Study of Psychological Disorders after Bam Earthquake in Bam and Kerman Cities, Iran

Alireza Eivazi[1], Javad Taghavi-Soorebargh[2], Ahmad Ali Noorbala[3]

Date of submission: 21 June 2018, *Date of acceptance:* 30 Oct. 2018

Original Article

Abstract

INTRODUCTION: The present study compared psychological disorders after the Bam earthquake in Bam and Kerman, Iran.

METHODS: This cross-sectional study was performed on 422 people (205 in Kerman and 217 in Bam) using stratified random cluster sampling in the three age groups of adolescents, adults, and elderly people. The Symptom Checklist-90-Revised (SCL-90-R) and a Personal Information questionnaire were used to collect data.

FINDINGS: The analytical statistics from the mean total score of discomfort in the respondents in Bam and Kerman were compared separately in the 9 dimensions. According to the results presented in tables and charts, of the 9 dimensions of symptoms, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, violence, phobia, and psychosis were significantly higher in Bam compared to Kerman. Moreover, only the dimension of paranoia was not significant in the respondents in both cities. Furthermore, based on the comparisons, there was a significant difference in the mean discomfort, total Global Severity Index (GSI), and Positive Symptoms Total (PST) between the two cities. However, the difference in the Positive Symptom Distress Index (PSDI) was not significant.

CONCLUSION: The results of this study showed that the Bam earthquake has increased psychological disorders in Bam city; thus, it is necessary to reduce the effects of these disorders in order to reduce the urgency of treatment in survivors.

Keywords: Bam; Kerman; Psychological Disorders; Earthquake

How to cite this article: Eivazi A, Taghavi-Soorebargh J, Noorbala AA**. Study of Psychological Disorders after Bam Earthquake in Bam and Kerman Cities, Iran.** Sci J Rescue Relief 2018; 10(3): 15-21.

Introduction

Mental health is one of the important dimensions of health and, based on the definition provided by the World Health Organization (WHO), mental health lies within the general concept of health, which is the full ability to play social and psychological roles, as opposed to sickness and mental backwardness (1). This concept is in fact an aspect of the general concept of health and refers to all methods and measures taken to prevent mental illnesses and their treatment and rehabilitation (2).

Mental disorders [fifth Diagnostic and Statistical Manual of Mental Disorders (DSM-5)] are part of the diagnostic subgroup of traumatic and stress-related disorders that are commonly observed following a traumatic event and are identified with four clusters of symptoms, including interference, persistent avoidance of stimuli associated with a traumatic event, negative changes in recognition and mood, and significant changes in excitation and reactivity (3).

Trauma is an integral part of human life, as individuals witness numerous and various events during their social life, whether directly or indirectly. As an incident beyond the psychological capacity of an individual, trauma is a topic that has long been discussed in

1-Psychiatrist, Research Center for Health Management in Mass Gathering, Red Crescent Society of the Islamic Republic of Iran, Tehran, Iran
2-MSc, School of Psychology, Young Researchers and Elite Club, Lahijan Branch, Islamic Azad University, Lahijan, Iran
3-PhD, Department of Psychiatry, Tehran University of Medical Sciences, Tehran, Iran
Correspondence to: Javad Taghavi-Soorebargh, Email: taghavi.psycho@gmail.com

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[DOI: 10.52547/jorar.10.3.15]

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psychological, sociological, and biological areas. The impact and consequences of traumatic events are not limited to a region, time, and individual; rather they cover all strata, groups, and individuals (4).

Every year, Iran encounters various types of natural disasters, and bad news is sporadically heard about the occurrence of one of them in one part of the country. According to the Office for the Coordination of Humanitarian Affairs (OCHA) of the United Nations, Iran ranks sixth in terms of the potential for natural disasters in the world, and over the past 10 years, an average of 4000 people have been killed annually in Iran due to these events, and 55000 others have been affected in some way (5).

Iran has always been one of the areas exposed to natural disasters due to its natural geographic and climatic conditions. Therefore, it has always been susceptible to 30 catastrophes, out of a total of 40 types of natural and man-made disasters in the world, and in this regard, is among the top ten countries in the world (6). As the densest and largest human habitats, cities have been exposed to extensive changes in the physical environment and, consequently, in social structure (7). Like other developing countries, Iran has also experienced a high level of urbanization, and the physical structure of its urban areas has changed completely (8). Therefore, at present, the urban population is about 74.1%, meaning that urban areas have become the main places affected by many potential disasters (9).

Iran is also regarded as a country susceptible to earthquakes and is located on the Alpine-Himalayan seismic belt, which is one of the most active seismic belts worldwide. Iran has experienced more than 130 earthquakes with a magnitude greater than 7.5 Richter in the last century and in the 1990s, these earthquakes have caused the death of more than 140000 individuals, in addition to destroying many cities and villages and imposing a heavy burden on the economy of the country (10). An important earthquake occurs in Iran every 2 to 3 years, and a large population is susceptible to damage due to this natural disaster (5). A review of the list of 100 incidents of the world's most devastating events in human history will show that Iran's name has been repeated four times on this list, all of which were due to earthquakes (11).

In developed countries, a high percentage of people die due to natural disasters and industrial incidents (12), and most of the information available on mental health regarding disaster outcomes is obtained from studies that have been conducted in these countries (13).

The occurrence of a wide range of natural disasters in the first decade of the 21st century indicated a disruption of the economies of large and modern cities, and recognizing the effects of these incidents has become an absolute necessity at a global level (14).

Findings of various studies suggest that traumatic accidents are the cause of many injuries in children and adults, including biochemical damage (e.g., increase in the level of catecholamines and hormonal changes, neurological changes, cognitive impairments such as impairment in information processing, memory and concentration weakness, aggressive thoughts, etc.), interpersonal damages, and even severe personality changes (15).

The DSM-5 considers post-traumatic stress disorder (PTSD) as one of the diagnostic sets of traumatic and stress-related disorders that are observed after exposure to a traumatic event (16). This disorder, as mentioned earlier, is an impairment characterized by the re-experiencing of a traumatic incident, the avoidance of incident-reminding stimuli, extreme arousal, and negative changes in recognition and mood (17).

PTSD symptoms occur after an individual experiences an intense stressful incident, so the individual with PTSD is not necessarily the victim of accidents and disasters, rather witnessing and observing, involvement, and even hearing about a trauma can also be problematic. Therefore, the causes of PTSD include not only the range of the factors (war, incidents, accidents, violation, incurable illnesses, etc.), but also a specific variety (the meaning and concept of stress, how to deal with and perceive stress, and individuals' response to it). Between 1991 and 1999, more than 9000 traumatic events occurred in the world, resulting in the death of 7 million people and more than 3 billion people suffering from physical, psychological, and social problems (18).

Lifetime prevalence estimates for PTSD indicate that it may be observed in 1-9% of the general population and in 6-45% of all survivors of the incident (19).

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Moreover, the concept of disaster is widespread in itself, so that personal disasters, engagement in serious incidents, being the victim of violence, or experiencing a life-threatening natural disaster are among the traumatic events. Fatal events such as fire, earthquakes, riots, and war are at the other end of this range and affect a large number of individuals (20).

Considering the above cases and concepts, the aim of this study was to determine and compare the rate of psychological disorders among people of over 18 years of age in a randomized sample selected from earthquake-affected areas of Bam and Kerman, Iran.

Methods

This cross-sectional study examined the psychological events and problems observed after the earthquake in Bam City. The statistical population from among whom the subjects were selected included the total population over 18 years of age living in Bam and Kerman during the earthquake in 2003. This study was conducted in 2016. Individuals living in Bam were present in body in the incident, and were affected by the earthquake during and after the earthquake directly or indirectly, and probably suffered from psychological problems; they were compared with people of over 18 years of age in Kerman, about 140 km from Bam.

Stratified cluster sampling was performed among the three age groups of young adults, adults, and the elderly. Determination of cluster heads in the city of Bam was based on the division of the regions by the Iranian Red Crescent Society (IRCS) in order to accommodate earthquake victims in 12 districts, and in Kerman based on the division of the municipality into 5 districts. Then, the clusters were selected based on the population of each district.

The study was carried out on the population over the age of 18 years in the two cities of Bam and Kerman during the 2003 earthquake. In this way, in each of the cities, 8 clinical psychologists were chosen and by holding classes, the necessary information and training on how to execute and complete the questionnaires were directly provided to them. Then, in the test designed in the pilot study to examine all individuals who were collecting information, each of them were asked to examine 3 people (a total of 24 people in each city), and then, the rate of agreement of the information collected from each of the interviewers with the actual number was examined separately. Then, the final interviewers (questioners) were selected and employed. The sample size was calculated based on frequency of population of each age group in comparison with the total population of each city.

Based on the latest information obtained from Red Crescent Centers in Bam and the Kerman Municipality, the population of Bam and Kerman was estimated to be 126,253 and 530,000 people, respectively.

Since the minimum difference of 15% in the prevalence rate of these disorders between the two cities was important for researchers clinically and in terms of the disease burden (considering the tools used to estimate disorders), with 80% confidence and 5% error rate, the sample size required was estimated in each society by the proposed formula to be 171 people, selected based on the stratified random cluster sampling method in both cities in terms of the volume of each cluster.

Given the use of cluster sampling, the maximum error rate (design effect) was considered as 1.2, and hence, 205 people were selected from each city for study.

For each person, two questionnaires including the Symptom Checklist-90-Revised (SCL-90-R) and a personal information questionnaire were completed. If the person was literate, they themselves completed the questionnaires; otherwise, they were completed by others.

The SCL90-R questionnaire contains 90 items that assess the psychological symptoms reported by the respondent. The responses to each test item are scored based on a 5-point scale of the degree of discomfort ranging from nothing to severe. The 90 items of this test include the 9 different aspects of physical complaints, obsession and compulsion, sensitivity in interpersonal relationships, depression, anxiety, aggression, phobia, paranoid thoughts, and psychosis. There are 7 additional items in this test that are not categorized under any of the 9 dimensions and are often added to depression. Scoring and interpretation of the test are based on the three indicators of the total coefficient of the disease symptoms, the discomfort coefficient criterion, and the sum of the disease symptoms. The time needed for implementation was about 12 to 15 minutes. Validation of the 9 dimensions of this test was performed through the two methods of

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internal validity calculation and re-test validation method. In order to calculate the internal validity of the test, performed on 219 volunteers in the United States to measure and determine the stability of the uniformity of the items, the alpha and Kuder-Richardson Formula 20 (KR-20) coefficients were used. The results of all the coefficients obtained for the 9 dimensions were totally satisfactory. The highest (0.90) and lowest (0.77) correlations were associated with the depression and psychosis dimensions (21). The re-test validity, which measured the stability of the test over time, was carried out on 94 heterogeneous mental patients after an initial evaluation for 1 week. Most of the coefficients had a high correlation ranging between 0.78 and 0.90 (22).

Demographic characteristics including age, gender, marital status, occupational status, and educational status were considered.

After completing the special form for each patient, the relevant data were imported into SPSS software (version 12.0, SPSS Inc., Chicago, IL, USA) and the necessary investigations were performed on them. In order to compare the mean values in two or more groups, the statistical analysis of variance (ANOVA) test was exploited. In addition, chi-square test was used proportionally for comparing the ratios. Finally, a multivariate statistical test was employed to control the confounding factors. In this section, the results were tested using analytical statistics and independent t-test through comparison of the variables considered in independent groups, and their separate comparison in both cities of Kerman and Bam in the 9 dimensions studied, including obsession-compulsion, interpersonal sensitivity, depression, anxiety, violence, phobia, and psychosis.

It is worth noting that the present study was conducted with the consideration of the principles of the Declaration of Helsinki (DOH) and the Research Ethics Checklist. In addition, in this study, respect for beliefs, behaviors, and customs of the society was observed.

Findings

In this cross-sectional study, 422 individuals (205 and 217 individuals, respectively, from Kerman and Bam) were selected using stratified cluster sampling method in three age groups of young adults, adults, and the elderly. The demographic characteristics of the subjects in the two cities studied are demonstrated in Table 1.

The results of the total discomfort coefficients among the respondents from Bam and Kerman were compared, according to which, the lowest and highest mean differences in each of the dimensions have been presented separately in Table 2.

The analytical statistics of the mean total score of discomfort among respondents in the two cities in 9 dimensions were compared separately. According to the results, physicalization, obsession, interpersonal sensitivity, depression, anxiety, violence, phobia, and psychosis in Bam were significantly higher in comparison to Kerman, and only the difference in paranoia was not significant between the respondents in the two cities.

Table 1. Demographic variables of the study population

Descriptive statistics	Statistical indices	Absolute frequency	Relative frequency (%)	Total
Place of residence during the earthquake	Bam	217	51.42	422
	Kerman	205	48.58	
Gender	Men	185	43.84	422
	Women	237	56.16	
Age (year)	18-30	230	57.65	399
	31-64	162	40.06	
	Above 64	7	1.75	
Education	Illiterate	15	3.56	421
	Pre-diploma	84	19.95	
	Diploma and higher	222	76.48	
Marital status	Single	156	37.59	415
	Married	227	54.07	
	Separated or Widowed	32	7.71	

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Table 2. Comparison of the mean of total discomfort coefficients among respondents in Bam and Kerman, Iran

	City	Number	Mean	Mean difference	SD	Minimum mean difference	Maximum mean difference	P
Physicalization	Kerman	183	12.17	3.81	10.29	-5.88	-1.73	0.009
	Bam	192	15.98		10.14			
Obsession	Kerman	188	9.51	2.72	7.80	-4.24	-1.20	0.009
	Bam	193	12.23		7.28			
Interpersonal sensitivity	Kerman	184	8.38	2.83	7.80	-4.39	-1.25	0.009
	Bam	189	11.21		7.63			
Depression	Kerman	144	15.33	3.06	11.80	-5.63	-0.48	0.020
	Bam	169	18.39		11.23			
Anxiety	Kerman	189	10.07	2.57	9.62	-4.39	-0.74	0.006
	Bam	199	12.64		8.61			
Violence	Kerman	192	5.53	1.87	5.04	-2.88	-0.86	< 0.001
	Bam	198	7.40		5.09			
Phobia	Kerman	188	4.63	1.67	5.78	-2.84	-0.47	0.006
	Bam	193	6.30		5.94			
Paranoia	Kerman	195	7.26	1.98	5.66	-2.05	0.09	0.075
	Bam	203	8.24		5.24			
Psychosis	Kerman	186	7.39	1.72	7.20	-3.23	-0.19	0.027
	Bam	191	9.11		7.82			
Other	Kerman	191	7.78	1.61	5.86	-2.77	-0.43	
	Bam	197	9.39		5.83			

SD: Standard deviation

In addition, based on the comparisons, there was a significant difference in the mean discomfort, total Global Severity Index (GSI), and Positive Symptoms Total (PST) between the two cities. However, the difference in the Positive Symptom Distress Index (PSDI) was not significant.

Conclusion

The present study was conducted with the aim to determine and compare the prevalence of psychological disorders among individuals of over 18 years of age in a randomized sample selected from the areas of Bam that were hit by earthquake and Kerman.

Based on the present study, 8 of the 9 dimensions examined were significantly higher among people residing in the earthquake center (Bam) compared to those in Kerman, located 140 km from the earthquake center. In the study conducted by Mohammadi et al. (2 years before the earthquake) to investigate the epidemiology of psychiatric disorders in Kerman Province, the rate of psychiatric disorders in Kerman Province was estimated to be 19.32%, which was higher than this rate for the whole country (17.1%) (23).

In the current study, the incidence rate of psychological disorders based on the SCL-90-R in Kerman and Bam cities was 41.38% and 62.21%, respectively, showing that the severe Bam earthquake resulted in an increase in psychological disorders. In previous studies, the rate of psychological disorders was increased with proximity to the earthquake center (24-26). In the present study, there was no significant difference in the 9 dimensions between the two cities of Kerman and Bam by age group. In the investigations by gender, the difference was significant in the depression dimension, which was higher among women. The results of the study by Goenjian et al. is in line with that of the present study (27).

Regarding the variables of mental disorders and the role of events in their incidence, studies carried out by Mollaei et al. (28), Kiani et al. (29), Lotfi Kashani et al. (30), and Moritz et al. (31) can be noted, all of which were consistent with the present study regarding the effect of traumatic events on mental disorders.

In the study performed by Golestaneh et al., designed to investigate the relationship between mental health and PTSD with the mediating role of personality traits, the mental health of earthquake victims had a direct relationship with personality traits and an indirect relationship with PTSD through the personality traits (32).

Natural disasters, including earthquakes, seem

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to affect everyone as a general and intense stressor, and in this case, the Bam earthquake had affected both sexes and all age groups equally.

Another point is the role of social support in preventing the incidence of psychological problems caused by natural disasters, and the provision of this support for the victims in lower spatial and time intervals will further reduce psychological damages. In a study by Soltani et al., it was shown that there was a significant relationship between components of social capital (trust, participation, support, confidence, sense of security, and life value) and management of social crises from variables (prevention, preparedness, coping, and reconstruction) (8). Furthermore, Moradi and Fathi (33), and Hofmann et al. (34) emphasized the accurate and rapid identification of posttraumatic harms in general and in natural disasters in particular.

Among the limitations of this study included the high number of questionnaires, which could have a negative impact on the level of cooperation of the participants.

Few individuals were not reluctant to participate in this study, and hence, those were replaced with other people, although the number of these people was very small, their exclusion from the study would result in bias in the results.

In this study, more women participated compared to men; this was due to the high rate of presence of women at the time of referring of the questioners to the homes.

After such events, it is likely that the following problems be expressed with exaggeration, and it is likely that the estimates be higher than the extent of the disorder among the population.

A long time after the event, recollections of the exact amount and timing of some of the symptoms may be inaccurate.

Since the extent of psychological disorders a long period of time after the incident is significantly higher, more serious interventions are required; thus, provincial and national health authorities need to pay attention to and plan in this regard.

Conflict of Interests

Authors have no conflict of interests.

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