Original Article

Prevalence and risk factors of prolonged grief disorder among bereaved survivors seven years after the Wenchuan earthquake in China: A cross-sectional study

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ABSTRACT

Background: This study aimed to determine the prevalence and predictive factors of prolonged grief disorder (PGD) among those bereaved by the Wenchuan earthquake in Southwestern China seven years after the event.
Methods: A cross-sectional survey based on census tracts was conducted on the bereaved earthquake survivors. Responses to the questionnaire regarding PGD and its potential associated factors were obtained either through face-to-face or telephone interview. PGD was screened by a validated Chinese version of the PGD questionnaire-13 (PG-13). Bivariate and multivariate regression analyses were used to determine the prevalence and associated risk factors of PGD.
Results: A total of 1464 bereaved earthquake survivors, with a response rate of 97.6%, were included in the study. Of the 1464 respondents studied, 124 (8.47%) were diagnosed with PGD. Multivariate regression analysis demonstrated that PGD in the bereaved earthquake individuals was significantly associated with several factors, including age, economic burden, close kinship with the deceased, and living with the deceased before the loss. Wenchuan earthquake bereaved aged 41—60 years were more likely to develop PGD compared to those aged younger than 40 or older than 60 ($OR = 2.075$, 95% $CI = 1.297-3.319$). Those who had a close kinship with the deceased had a higher tendency to develop PGD ($OR = 5.144$, 95%$CI = 2.716-9.740$). The odds of PGD among the earthquake bereaved with economic burdens were higher relative to those who did not experience an economic burden ($OR = 8.123$, 95% $CI = 2.657-24.831$). Those who living with the deceased before loss also had a higher tendency to develop PGD ($OR = 0.179$, 95%$CI = 0.053-0.602$).
Conclusions: This study revealed that a significantly high proportion (8.47%) of the Wenchuan earthquake-bereaved remain grieving seven years after the event. Those diagnosed with PGD should receive appropriate interventions from clinical psychologists. The risk factors identified in this study are crucial for the early screening and prevention of PGD in future nursing and psycho-clinical practices.
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1. Introduction

Earthquakes are one of the most devastating natural disasters. An earthquake causes death and injuries to thousands of people within minutes. The Wenchuan earthquake in southwest China on May 12, 2008 was measured at 8.0 on the Richter scale and ranked as the most devastating in China since the 20th century. It affected over 100,000 km^2 and caused over 100,000 deaths. Apart from the destruction of the natural environment, the Wenchuan earthquake caused long-lasting and widespread psychological injures among bereaved individuals, resulting in a high risk of psychological morbidity among the earthquake bereaved [1].

Grief is a common reaction to bereavement. Prigerson et al. characterized grief as "a psychological protest against the reality of loss and a general reluctance to make the adaptations to life in the absence of the loved one" [2]. Most individuals can mourn effectively over time. However, for some individuals, grieving can be aggravated and prolonged, which will eventually develop into

pathological grief or prolonged grief disorder (PGD). Individuals suffering from PGD may have a series of symptoms, such as strong denial of the loss, lowered self-worth, and an inability to form new relationships with others [3,4]. Studies confirmed that these chronic and durable symptoms lead to increased risk of long-term physical, mental, and social functional disturbance [5,6].

To date, with the focusing on different kinds of bereaved individuals among natural disasters or other events, some studies have investigated the prevalence of PGD. Many of these studies were conducted in western countries and reported varied PGD rates. For example, six months to three years after a loss, PGD prevalence among general bereaved individuals varied between 12% and 43% [7—9]; six years after a loss, the value decreased to 10% [10]; and at 10 years, it remained at 7% [11]. Investigations in China revealed that the PGD rate among Chinese general bereaved survivors 1—1.5 years after the loss was 71.1%—79% [12,13]. Moreover, the value still reached up to 13.9% three to four years after a loss, the longest time studied since the occurrence of an earthquake.

PGD resembles other bereavement-related disorders, such as post-traumatic stress disorder (PTSD) or major depressive disorder (MDD), and it always occurs simultaneously with these disorders (approximately 30%—50% and 21%—54%, respectively) [3,14,15]. At the same time, PGD differs significantly from PTSD and MDD in terms of symptoms and treatment [16]. The known risk factors of PGD include the circumstances of death (cause, location, and unexpectedness of death), the relationship with the deceased, closeness of the kinship, pre-bereavement caregiver burden, the characteristics of the bereaved (religion, quality of social support, and coping style), and concurrent socioeconomic stressors [17]. Lack of knowledge and awareness on PGD makes diagnosis and treatment in China difficult, where it is often diagnosed and treated as PTSD, MDD, or other psychological disorders. Expanding our understanding of PGD is urgently needed to prepare for large-scale natural disasters in the future.

Given this background, the current study aimed to explore the prevalence and risk factors among Chinese earthquake-bereaved individuals. A cross-sectional study using a questionnaire with bereavement-related items was conducted on Wenchuan earthquake-bereaved individuals from severely afflicted areas in southwest China. Bivariate analysis and multivariate stepwise logistic regression analysis were applied on the collected data. Results indicated a significantly high level of PGD rates among the bereaved, and several predictive factors of PGD were identified. Information obtained from this study extended our understanding of PGD and is valuable for establishing early screening and prevention systems for PGD in routine nursing and clinical practices.

2. Material and methods

2.1. Participants

Participants involved bereaved survivors of the Wenchun earthquake in southwest China. Individuals who provided incomplete information were excluded. Survivors with obvious suicidal tendency, dementia, or other psychological disorders were also excluded after using relevant detection tools.

2.2. Procedure

An anonymous questionnaire survey was conducted on the earthquake bereaved through face-to-face or telephone interview. We identified three towns in the severely afflicted areas to establish a wide geographic distribution of the samples. We selected 10 census tracts in each of the three target areas and then chose 50 individuals within each census tract. A total of 1500 respondents were confirmed using a stratified two-stage convenient sampling method. After assessment for missing data, the final number of respondents was 1464. The study protocol was approved by the Ethics Committee of the Chengdu University of Traditional Chinese Medicine. All participants provided their consent before joining the study.

2.3. Questionnaire

The questionnaire was composed of two parts, namely, the general information questionnaire and the Prolonged Grief Disorder Questionnaire-13 (PG-13), which can diagnose PGD [18].

The general information questionnaire covered demographic characteristics (e.g., age, gender, and nationality) and bereavement-related clinical characteristics, including their relationship with the deceased, whether they shared a close relationship with the deceased, and whether they were living with the deceased before their loss. The PG-13 was revised from the original version of the Inventory of Complicated Grief (ICG) as developed by Professor Prigerson from Harvard University Medical School to measure PGD lasting over six months since the loss. After obtaining authorization from Professor Prigerson, we began translation into Chinese, and our version was proven to have high reliability and validity [19]. The reliability and validity of the revised PG-13 were confirmed by previous studies [20,21].

PG-13 is a diagnostic tool comprising four dimensions: separation distress; duration criteria; cognitive, emotional, and behavioral symptoms; and impairment criteria, for a total of 13 items. The criteria for diagnosing PGD include the following: (1) event criteria: ensure the respondent has experienced bereavement; (2) separation distress: the respondent must experience the characterizations in PG-13 question #1 or #2 at least daily; (3) timing criteria: duration of at least six months from the onset of separation distress, and question #3 must be answered with "Yes"; (4) cognitive, emotional, and behavioral symptoms: the respondent must experience five of the descriptions in PG-13 questions # 4—12 at least "once a day" or "quite a bit"; and (5) functional impairment: the respondent must have significant impairment in social, occupational, or other important areas of functioning (e.g., domestic responsibilities). Specifically, PG-13 question #13 must be answered with "Yes" [3].

2.4. Statistical analysis

We exploited different statistical tools to analyze the factors included in the survey. Chi-square test was used to examined gender, economic burden, relationship with the deceased, close kinship with the deceased, and confiding to relatives/friends about the deceased after loss. Fisher's exact test was used to investigated nationality, living with the deceased before loss, and religious belief. The Wilcoxon rank sum test was used to evaluated age and educational status. Bivariate analysis was also conducted to identify factors possibly associated with the presence of PGD. Multivariate stepwise logistic regression analysis (forward: Likelihood Ratio Test) was performed with the presence of PGD as the dependent variable and factors with significant correlation (as confirmed by the simple factor analysis above) as independent variables. All the P-values were two-tailed, and the level of statistical significance was set at $P < 0.05$. All statistical analyses were performed using SPSS version 19.0 software (SPSS Inc., Chicago, IL, USA).

3. Results

Of the 1464 earthquake-bereaved respondents, 124 were diagnosed with PGD by clinical psychologists using PG-13. Hence, the

prevalence of PGD among the earthquake bereaved seven years post loss was 8.47%. The demographic and clinical characteristics of the earthquake bereaved are shown in Table 1.

Bivariate analysis was conducted to identify the demographic and clinical characteristics associated with PGD. Factors including gender ($P = 0.036$), age ($P < 0.001$), educational status ($P = 0.046$), economic burden ($P = 0.005$), relationship with the deceased ($P < 0.001$), close kinship with the deceased ($P < 0.001$), living with the deceased before loss ($P = 0.035$), and confiding to relatives/friends about the loss ($P = 0.001$) were found to be significantly associated with PGD. Other factors, including nationality and religious belief, were not correlated with PGD. Table 2 presents the connection between the demographic and clinical characteristics of the earthquake bereaved with PGD.

Of the 1464 earthquake-bereaved respondents, 279 lost their children and 202 lost their spouse. Among them, 40 of the 279 and 23 of the 202 were diagnosed with PGD, resulting in 14.34% and 11.39% of PGD rates in the earthquake bereaved who lost their child or spouse, respectively. For those who did not give birth to other children or rebuild a marriage, the respective PGD rates were 15.82% and 14.44%, significantly higher than those who did (8.45% and 8.93%, respectively). The detailed association analysis of these factors with PGD is shown in Table 3.

The test of multicollinearity of intra-predictor variables revealed that the variable relationship with the deceased has collinearity with the variables of close kinship with the deceased, age, and

Table 1
Demographic and clinical characteristics of the earthquake bereaved.

Variable	n	%
Gender		
Male	604	41.26
Female	860	58.74
Age(years)		
≤40	345	23.57
41—60	542	37.02
≥61	577	39.41
Education status		
Elementary school and below	864	65.85
Secondary school	425	22.20
High school and upper	175	11.95
Economic burden		
Yes	915	62.50
No	549	37.50
Nationality		
Han	328	22.40
Qiang	1136	77.60
Relationship with the deceased		
Child	279	19.06
Spouse	202	13.80
Parents	352	24.04
Others	631	43.10
Close kinship with the deceased		
Yes	556	37.98
No	908	62.02
Rebirthed a child		
Yes	142	44.51
No	177	55.49
Rebuilt a marriage		
Yes	90	45.00
No	110	55.00
Living with the deceased before loss		
Yes	898	61.34
No	566	38.66
Confiding to relatives/friends about the deceased after loss		
Yes	788	53.83
No	676	46.17
Religious belief		
Yes	358	24.45
No	1106	75.55

Table 2
Bivariate analysis of demographic and clinical characteristics of the earthquake bereaved and their association with PGD.

Variable	Prolonged grief disorder		χ^2/Z	P
	n	%		
Total	124	8.47		
Gender				
Male	40	6.62	4.527[a]	0.033
Female	84	9.77		
Age(years)				
≤40	25	7.25	−33.549[c]	<0.001
41—60	70	12.92		
≥61	29	5.03		
Education status				
Elementary school and below	62	7.18	−33.930[c]	<0.001
Secondary school	40	9.41		
High school and upper	22	12.57		
Economic burden				
Yes	92	10.05	7.904[a]	0.005
No	32	5.83		
Nationality				
Han	32	9.76	0.901[b]	0.368
Qiang	92	8.10		
Relationship with the deceased				
Child	40	14.34	25.892[a]	<0.001
Spouse	23	11.39		
Parent(s)	31	8.81		
Others	30	4.75		
Close kinship with the deceased				
Yes	72	12.95	23.205[a]	<0.001
No	52	5.73		
Living with the deceased before loss				
Yes	87	9.69	4.447[b]	0.043
No	37	6.54		
Confiding to relatives/friends about the deceased after loss				
Yes	52	6.60	7.706[a]	0.006
No	72	10.65		
Religious belief				
Yes	30	8.38		1.000
No	94	8.50	0.005[b]	

a: Chi-square test; b: Fisher's exact test; c: Wilcoxon rank sum test.

Table 3
Bivariate analysis of the variables give birth to other child and rebuild a marriage among the earthquake bereaved and their association with PGD.

Variable	Total	Prolonged Grief Disorder		χ^2	P
		n	%		
Give birth to other child	279	40	14.34	3.901[a]	0.048
Yes	142	12	8.45		
No	177	28	15.82		
Rebuild a marriage	202	23	11.39	10.093[a]	0.001
Yes	112	10	8.93		
No	90	13	14.44		

a: Chi-square test.

living with the deceased before loss. Therefore, the multivariate logistic regression was assessed by removing the variable of relationship with the deceased. With the above significant variables in the binary analysis entered as independent variables and the presence of PGD as the dependent variable, the multivariate regression analysis demonstrated that PGD was associated with age, economic burden, close kinship with the deceased, and living with the deceased before loss (Table 4). Specifically, Wenchuan earthquake bereaved aged 41—60 years were more likely to develop PGD compared to those aged younger than 40 or older than 60 ($OR = 2.075$, $95\%CI = 1.297—3.319$). Those who had a close kinship

Table 4
Multivariate analysis of selected predictor variables of the earthquake bereaved and their association with PGD.

Variable	Odds Ratio	95%CI	Wals	P
Age	2.075	1.297—3.319	9.274	0.002
Economic burden	8.123	2.657—24.831	13.498	<0.001
Close kinship with the deceased	5.144	2.716—9.740	25.277	<0.001
Living with the deceased before loss	8.152	2.816—23.604	7.715	0.005

with the deceased had a higher tendency to develop PGD ($OR = 5.144$, $95\%CI = 2.716—9.740$). Moreover, the odds of PGD among the earthquake bereaved with economic burdens were higher relative to those who did not experience an economic burden ($OR = 8.123$, $95\%CI = 2.657—24.831$). Living with the deceased before loss was another predictor of PGD among the earthquake bereaved ($OR = 0.179$, $95\%CI = 0.03—0.602$).

4. Discussion

The long-term prevalence of PGD and its association with other factors among earthquake-bereaved individuals have rarely been studied in China. We employed a questionnaire to identify the percentage of individuals suffering from PGD and the demographic and clinical factors associated with the disorder.

Results from this study indicated that the prevalence of PGD was 8.47% among the surveyed individuals seven years after the event. Our data suggested that the decrease of PGD rate with time is extremely slow. A significant number of survivors continue to suffer from the psychological impact of the disaster. The result overturned our previous hypothesis that the prevalence of PGD among the Wenchuan earthquake bereaved should decrease to a lower percentage by this time, given that prior studies indicated a correlation between the presence of PGD and the time since loss [22,23]. The prevalence rate of PGD among Chinese earthquake-bereaved survivors 1—1.5 years after loss was 71.1%—79% [12,13], and the value was 13.9% 3—4 years after loss [24]. With another three to four years of treatment, one would expect a much lower rate of PGD than the value obtained from the present study. Similar results were revealed in other studies conducted among psychiatric morbidity samples, with the prevalence ranging from 18.6% to 31.1%, and the years post loss ranging from 10.4 to 16.4 [25—27]. These results were also consistent with another study focusing on general bereaved individuals [28].

Generally, PGD prevalence rates vary with the type of event and decrease with the time since the occurrence of the event. A systematic review reported that the average prevalence of PGD is 9.8% among general bereaved individuals [29]. In general bereaved survivors, the prevalence varies between 12% and 43% after loss for six months to three years [7,9,30]. In community-dwelling individuals, after loss for six years, the value decreases to 10% [10], whereas after 10 years, the value remains at 7% [11,31]. In addition to sample diversity and time, cultural differences and the criteria used for diagnosing PGD also affect its prevalence rate [32]. The current study employed the latest revised version of Prigerson's criteria (PG-13), including four dimensions, namely, separation distress, duration of more than six months, traumatic distress, and clinically significant impairment [33]. The criteria utilized in the current study differed from those of Horowitz and Shear's BGQ [34,35]. In future studies, evaluating PGD with different criteria may be informative for exploring the persistence of PGD over a longer time among earthquake bereaved or other bereaved samples.

PGD diagnosis can be relatively easy among the earthquake bereaved, and the identification of the risk factors of PGD is critical for early screening and prevention. Bivariate analysis found gender, age, educational status, economic burden, relationship with the deceased, close kinship with the deceased, living with the deceased before loss, and confiding to relatives/friends about the loss were significantly associated with PGD. In contrast to previous studies [10,12,23,36,37], nationality and religious belief were not associated factors of PGD in the present research. Most likely, this outcome is because of the relatively consistent ethical and religious background in the Wenchuan earthquake affected areas.

Multivariate logistic analysis further indicated that age, economic burden, close kinship with the deceased, and living with the deceased before loss were significant risk factors of PGD in the earthquake bereaved. Similar to our finding, He et al. described age as an associated factor to PGD in a study on the Chinese general bereaved [36]. The PGD rate for those who had a close kinship with the deceased was determined to be 12.95%, compared to 5.73% for those who did not have such relationship. This observation is in line with results from other studies, which reported that the relationship with the deceased was associated with PGD among the bereaved [10,13,36]. Our finding also indicated that living with the deceased before loss was another predictor of PGD among the earthquake bereaved ($OR = 0.179$, $95\%CI = 0.03—0.602$). Although the association of PGD with such factor was rarely reported, the observation can be explained by the close kinship while living with the deceased.

We observed that the relationship with the deceased had multicollinearity with the three predictors above (age, close kinship with the deceased, living with the deceased before loss). Thus, it can be interpreted that the relationship with the deceased was also a significant predictor of PGD among the earthquake bereaved. This result was supported by other research conducted on different bereaved samples [30,36,37]. Considering earthquake-bereaved individuals who lost their child or spouse, the bivariate analysis showed that giving birth to other children and rebuilding a marriage were protective factors for developing PGD. This result is in accord with another study also conducted among Wenchuan earthquake bereaved in China [12].

PGD is a mental disease with long-term effects. More and more studies focus on the intervention of PGD, and some effective methods have been established. Simon and colleagues proposed targeted psychotherapy as an effective treatment for PGD [38]. Maccallum reported that 10 weeks of group therapy and 4 weeks of individual cognitive behavioral therapy, including psychoeducation, and discussing positive and negative memories of the deceased were beneficial for PGD [39]. Rather than treating patients diagnosed with PGD, establishing early screening and prevention methods is probably a more effective way to promote the mental health of the bereaved. Early screening and prevention will only be possible if we know the factors that contribute to the development of PGD. Our work and those of others identified several potential risk factors for PGD. Individuals with these risk factors should be closely monitored after the events and receive extra psychological care and social and economic support to prevent the development of PGD.

Our work is also valuable to the nursing practice, especially in China, as many of the PGD patients are underdiagnosed, resulting in being treated as sufferers of other mental disorders and receiving

inappropriate nursing care. Our findings clearly confirmed that the PGD prevalence rate remains high seven years after the event, and special attention must be paid to the potential sufferers during clinical and nursing practices.

5. Conclusion

The prevalence of PGD among the earthquake bereaved has rarely been studied, especially after considerable time post event. This study revealed that the earthquake-bereaved individuals were still grieving seven years post loss, with an unexpected prevalence of PGD rate at 8.47%. We also identified age, economic burden, closeness kinship with the deceased, and living with the deceased before loss as potential predictive factors for PGD. Our work provided valuable information for the early screening and prevention of PGD in clinical and nursing practices, especially for the earthquake bereaved in China.

Funding

Conflicts of interest

The authors declare no conflicting interests.

Acknowledgments

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.ijnss.2018.04.001.

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