



REVIEW ARTICLE

Disaster Psychiatry in Taiwan: A Comprehensive Review

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ARTICLE INFO

Article history:

Received: Dec 14, 2011

Revised: Jan 16, 2012

Accepted: Jan 18, 2012

KEY WORDS:

disaster medicine;
 mental rehabilitation;
 posttraumatic stress disorder (PTSD);
 the Chi-Chi Earthquake;
 the Morakot Typhoon

Natural disasters have caused millions of deaths worldwide, and hundreds of millions of people have suffered from various types of physical or mental traumas. Disasters change patterns of thinking and the concept of security among members of a community, which highlights the importance of mental rehabilitation in disaster psychiatry. Mental rehabilitation is not only a short-term intervention, but also involves long-term follow-up and referral of cases to regular psychiatric management. We used PubMed (<http://www.ncbi.nlm.nih.gov/pubmed>) to search for papers related to the Chi-Chi Earthquake and the Morakot Typhoon published between January 2001 and November 2011. We found that 33 articles are involved in seven topics. The most common disaster-related psychiatric diagnoses were major depressive episodes and posttraumatic stress disorder. The prevalence of posttraumatic stress disorder ranged from 8.0% to 34.3% in Taiwan after the 1999 Earthquake. However, lifetime and current prevalence for psychiatric disorders ranged from 1% to 74%, affecting women twice more than men. Because disasters are becoming increasingly common, it is vital to train a sufficient number of specialists with guidelines for standard clinical treatment, and to create a standard operating procedure for reducing traumatic conditions.

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1. Introduction

In the past two decades, natural disasters have caused millions of deaths worldwide, and hundreds of millions of people have suffered from various types of physical or mental traumas. The 9/11 terrorist attacks in the United States in 2001 caused worldwide panic; the 2004 Richter scale 9 earthquake and tsunami in South Asia resulted in hundreds of thousands of casualties in coastal areas, and the 2008 earthquake in Sichuan, China, claimed hundreds of thousands of casualties. In the past 10 years, Taiwan has been hit with various small-scale disasters such as traffic accidents, airplane crashes including crashes of China Airlines and Singapore Airlines, train derailment of the Alishan Railway, as well as the collapse of the Pingtung Bridge and the Lincoln Mansions in Taipei County. In addition, Taiwan has experienced several large-scale disasters, including the catastrophic destruction produced by the Chi-Chi Earthquake in 1999, the Severe Acute Respiratory Syndrome epidemic in 2003, the 8/8 floods in southern Taiwan in 2009, and the Morakot Typhoon, which resulted in the tragic

destruction of Xiaolin village. Because of their geographic location, many Asian countries are at a higher risk for natural disasters. According to statistical data from the Red Cross Society, Asia is more disaster-prone than any other areas in the world.¹ Repeated disasters alter thinking patterns and the concept of security within a community. The recent onslaught of disasters highlights the need for disaster psychiatry and the importance of mental rehabilitation.²

2. The classification of disaster

Neria et al classified disasters into three categories: (A) man-made disasters, (B) technological disasters, and (C) natural disasters, which affect millions of people around the world every year. Natural disasters (e.g., earthquakes and hurricanes) and man-made disasters (e.g., traffic accidents, acts of terrorism, and wars) can cause psychological trauma with long-lasting consequences.^{3–6}

The impact of a mass disaster or man-made trauma on an individual is a composite of two major elements: (A) the catastrophic event itself and effects of media coverage and (B) the vulnerability of the individual affected by the event. Affected individuals may include survivors, rescue workers, and vulnerable populations affected by media coverage.^{7–9}

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3. The relationship between psychiatric disorders and disaster

Many studies^{10–14} have shown evidence of psychological sequelae in disaster survivors, including posttraumatic stress disorder (PTSD), major depressive episodes (MDE), substance abuse, sleep disorders, anxiety, panic attacks, and other symptoms. The most common disaster-related psychiatric diagnoses are MDE and PTSD, which are closely associated,^{2–5,12–26} and this continues to gain attention in trauma outcome research.⁴ In addition, rescue workers such as nurses, firefighters, and soldiers incur a high prevalence of psychiatric disorders after disaster rescue. These individuals would also benefit from mental rehabilitation.^{7,27–30}

4. PTSD in disaster survivors

A systematic review of PTSD following disasters by Neria et al⁶ concluded that the post-disaster burden of PTSD is substantial.

According to the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition (DSM-IV)* diagnostic criteria, PTSD has three core psychopathologies: (A) reexperience, (B) numbness and avoidance, and (C) hyper-arousal. The *DSM-IV* diagnostic criteria for PTSD allow clinicians to specify whether the disorder is chronic (if the symptoms have lasted 3 months or more) or exhibits delayed onset (if the onset of symptoms was 6 months or more after the stressful event).

5. The prevalence of PTSD in disaster survivors

The prevalence of PTSD ranged from 8.0% to 34.3% in Taiwan after the 1999 earthquake,^{15,16} measured about 25% in Turkey after the 1999 earthquake,³¹ and was reported to reach as high as 74% in Armenia after the 1988 earthquake.³² In a systematic review of the literature, Andrews et al³³ found that delayed-onset PTSD in the absence of any previous symptoms is rare, whereas a delayed onset that represented an exacerbation or reactivation of prior symptoms accounted for 38.2% and 15.3% of military and civilian cases of PTSD, respectively. Generally, the lifetime and immediate prevalence rates for psychiatric disorders range anywhere from 1% to 74%,^{34–38} affecting women twice more than men. Furthermore, women report more symptoms of anxiety and depression than men.^{36,37}

6. Publications related to disaster in Taiwan acquired from a from a PubMed search

We used PubMed (<http://www.ncbi.nlm.nih.gov/pubmed>) to search for papers related to the Chi-Chi Earthquake and the Morakot Typhoon, published between January 2001 and November 2011, and found 33 in total. The topics of articles cover: (A) prevalence of and risk factors for psychiatric disorders in different groups, (B) establishment of screening tests, (C) quality of life in survivors, (D) suicide rates following the disaster, (E) the effects of coping strategies in rescue workers, (F) the direct and indirect causes of and risk factors for PTSD and major depressive disorder (MDD) using structural equation modeling, and (G) various other topics. Table 1^{1,3–5,7,15–21,23–25,27,29,30,36–38,42–53} summarizes the research articles on the Chi-Chi Earthquake and the Morakot Typhoon related to psychiatry.

7. The theory of mental rehabilitation post-disaster

Reconstruction of life after a disaster can be a challenging process. Mental rehabilitation is a part of life reconstruction and requires a planned, comprehensive approach. Several years after the impact of the disaster, the prevalence of most psychiatric disorders will

decline; however, rates of substance abuse and suicide have been shown to increase.^{9,24} Mental rehabilitation is not only important as a short-term intervention, but also as a long-term follow-up mechanism. It can also prove useful in identifying cases that should be referred for further psychiatric management. Hobfoll's Conservation of Resources (COR) model has been well substantiated by previous studies on natural disasters.³⁹ According to Hobfoll's COR stress theory,^{4,40} resource loss is an important determinant of individual stress, physical and mental health, and vulnerability to developing PTSD. Brewin et al⁴¹ also found that although the effect sizes of all risk factors were modest, factors operating during or after the trauma such as trauma severity, lack of social support, and additional life stress, had somewhat stronger effects than did pre-trauma factors.

Multiple risk factors may combine to result in psychiatric illness. According to Hobfoll's COR theory, resource loss is an important determinant of individual stress and physical and mental health, including PTSD. Our hypothesis states that an individual reaches a subthreshold of psychiatric illness and then develops the illness due to a decreasing availability of resources, an accumulation of risk factors, and/or a major stressful event. Furthermore, unresolved, subclinical psychiatric symptoms caused by a disaster or major life event may increase a survivor's sensitivity to future stresses. When faced with either stressful life events or trauma such as brain damage or deprivation of internal or external resources, individuals may become more vulnerable to psychiatric impairment and disorders such as PTSD. Our hypothesis states that an individual might reach a subthreshold for PTSD and then develop the illness due to a decreased availability of resources, an accumulation of risk factors such as personality traits or poor social interactions, or a major stressful life event. Furthermore, unresolved subclinical psychiatric symptoms caused by a disaster may increase a survivor's sensitivity to future stressors.⁷

8. The establishment of a standard operating procedure

Although the types of disasters faced in modern times may vary, it is vital to train a sufficient number of specialists and to develop a standard operating procedure (SOP) for reducing unfavorable conditions when a disaster occurs.⁷ Su et al⁷ endeavored to establish an SOP based on experience with mental rehabilitation efforts following the Chi-Chi Earthquake. They demonstrated that an Emergency Operation Center (EOC) should be set up as quickly as possible, generally within 1–8 h. The EOC should provide the central government with updates on the situation, as the scale of the EOC will depend on the degree of the emergency. Within 24–48 h, the EOC should assess the actual damage and coordinate "battle resources" such as manpower and equipment with the supporting teams in order to serve the real needs in the disaster area. Multiple rescue teams, including the administrative team, the public health and medical teams, and the engineering and rescue-worker teams, should be involved during the urgent initial stages. An emergency management system should be established to effectively intervene immediately after a disaster. Systematic mental rehabilitation should then be performed 1–3 months after the disaster.

9. Clinical guidelines for post-disaster mental rehabilitation in Taiwan

Su et al⁷ offered a 14-part draft of potential clinical guidelines. The Taiwanese Department of Health also endeavored to publish a post-disaster mental rehabilitation book. Expert consensus concludes that every mental health rescue worker should receive 24 h of training on various topics, including: (1) the service concept of

Table 1 Summary of psychiatric articles related to the Chi-Chi earthquake or the Morakot typhoon (PubMed search, Jan 2001–Nov 2011)

| Author(s) | Year | Study period after earthquake | Subjects | Purpose | Method |
|-----------------------------|-------|--------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Chen et al ¹⁷ | 2001 | Within 1 mo | 525 residents | Screening for psychiatric morbidity and posttraumatic symptoms among survivors in the early stages | Purposeful sampling |
| Chen et al ⁴² | 2001 | Within 2 y | 210 residents | The Chinese version of the Davidson Trauma Scale, a preliminary study for validation | Translation, back-translation, and concurrent validity |
| Chang et al ¹⁸ | 2002 | 6 mo later | 171 pregnant residents | Psychiatric morbidity and pregnancy outcome in a disaster area | Purposeful sampling |
| Hsu et al ²⁰ | 2002 | 6 wk later | 323 student residents | PTSD among adolescent earthquake victims in Taiwan | Purposeful sampling |
| Liao et al ²⁸ | 2002 | 2 mo later | 1104 rescue workers serving in the area hit by the earthquake | Association of psychological distress with psychological factors in rescue workers | Purposeful sampling |
| Lin et al ⁴³ | 2002 | 1 y later | 368 residents (268 residents ≥ 65 y old) | Geriatric survivors | Purposeful sampling |
| Shih et al ²⁹ | 2002 | Within 1 y | 46 nurses who worked in a hospital in the community | The impact of the 9-21 earthquake experiences on Taiwanese nurses as rescuers | Purposeful sampling |
| Yeh et al ³⁰ | 2002 | Within 16 d | 187 young, male military personnel who served as rescue workers | Characteristics of acute stress symptoms and nitric oxide concentrations in young rescue workers in Taiwan | Purposeful sampling |
| Chang et al ³⁶ | 2003 | 5 mo later | 84 male firefighters | Posttraumatic distress and coping strategies among rescue workers | Purposeful sampling |
| Chou et al ³⁷ | 2003 | 21 mo later | 461 residents | Establishment of a disaster-related psychological screening test | Population survey |
| Kuo et al ²¹ | 2003 | 2 mo later | 120 bereaved survivors | Prevalence of psychiatric disorders and risk factors for PTSD and major depressive disorder among bereaved survivors | Purposeful sampling |
| Yang et al ²⁵ | 2003 | 3 mo later | 663 victims | Psychiatric morbidity and posttraumatic symptoms among earthquake victims in primary care clinics | Purposeful sampling |
| Chou et al ¹⁵ | 2004a | 21–24 mo | 461 residents | Quality of life and related risk factors in Taiwanese earthquake survivors with different psychiatric disorders | Purposeful sampling |
| Chou et al ¹⁶ | 2004b | 4–6 mo | 4223 residents | Relationship between quality of life and psychiatric impairment | Purposeful sampling |
| Guo et al ⁴⁴ | 2004 | 1 mo | 252 rescue workers | Prevalence of PTSD among professional and nonprofessional rescue workers involved in the 1999 Chi-Chi earthquake | Purposeful sampling |
| Lai et al ¹⁹ | 2004 | 10 mo | 252 residents | Full and partial PTSD among earthquake survivors in rural Taiwan | Random selection from two rural communities |
| Chou et al ³ | 2005 | 4–6 mo | 442 residents | Development of psychiatric disorders among residents post-earthquake | Population survey |
| Yang et al ⁴⁵ | 2005 | During a 7-y period | — | Time-related trends of increased suicide rates | Time-series analysis |
| Seplaki et al ⁴⁶ | 2006 | Before and after the earthquake | 1160 older individuals | Variability in resilience to depressive symptoms in the aftermath of the 1999 earthquake | Longitudinal survey with interviews |
| Wu et al ²⁴ | 2006 | 33–36 mo | 405 residents | Quality of life and related risk factors in earthquake survivors diagnosed with different psychiatric disorders | Population survey |
| Chen et al ⁴⁷ | 2007 | 2 y later | 6412 earthquake survivors whose houses were destroyed | Prevalence and risk factors of posttraumatic stress symptoms and psychiatric morbidity | Purposeful sampling |
| Chou et al ⁴ | 2007 | 6 mo, 2 y, and 3 y later—total three times | 442, 461, and 405 residents | Dynamic population survey for risk factors for PTSD and major depression; prevalence of different psychiatric disorders 6 mo, 2 y, and 3 y after the earthquake | Population survey |
| Kuo et al ⁴⁸ | 2007 | 1 y later | 272 victims from temporary housing units | Incidence of PTSD among and the psychological health status of earthquake victims 1 y after the event | Purposeful sampling |
| Tsai et al ²³ | 2007 | 3 y later | 1756 respondents | Prospective evaluation of the relationship between the clinical course of posttraumatic stress symptoms and quality of life | Fixed cohort follow-up |
| Chang et al ²⁷ | 2008 | — | 193 firefighters | Modification effects of coping strategies on the relationship between rescue effort and psychiatric morbidity in earthquake rescue workers | Purposeful sampling |
| Wu et al ⁴⁹ | 2009 | — | 705 adolescent (Chi-Chi earthquake) | Examination of two models: (1) traditional social support (2) supportive and detrimental social relations model | Using structural equation modeling (SEM) |
| Su et al ⁵ | 2010 | 3 y later | 1756 respondents (post-Chi-Chi earthquake) | Predicting the longitudinal course of PTSD in survivors 3 y following a catastrophic earthquake using multivariate data presented 6 mo after the earthquake | Population-based survey |
| Tang et al ⁵⁰ | 2010 | 3 mo later | 271 adolescents | Direct and indirect causes of PTSD, MDD, and risk factors using a SEM model (Morakot typhoon) | SEM |
| Yen et al ⁵¹ | 2011 | — | 271 adolescents | MASC-T | To construct validity of MASC-T Chinese version |
| Yang et al ⁵² | 2011 | 3 mo later | 271 adolescents (post-Morakot typhoon) school-based survey | Prevalence rates of PTSD, its associated factors and co-occurring psychological problems | Cluster sampling |
| Su et al ⁷ | 2011 | 3 y later | 4223 post-Chi-Chi earthquake respondents | Designing a standard operating procedure for psychiatric service | Population survey |
| Chen et al ⁵³ | 2011 | 1 y later | 120 Taiwanese aboriginal people aged ≥ 55 y old | Risk factors associated with PTSD symptoms in a middle- and old-age population who experienced Typhoon Morakot | Purposeful sampling |

Modified and updated from Chou et al⁴ and Su et al⁷ with permission.

MASC-T = Chinese version of the Multidimensional Anxiety Scale for Children; MDD = major depressive disorder; PTSD = posttraumatic stress disorder; SEM = structural equation modeling.

post-disaster mental health; (2) administration and procedure: (a) linkage of post-disaster service and resource offers, (b) sensitivity to culture and religion; (3) intervention of post-disaster mental health service, include mental rescue lessons, high-risk group screening and suicide prevention as well as group therapy; and (4) clinical practice.

10. Conclusion

The frequency of disasters in modern times has highlighted the value of disaster psychiatry and the importance of mental rehabilitation. It is necessary to strengthen professional awareness regarding the treatment of posttraumatic stress disorder, depression, and panic disorder. A two-stage rapid screening strategy may also prove effective, despite the typical limitations on resources following a disaster. In a two-stage survey method, the initial questionnaire can help identify high-risk groups and keep track of these individuals for mental rehabilitation,³⁷ which can be an effective labor-saving method. It is also vital to train a sufficient number of specialists on the guidelines for clinical intervention and to create an SOP for mitigating traumatic conditions when any disaster occurs.

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