.250	1.00	0.99	1.01
Monthly income(0= <¥1,500; 1= >¥1,500)	-0.36	0.012*	0.70	0.17	0.86
Financial burden(0= no; 1= yes)	0.86	0.013*	2.36	1.26	4.44
Number of chronic diseases(0= 0 or 1;1= 2 or more)	0.93	0.001**	2.53	1.42	0.93
Medical insurance (0=no; 1= yes)	-1.23	0.013**	0.51	0.38	0.96

*p<5; **p<01

This study examined the correlation between PCS, MCS and SRQ. Negative correlation was found between the total score of SRQ and PCS (rs = -0.525, p <0.001) and MCS (rs = -0.679, p <0.001). Survivors with psychiatric disorders tend to have poor quality of life. Although there are few studies exploring the relationship between psychiatric disorder and quality of life among survivors two years following the Sichuan earthquake, the results in the study were consistent with similar studies focusing on children and adolescence post-disaster (Jia, Tian, He et al 2010; Chou et al 2004). Victims who were identified as psychiatric morbidity reported poor scores on PCS and MCS, indicating poor quality of life, which emphasised the importance of focusing on long-term psychiatric morbidity among disaster-exposed survivors.

Additionally, the multivariate logistic regression models of SRQ showed there were several negative predictors or defensive factors of the occurrence of psychiatric disorder and a significant negative predictor was 60 or older (OR 3.75; 95%CI 2.04-6.87), survivors aged 60 or older showed more severe psychiatric disorder than those aged <60. This outcome was consistent with previous studies (Jia, Tian, Liu et al 2010; Yazgan et al 2006). In addition, the results demonstrated that females, aged 60 or older, having financial burden and having >2 chronic diseases were risk factors for psychiatric disorder. While married, monthly income >¥1,500, and with medical insurance were protective factors for psychiatric disorder. These findings were consistent with previous studies (Kuo et al 2003). Additionally, having medical insurance can reduce the economic pressure, and make up for the financial loss, and alleviate psychiatric disorders. The results indicate that appropriate public health operation procedure for psychiatric service after an earthquake should be established.

LIMITATIONS

The study has limitations as follows: firstly, both the SRQ-20 and SF-36 are self-administrated questionnaires; a response bias might exist due to social desirability. Secondly, a cross-sectional observational research design was utilised so that dynamic variation of psychiatric morbidity among the survivors has not been observed. In future, it is necessary to characterise longitudinally the survivors' psychiatric morbidity after a massive earthquake with various demographics and earthquake-related experiences and to identify risk factors that were associated with psychiatric morbidity for the survivors.

CONCLUSION

A high prevalence of psychiatric morbidity was found among survivors two years after the 2008 Sichuan earthquake. Furthermore, the predicting factors for psychiatric disorders were found to be related to being female, being aged 60 or older, having financial burden and having >2 chronic diseases. The survivors with psychiatric disorders tend to have lower quality of life. These findings can contribute to post-disaster rebuilding and relief work. The survivors at high risk for psychiatric disorders should be particularly considered. Moreover, the findings support focusing on post-earthquake efforts to provide effective and sustainable mental health services for survivors in order to prevent psychiatric diseases and improve quality of life.

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