Disaster Medicine and Public Health Preparedness

www.cambridge.org/dmp

Prevalence of Posttraumatic Stress Disorder Following the Earthquake in Iran and Pakistan: A Systematic Review and Meta-Analysis

Maryam Hosseinnejad[1,2], Vahid Yazdi-Feyzabadi PhD[3], Ahmad Hajebi MD[4], Ali Bahramnejad MSc[5], Reza Baneshi PhD[6], Roghayeh Ershad Sarabi PhD[7], Maryam Okhovati PhD[8], Razieh Zahedi PhD[6], Hossein Saberi PhD[9] and Farzaneh Zolala PhD[10]

[1]Health in Disasters and Emergencies Research Center, Institute for Future Studies in Health, Kerman University of Medical Sciences, Kerman, Iran; [2]Department of Health, Faculty of Nursing and Midwifery and Health, Islamic Azad University, Kerman Branch, Kerman, Iran; [3]Health Services Management Research Center, Institute for Future Studies in Health, Kerman University of Medical Sciences, Kerman, Iran; [4]Research Center for Addiction & Risky Behaviors (ReCARB), Psychiatric Department, Iran University of Medical Sciences, Tehran, Iran; [5]Neuroscience Research Center, Kerman University of Medical Sciences, Kerman, Iran; [6]Modeling in Health Research Center, Institute for Future Studies in Health, Kerman University of Medical Sciences, Kerman, Iran; [7]Medical Informatics Research Center, Institute for Future Studies in Health, Kerman University of Medical Sciences, Kerman, Iran; [8]Physiology Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran; [9]School of Management and Medical Informatics, Kerman University of Medical Sciences, Kerman Iran and [10]Social Determinants of Health Research Center, Institute for Future Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

Abstract

Posttraumatic stress disorder (PTSD) is a common mental disorder following traumatic events. The present study was conducted to understand the prevalence of PTSD after the earthquake in Iran and Pakistan. The review includes all articles published from inception to March 2019. The pooled prevalence for overall PTSD was 55.6% (95% CI: 49.9–61.3). It was 60.2% (95% CI: 54.1–66.3) and 49.2% (95% CI: 39.4–59) for Iranian and Pakistani survivors, respectively. Women experienced higher incidence of PTSD than men. The variation of PTSD based on the clinical interview was lower than the self-report approach. The interval time between the earthquakes and the assessment showed that the prevalence of PTSD decreased over time. The prevalence of PTSD in Iran and Pakistan was higher than the global average, and the rate of the disorder in Iran was higher than in Pakistan. Sex, method of assessment, and time lag between the occurrence of disaster and assessment of PTSD affect the prevalence.

Systematic Review

Cite this article: Hosseinnejad M, Yazdi-Feyzabadi V, Hajebi A, Bahramnejad A, Baneshi R, Ershad Sarabi R, Okhovati M, Zahedi R, Saberi H, Zolala F (2022) Prevalence of posttraumatic stress disorder following the earthquake in Iran and Pakistan: a systematic review and meta-Analysis. *Disaster Med Public Health Prep* **16**: 801–808 doi: https://doi.org/10.1017/dmp.2020.411.

First published online: 29 March 2021

Keywords:
earthquake; Iran; Pakistan; posttraumatic stress disorder; prevalence

Corresponding authors:
Farzaneh Zolala,
Email: zolalafarzaneh@gmail.com.

Introduction

Exposure to disasters results in mortality, morbidity, and disability among the affected populations.[1] Mental disorders as a consequence of disasters have some impacts on mental, social, behavioral, and physical health,[2,3] which can lead to the decrease of quality of life.[4]

A previous review showed that anxiety, depression, alcohol misuse, and posttraumatic stress disorder (PTSD) are associated with disasters.[5] Among these, PTSD is the most prevalent mental disorder after a disaster.[6] The main symptoms of PTSD are re-experiencing the trauma, emotional numbness, avoidance, and increased arousal.[7]

A meta-analysis showed a global prevalence of 23.66% for post-disaster PTSD.[8] Several factors show that substantial discrepancies in prevalence rates of PTSD can be due to factors such as individual vulnerability (eg, age and sex), exposure factors (eg, damage to houses), and post-trauma (eg, the death of family members, friends, or neighbors).[9]

Time and method of PTSD assessment are other factors that can be responsible for the variation prevalence. The symptoms of the disease may be improved in a number of people over time.[10] Hence, the time lag between the occurrence of the disaster and assessment of disorder is an important factor in estimating the PTSD prevalence. Moreover, there are some methods for PTSD assessment, including questionnaire and clinical interviews, which might lead to different results.[11]

Some regions of the world are more disaster-prone, such as the Eastern Mediterranean region (EMR). This region is exposed to large-scale man-made and natural disasters that have affected more than 76 million people.[12] Among 21 countries located in the EMR, the natural disaster was more prevalent in 9 countries, including Iran, Pakistan, Afghanistan, Sudan, Somalia, Algeria, Morocco, Yemen, and Egypt.[13] The common hazards causing natural disasters in this region include flood, drought, and earthquake.[14] Earthquakes are the second most prevalent disaster

SDMPH
SOCIETY FOR DISASTER MEDICINE & PUBLIC HEALTH

in the EMR[13]; for example, a drastic earthquake measuring 6.5 on the Richter scale hit the city of Bam in Iran in 2003, which was the worst natural disaster to occur in Iranian history.[15] Also, a significant earthquake measuring 7.6 on the Richter scale struck Pakistan's North–West province. The earthquake killed more than 73 000 people.[9]

Regarding the type of health consequences of the disasters, it has been reported that mental disorders have been responsible for 5.6% of the total disease burden in the EMR in 2013, which is higher than the global average primary.[16] Therefore, we conducted a scoping review among countries in the EMR; some related studies have been conducted in Iran and Pakistan, and most studies were related to the earthquake. Also, depression, anxiety, and PTSD were the common post-disaster mental disorders. The prevalence of depression and anxiety among the 2 countries is the subject of a separate paper. Hence, the main aim of this study is to estimate the prevalence of PTSD after the earthquake in Iran and Pakistan.

Materials and Methods

Search Strategy

Literature Search

PubMed, Psych Info, Embase, Web of Science, Scopus, and Scholar Google databases were searched from inception to March 2019. To retrieve more articles, we searched for references cited in relevant and review articles. We searched the databases, using keywords: *posttraumatic stress disorder*, *PTSD*, *psychiatric disorder*, *mental disease*, *mental disorder*, *mental health*, *disaster*, *catastrophe*, *earthquake*, *Iran*, and *Pakistan*. We combined these terms with OR and AND operators.

Gray Literature Search

We searched dissertations, theses, and annual national and international reports conducted on the websites of the World Health Organization, governmental, and non-governmental organizations, such as the Ministry of Health and Red Crescent.

Inclusion and Exclusion Criteria of Studies

All studies on prevalence for PTSD after Iran and Pakistan earthquakes published in English and Persian were included in our meta-analysis and systematic review. We included the studies that applied any standardized diagnostic criteria on PTSD. The standardized questionnaires and clinical interviews are instruments for measuring mental disorders, including PTSD. They have been developed based on the International Classification of Diseases (ICD) or the Diagnostic and Statistical Manual of Mental Disorders (DSM) diagnostic criteria. Most of the instruments assess PTSD symptoms as defined in the DSM IV or DSM V version. Therefore, we included the studies in which the standardized questionnaires and clinical interviews were employed.

We included participants of any age, gender, ethnicity, and religion and excluded some subgroup, such as medically ill patients and qualitative studies. Also, we excluded editorial and commentary article and those articles whose full texts were not available.

We used 2 checklists for quality assessment, including The Joanna Briggs Institute checklist,[17] which is a critical appraisal instrument tool for cross-sectional and cohort studies and risk assessment checklist.[18] Each of these questionnaires had 10 items and their score range is between 0 and 10. The average scores from the 2 checklists were calculated, and studies with scores below 5 (based on the average score of both checklists) were excluded from the study.

Extracted Data

Extracted data included general information, such as the title of the study, Digital Object Identifier (DOI), first author's name, year of study, the name of the journal, year of publication, and writer's address. Specific information of the studies included the place of study, the lag between disaster and assessment, the design of the study, the sampling method, the sample size, the name of the tool, the method of assessment, ages and genders of the participants, the number of cases, and PTSD prevalence.

Analysis

Because the lowest reported prevalence in our studies was 20%, considering a power of 80% and conducting back calculation, the minimum sample size of 200 was needed; therefore, we excluded the studies with a sample size smaller than 200.

We used the statistical software STATA, version 14 (College Station, TX). Metaprop command was used to perform a meta-analysis for estimating the prevalence and standard error. Due to the heterogeneity in the studied data, the pooled prevalence was estimated using a random effects model. Furthermore, we also scrutinized the source of heterogeneity by examining the effect of the age group, sex, method of gathering data, and time lag between the occurrence of the disaster and study. The results showed that they did not change the heterogeneity. The only source of heterogeneity that remained statistically significant in the model was the place of study. Hence, the results of the meta-analysis were estimated based on 2 populations, that is, Iranian and Pakistani. Also, the forest plot depicted PTSD prevalence based on different studies.

As described above, we could not perform a meta-analysis on other subgroups, that is, age group, sex, method of gathering data, and time lag between the occurrence of the disaster and study. Therefore, we described the results based on these subgroups.

Results

Characteristics of Studies Included

Figure 1 presents the results of the systematic review. The search yielded 583 studies, of which 313 were duplicates. Following the removal of duplicates, 270 titles and abstracts were identified for screening and among them 44 full texts were read in deep. Of 25 studies that were eligible for the study, 16 studies had the high quality, among them 5 studies were excluded because of a low sample size, and 11 studies remained in the study for meta-analysis.

Sixteen studies met inclusion criteria, providing prevalence data for PTSD (Table 1) for a total sample of 8258 people. The majority of studies were cross-sectional studies, published between the years 2004 and 2019. Except for 1 article related to the Kermanshah earthquake in Iran,[19] the rest of the studies were related to 2 earthquakes that struck Iran (in 2003) and Pakistan (in 2005). Most of them were from Iranian studies. Two different mean age groups (younger than 15 years and older than 15 years) were identified during the data extraction process. The mean age in 12 studies was older than 15 years, and 4 studies had a mean age younger than 15 years. Three studies presented the prevalence rates for men and women inclusively.[9,20,21]

A variety of the standardized instruments (self-report questionnaires and clinical interview) had been used to assess PTSD,

https://doi.org/10.1017/dmp.2020.411 Published online by Cambridge University Press

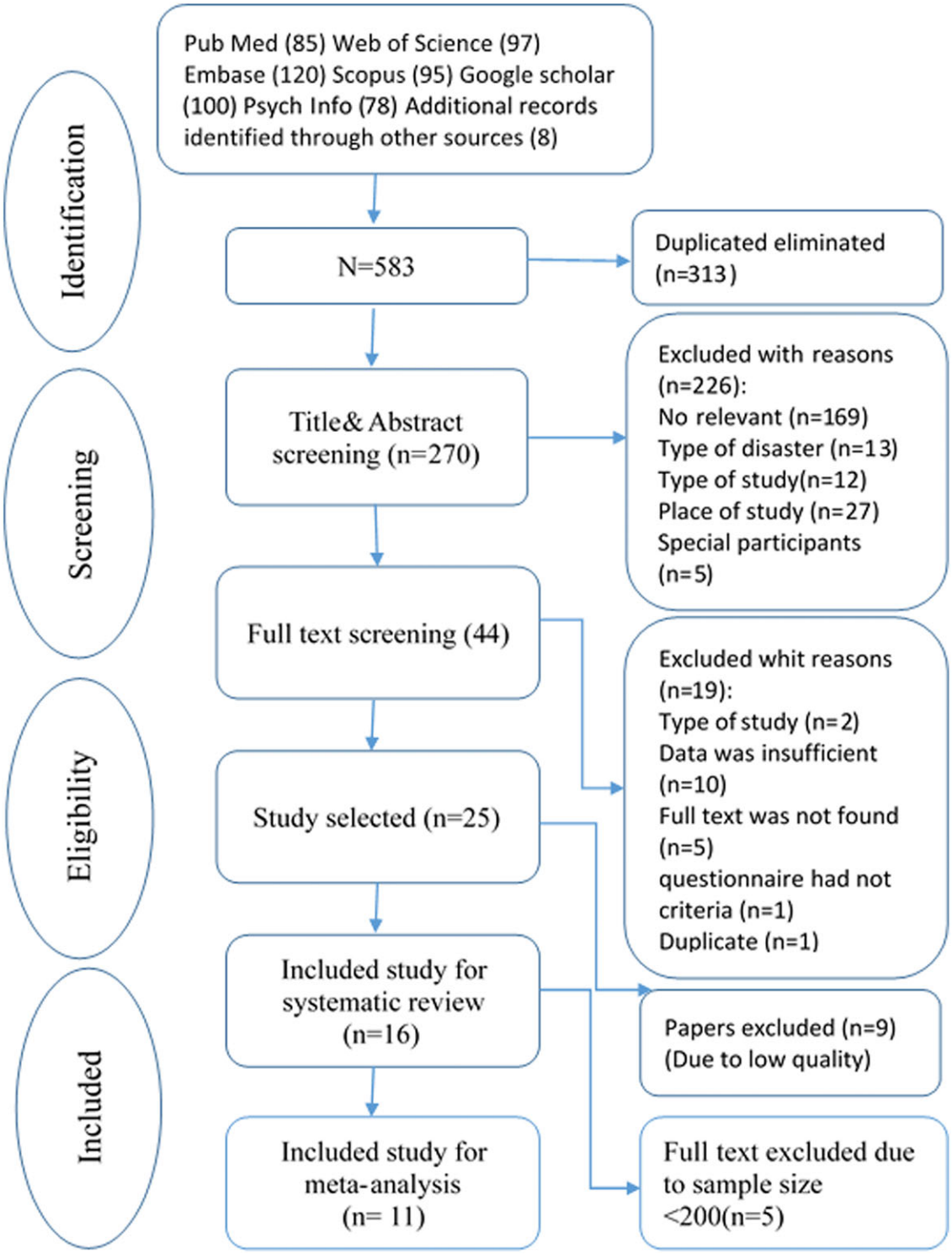

Figure 1. Flow chart of study selection for review.

including the Davidson Trauma Scale, The Children's Revised Impact of Event Scale (CRIES-13), The Impact of Event Scale – Revised (IES-R), The PTSD Symptom Scale, The Traumatic Stress Symptom Checklist (TSSC), Posttraumatic Stress Diagnostic Scale (PDS), The PTSD Symptom Scale – Interview (PSS-I), Watson interview, and the Composite international diagnostic interview (CIDI). The majority of studies used the self-report method for data collection.[9,20,22–30]

Most of the studies were conducted within shorter than 12 months after the occurrence of the disaster.[20,21,23,25–27,31,32] As mentioned in the method section, we excluded 5 studies because the sample size was less than 200[19,25,26,28,32] and performed a meta-analysis on 11 studies based on the location of the disaster (ie, Iran and Pakistan). Then, these studies were presented based on age group, sex, the method of assessment, and the time lag between the occurrence of the disaster and study, without

https://doi.org/10.1017/dmp.2020.411 Published online by Cambridge University Press

Table 1. Characteristics of 16 studies on the prevalence of PTSD after the Iran and Pakistan earthquakes

No.	Name of Author	Year	Location and Year of Disaster	Type of Study	Mean Age Target Population	Sample Size	Method of Assessment	Time After Disaster	Prevalence, %
1	Moazza, A.	2012	Pakistan, 2005	Cross section	> 15	300	Self-report	> 1 year	41.3
2	Ayub, M.	2012	Pakistan, 2005	Cross section	< 15	1078	Self-report	> 1 year	64.8
3	Avazi	2017	Iran, 2003	Cross section	> 15	205*	Self-report	> 1 year	57.1
						207			61.1
4	Ehring, T.	2011	Pakistan, 2005	Cross section	> 15	267	Self-report	> 1 year	41.2
5	Hagh-Shenas, H.	2006	Iran, 2003	Cross-section	> 15	145	Self-report	< 1 year	81
6	Hashmi, S.	2011	Pakistan, 2005	Cross section	> 15	356	Self-report	< 1 year	51.4
7	Mousavi, S.	2006	Iran, 2003	Cross section	< 15	284	Self-report	< 1 year	45.1
8	Mohamadi, L.	2010	Iran, 2003	Cross section	< 15	1000	Interview	Not report	70.0
9	Naeem, F.	2011	Pakistan, 2005	Cross section	> 15	1291	Self-report	> 1 year	46.6
10	Nobakht	2019	Iran, 2017	Cross section	> 15	127**	Self-report	< 1 year	25.2
						103*			77.7
11	Parvaresh, N.	2009	Iran, 2003	Cross section	> 15	160	Interview	< 1 year	36.3
12	Rana, H.	2008	Pakistan, 2005	Cross section	> 15	111	Self-report	< 1 year	46.8
13	Ziaaddini, H.	2009	Iran, 2003	Cross section	< 15	466	Self-report	< 1 year	66.7
14	Farhodia, N.	2006	Iran, 2003	Cross section	> 15	786	Interview	< 1 year	51.9
15	Godarzi	2011	Iran, 2003	Cross section	> 15	117	Self-report	Not report	20.5
16	Yasami	2004	Iran, 2003	Longitudinal	> 15	1050	Interview	< 1 year	55.8

*Near the epicenter.
**Far from the epicenter.

performing a meta-analysis. Thus, in the following, the pooled prevalence is presented based on location, and then more details of prevalence based on other subgroups are presented.

Pooled Prevalence: Results of a Meta-Analysis

The results of the included studies show a varying picture of the prevalence of PTSD, ranging from 41% to 70% (Figure 2). The pooled prevalence was 56% (95% CI: 50–61). In the following, pooled prevalence is presented based on subgroup: the place of the study (ie, Iran and Pakistan).

The Prevalence by Place of Disaster

Among the reviewed studies, 10 of them were related to the earthquake in Iran.[19-21,24,25,27,28,31-33] We performed a meta-analysis on 6 studies. The pooled prevalence of PTSD was 60.2% (95% CI: 54.1–66.3). The highest and lowest prevalence of PTSD in Iran was 45% and 70%, respectively (see Figure 2). The lowest prevalence was among 284 adolescent survivors, 7–9 months after the earthquake. Data were collected using the PDS. The highest prevalence was related to 1000 students who survived in Iran. The PSS-I was used for data gathering.[18]

Six studies were related to Pakistan.[9,22,23,29,30] We performed a meta-analysis on 5 of them. The pooled estimated prevalence of PTSD was 49.2% (95% CI: 39.4–59). PTSD prevalence ranged from 41% to 65% (see Figure 2). The lowest prevalence was identified in 2 studies. One of them, which was conducted 2 years after the disaster, was among 267 recovery workers. The IES-R questionnaire was used for data collection in this study. The other study was conducted 30 months after the disaster on 300 survivors, using the Davidson Trauma Scale.

The highest prevalence was related to a study that was conducted 18 months after the disaster of 1154 adolescents. Data were collected using the CRIES-13. Based on the obtained results, 92% of survivors had a family death.

Results of Prevalence Based on a Systematic Review

Age Categories (younger than 15 mean age years versus older than 15 mean age years)

Among survivors who were older than 15 mean age years, the range of PTSD was 20.5% to 81%. The highest prevalence was found among survivors of Bam (Iran), who lived in camp or temporary residence. The sample size was 145. This study was conducted 40 days after the Bam earthquake, using the PTSD Symptom Scale.[3] The lowest prevalence was among 117 survivors who were employed.[28]

Among survivors who were younger than 15 mean age years, PTSD prevalence was between 45.1% and 70%. The lowest prevalence was among 284 survivors, 7–9 months after the earthquake. These data were collected by the PDS. Most of them were students (79.2%), and 23.6% of them had lost at least 1 first-degree relative.[20] The highest prevalence was related to 1000 students who survived the Bam earthquake. The PSS-I was used for assessment. About 89% of them lost relatives and 33% were reported with a preexisting mental disorder.[33]

https://doi.org/10.1017/dmp.2020.411 Published online by Cambridge University Press

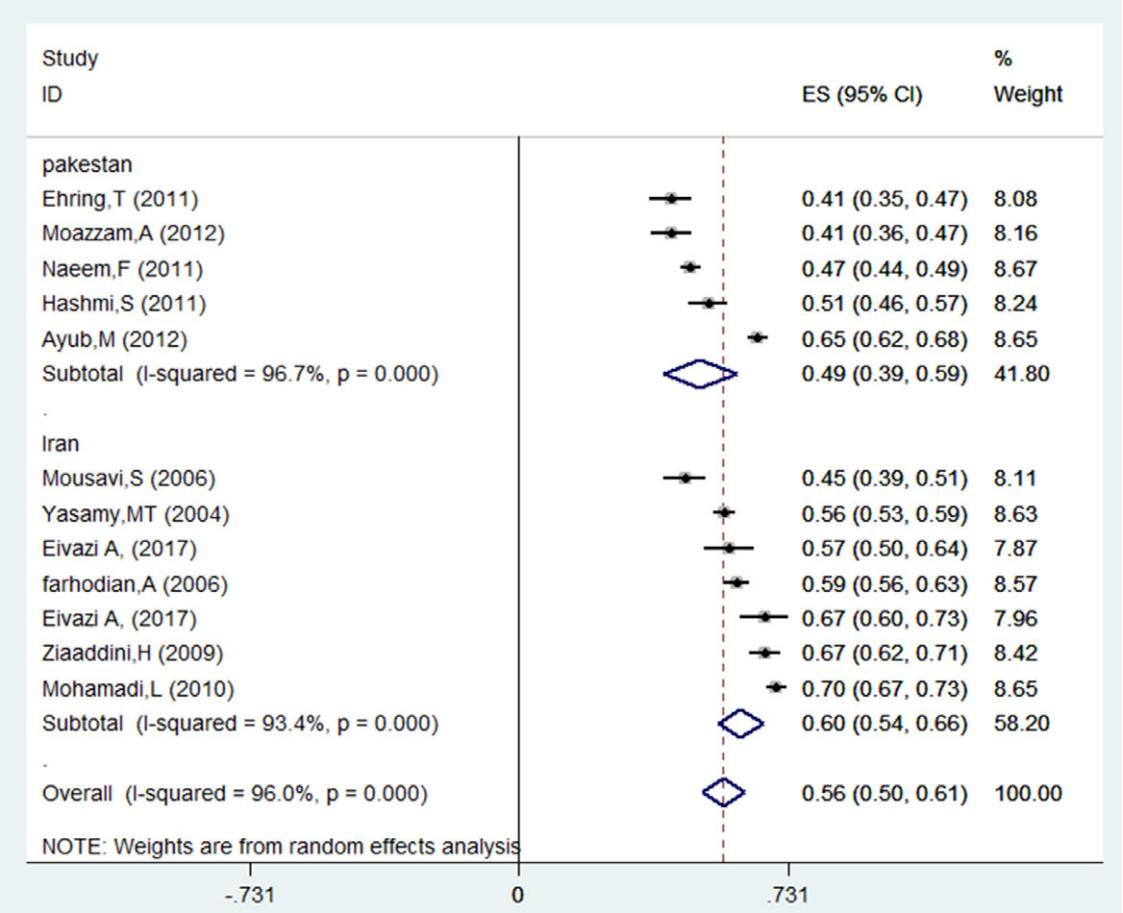

Figure 2. Prevalence of PTSD after Iran and Pakistan earthquakes.

Prevalence by Sex

Among these studies, 3 of them have reported distinct prevalence rates for men and women.[9,13,21] The lowest and highest prevalence of PTSD among men was 39.7% and 50.5%, respectively, and, for women, they were 53.4% and 60.3%, respectively. The low prevalence among men and women was reported in a study conducted in Pakistan, using the PTSD Symptom Scale questionnaire 18 months after the earthquake. Among the survivors, 47.1% of them reported a loss of a close family member. The highest prevalence among both sexes was reported in an Iranian study in which a clinical interview 8 months after the disaster was used for data collection. A significant number of survivors (89.3%) was reported with the loss of at least 1 of their close relatives.

Prevalence by Methods of Data Collection: Self-Report and Clinical Interview

The range of prevalence was reported between 20.5% and 81% by the self-report method. The lowest prevalence was related to the study among Iranian survivors using an Eshel questionnaire,[28] whereas the highest prevalence was among Iranian survivors using the PTSD Symptom Scale.[25]

The prevalence by clinical interview method was between 36.3% and 70%. The lowest prevalence was found in a study conducted using the Watson interview method on 160 students, 4 months after the earthquake,[32] whereas the highest prevalence used PSS-I on 1000 Iranian students.[33]

Prevalence by Time Lag Less Than 12 Months Versus Greater Than 12 Months

The interval between the occurrence of disaster and assessment of PTSD in 9 articles was shorter than 12 months.[19-21,23,25-27,31,32] The lowest prevalence of PTSD was 36.3% among Iranian students, 4 months after the earthquake. The highest was 81% among Iranian people, 6 weeks after the disaster.

The time lag between the occurrence of the disaster and the assessment of PTSD in 5 articles was longer than 12 months.[9,22,24,29,30] The range of PTSD prevalence was between 41.3% and 66.7%. The time lag in the lowest and highest prevalence was 30 months and 18 months, respectively.

Discussion

We reported only a small part of the study as a meta-analysis. Due to methodological limitation, the majority of the results were reported as a systematic review. The results of meta-analysis showed that the pooled prevalence of PTSD was 60.2% and 49.2% among Iranian and Pakistani survivors, respectively. The results of the systematic review showed a high prevalence among both age groups younger than 15 years and older than 15 years. Women were more vulnerable than men. The variation of the prevalence based on the clinical interview method was less than the self-report method. The prevalence of PTSD decreased with the long time period between the occurrence of disaster and assessment of the disorder.

https://doi.org/10.1017/dmp.2020.411 Published online by Cambridge University Press

Our review revealed that post-disaster PTSD is a common disorder among the survivors after the earthquake. These results show that about half (48.8%) of the Pakistani survivors and more than half (60.6%) of the Iranian survivors suffer from PTSD after a disaster. A previous meta-analysis study showed that the global prevalence of PTSD after the earthquake was 23.66%,[8] which is considerably lower than those of the current study. This discrepancy could be explained by several reasons. Our study was limited to Iran and Pakistan, and the cited comparison article included all relevant studies around the world. The majority of them were on related studies in other countries, which have many contextual differences with Iran and Pakistan. Theses contextual factors, such as higher prevalence of preexisting mental disorders in the study setting, may be responsible for the high prevalence of PTSD in our study in some ways. First, the lack of mental health preparedness might be a major cause of PTSD prevalence.[34] The second might be the shortage of psychosocial support programs in developing countries,[35] including Iran and Pakistan. The next factor is the weakness of infrastructures and a shortage of resources to respond to a disaster, which might not be adequate to meet the needs of the affected population. In this case, countries seek international help; however, international aids in some circumstances might even lead to poor results.[36] Finally, there are some barriers to seeking mental health care that make survivors reluctant to seek treatment and result in increased rates of mental disorders.[37]

The current study showed that the prevalence of PTSD among Iranian survivors is higher than that of Pakistani survivors. Some factors that can influence the prevalence of mental disorders are the characteristics of disaster, including severity of the disaster, the extent of trauma, proximity or distance from a disaster location, background factors, personality traits, and social support.[6] Although the severity of the Pakistan earthquake was higher than in the Iran earthquake and caused more mortality and morbidity, perhaps preexistence disorder is one of the factors that contributes to the high rate prevalence of PTSD in Iranian people. A study in 1999 showed that about one-fifth of the Iranian population suffered from mental disorders.[38] Moreover, Pakistani people might be more resilient compared with the Iranian people.

In the present study, we grouped our results based on the 2 mean age groups: younger and older than 15 years. Although the difference between the prevalence of PTSD between the 2 age groups is not very obvious, in both developed and developing countries, PTSD is a predominant mental disorder among young people.[39] There are many reasons for the high rate of PTSD among young people. Mental health needs of young people are complex and diverse.[40] Also, this age group does not have adequate experience, skills, and resources, and thus is vulnerable to the impact of the calamitous event.[41]

The range of PTSD among survivors older than 15 years was between 20.5% and 81%. This variation in the prevalence may be due to the difference between the target populations. There was a prevalence of 81% for Bam survivors who lived in a tent or temporary residence and a prevalence of 20.5% for survivors who were employed. It might be due to that people who lived in a tent or temporary residence were in a more unstable situation of living or job, or they might experience severe impacts of the disaster.

The range of PTSD among survivors younger than 15 years was 45.1% to 70%. A potential explanation for the variation in this age group could be explained through the different impact of the disaster; within the lowest reported prevalence (ie, 45.1%), only 23% of them lost a relative at the earthquake. In comparison, the corresponding figure for the highest prevalence of PTSD (ie, 70%) was 89%. Compared with the rates of PTSD in the Wenchuan earthquake, the rates of PTSD in our study were significantly higher. The prevalence of PTSD among adult and children after the Wenchuan earthquake was reported to be 15.57%[42] and 19.2%,[43] respectively. The reason for the lower rates in the Wenchuan earthquake might be that China is more experienced in managing the impact of earthquake, including mental disorders.[6] Of course, there may be other factors of this discrepancy, such as the method and time of assessment, and the prevalence of the disorder before disaster.

The results show that the prevalence of PTSD among woman is higher than that of men. This finding is consistent with many studies.[8] The sociocultural and cognitive factors have a pivotal role in explaining gender difference.[44] The sociocultural element, especially in a developing country, has an important role in the vulnerability of a woman. The less access to power for decision making, as well as the values and traditions that are prominent in these societies, makes a woman more vulnerable to disaster impacts.[45]

In our study, the time of assessment of PTSD was categorized into below and over 12 months. Although the difference between the prevalence of PTSD among the 2 categories is not very obvious, in both, the rates of PTSD decreased over time. A systematic review identified a decrease in PTSD from 28.8% at 1 month to 17.0% at 12 months.[46] Considering the that PTSD is a curable disorder, a number of affected people can recover, leading to a declined prevalence over time and only a small percentage of people suffering from chronic PTSD in the aftermath of a disaster.[47]

The results about the method of measurement showed that PTSD prevalence is different according to the self-report and interview approaches. The results showed that the variation related to clinical interview is lower than the self-report method. This finding shows that clinical interview is probably more precise than the self-report method. However, the literature highlighted that both these methods might overestimate or underestimate the outcome.[48]

This systematic review has a number of important limitations. First, despite the occurrence of natural disasters in Iran and Pakistan, we failed to find adequate articles on subgroups of populations. Second, we did our best to find the full texts of some articles but could not succeed as many systematic reviews. Third, we found a variety of instruments for PTSD assessment, which might affect the results of a meta-analysis. To overcome this problem, at least to some extent, we proceeded the analysis through consulting with a physiatrist who was expert in the systematic review. Then, to reach more accurate results, we categorized instruments into self-report and clinical interview methods.

Conclusion

Aftermath PTSD is a common disorder. The studies conducted in Iran and Pakistan presented different results. The results of meta-analysis identified that post-disaster PTSD in Iran is more prevalent than in Pakistan. The results of this systematic review showed that the rate of PTSD was high in both age groups (younger and older than 15 years). Also, the shorter the time lapses between the occurrence of disasters and time of the study, the higher the PTSD prevalence. Also, PTSD among woman was higher than among men. The clinical interview method showed less variation on the rate of PTSD than the self-report method.

Disaster managers should be aware of the high prevalence of PTSD to better address the needs of affected people.

https://doi.org/10.1017/dmp.2020.411 Published online by Cambridge University Press

Appropriate planning and interventions can reduce the prevalence of the disorder. Because social problems after disasters can lead to mental disorders, future studies should aim at discovering a social problem in the wake of disasters.

Conflict(s) of Interest. The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this paper.

Acknowledgments. We would like to acknowledge and thanks the fanatical support provided by the Iran National Science Foundation of Vice-presidency for science and technology, the office of president.

References

1. **Brilleman SL, Wolfe R, Moreno-Betancur M, *et al.*** Associations between community-level disaster exposure and individual-level changes in disability and risk of death for older Americans. *Soc Sci Med.* 2017;173:118–125.
2. **Nepon J, Belik SL, Bolton J, Sareen J.** The relationship between anxiety disorders and suicide attempts: findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *Depress Anxiety.* 2010;27(9):791–798.
3. **Bryant RA, Gallagher HC, Gibbs L, *et al.*** Mental health and social networks after disaster. *Am J Psychiatry.* 2016;174(3):277–285.
4. **Li J, Zweig KC, Brackbill RM, *et al.*** Comorbidity amplifies the effects of post-9/11 posttraumatic stress disorder trajectories on health-related quality of life. *Qual Life Res.* 2018;27(3):651–660.
5. **Beaglehole B, Mulder RT, Frampton CM, *et al.*** Psychological distress and psychiatric disorder after natural disasters: systematic review and meta-analysis. *Br J Psychiatry.* 2018;213(6):716–722.
6. **Neria Y, Nandi A, Galea S.** Post-traumatic stress disorder following disasters: a systematic review. *Psychol Med.* 2008;38(4):467–480.
7. **Levin AP, Kleinman SB, Adler JS.** DSM-5 and posttraumatic stress disorder. *J Am Acad Psychiatry Law.* 2014;42(2):146–158.
8. **Dai W, Chen L, Lai Z, *et al.*** The incidence of post-traumatic stress disorder among survivors after earthquakes: a systematic review and meta-analysis. *BMC Psychiatry.* 2016;16(1):188.
9. **Naeem F, Ayub M, Masood K, *et al.*** Prevalence and psychosocial risk factors of PTSD: 18 months after Kashmir earthquake in Pakistan. *J Affect Disord.* 2011;130(1-2):268–274.
10. **Yoon S, Kim JE, Hwang J, *et al.*** Recovery from posttraumatic stress requires dynamic and sequential shifts in amygdalar connectivities. *Neuropsychopharmacology.* 2017;42(2):454.
11. **Galea S, Nandi A, Vlahov D.** The epidemiology of post-traumatic stress disorder after disasters. *Epidemiol Rev.* 2005;27(1):78–91.
12. **World Health Organization**. *Emergencies in the Eastern Mediterranean Region in 2017: the year in review*. Geneva, Switzerland: WHO; 2017.
13. **Ghomian Z, Yousefian S.** Natural disasters in the Middle-East and North Africa with a focus on Iran: 1900 to 2015. *Health Emerg Disasters.* 2017;2(2):53–62.
14. **World Health Organization**. Managing disaster risks in communities: a community-based approach to disaster risk reduction: training manual for the trainers of cluster representatives and volunteers. Regional Office for the Eastern Mediterranean: WHO; 2015.
15. **Oliveira CS, Roca A, Goula X.** *Assessing and managing earthquake risk: geo-scientific and engineering knowledge for earthquake risk mitigation: developments, tools, techniques*. Berlin: Springer Science & Business Media; 2007.
16. **Charara R, Forouzanfar M, Naghavi M, *et al.*** The burden of mental disorders in the eastern Mediterranean region, 1990-2013. *PLoS One.* 2017;12(1):e0169575.
17. **Munn Z MS, Lisy K, Riitano D, Tufanaru C.** Chapter 5: systematic reviews of prevalence and incidence. In: Aromataris E, Munn Z, eds. *Joanna Briggs Institute Reviewer's Manual.* Adelaide, South Australia: The Joanna Briggs Institute; 2017.
18. **Hoy D, Brooks P, Woolf A, *et al.*** Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. *J Clin Epidemiol.* 2012;65(9):934–939.
19. **Nobakht HN, Ojagh FS, Dale KY.** Risk factors of post-traumatic stress among survivors of the 2017 Iran earthquake: the importance of peritraumatic dissociation. *Psychiatry Res.* 2019;271:702–707.
20. **Gholampoor E, Bina M, Mahmoudi-Gharaei J, *et al.*** Post traumatic stress disorder and general symptoms of anxiety in adolescent survivors of Bam earthquake. *Iran J Psychiatry.* 2006;1(2):76–80.
21. **Farhoudian A SV, Rahimi Movaghar A, Radgoudarzi R, *et al.*** The prevalence of posttraumatic stress disorder and its symptoms among Ban earthquake survivors. *Adv Cogn Sci.* 2006;31(8):58–70.
22. **Ali M, Farooq N, Bhatti MA, Kuroiwa C.** Assessment of prevalence and determinants of posttraumatic stress disorder in survivors of earthquake in Pakistan using Davidson Trauma Scale. *J Affect Disord.* 2012;136(3):238–243.
23. **Hashmi S, Petraro P, Rizzo T, *et al.*** Symptoms of anxiety, depression, and posttraumatic stress among survivors of the 2005 Pakistani earthquake. *Disaster Med Public Health Prep.* 2011;5(4):293–299.
24. **Eivazi A NA, Meysami A**. Comparative study of prevalence of post-traumatic stress disorder among survivors of Bam earthquake 18 months after the event in Bam and Kerman cities. *J Rescue & Relief.* 2016;8(2):55–67. http://jorar.ir/article-1-254-en.html.
25. **Hagh-Shenas H, Goodarzi MA, Farajpoor M, Zamyad A.** Post-traumatic stress disorder among survivors of Bam earthquake 40 days after the event. *East Mediterr Health J.* 2006;12(Suppl 2):S118–S125.
26. **Rana H, Ali S, Yusufi B, *et al.*** The psychological and psychosocial impact of the Pakistan Kashmir earthquake after 8 months: a preliminary evaluation by PACTT: PACTT: Pakistan–Aberdeen Collaborative Trauma Team. *Int Psychiatry.* 2008;5(2):43–46.
27. **Ziaaddini H, Nakhaee N, Behzadi K.** Prevalence and correlates of PTSD among high school students after the earthquake disaster in the city of Bam, Iran. *Am J Appl Sci.* 2009;6(1):130–132.
28. **Goodarzi M FS, Tarikhi A**. The relationship between religious attitude and the symptoms of post traumatic stress disorder in people who experienced the Bam earthquake. *J Fundament Ment Health.* 2011;13(50):93–182.
29. **Ayub M, Poongan I, Masood K, *et al.*** Psychological morbidity in children 18 months after Kashmir earthquake of 2005. *Child Psychiatry Hum Dev.* 2012;43(3):323–336.
30. **Ehring T, Razik S, Emmelkamp PM.** Prevalence and predictors of posttraumatic stress disorder, anxiety, depression, and burnout in Pakistani earthquake recovery workers. *Psychiatry Res.* 2011;185(1-2):161–166.
31. **Yasamy MT FM, Farajpour M, Gudarzi A, Bahramnezhad A, *et al.*** *Report submitted to UNICEF: First seven months of psycho-social intervention.* Iran, Tehran: Department of Mental Health, Ministry of Health and Medical Education; 2004.
32. **Parvaresh N, Bahramnezhad A.** Post-traumatic stress disorder in Bam-survived students who immigrated to Kerman, four months after the earthquake. *Arch Iran Med.* 2009;12(3):244–249.
33. **Mohamadi L, Mohamadkhani P, Dolatshahi B, Golzari M.** Posttraumatic stress disorder symptoms and their comorbidity with other disorders in eleven to sixteen years old adolescents in the city of Bam. *Iran J Psychiatry Clin Psychol.* 2010;16(3):187–194.
34. **Roudini J, Khankeh HR, Witruk E.** Disaster mental health preparedness in the community: a systematic review study. *Health Psychol Open.* 2017;4(1):2055102917711307.
35. **Gilbert BJ, Patel V, Farmer PE, Lu C.** Assessing development assistance for mental health in developing countries: 2007–2013. *PLoS Med.* 2015;12(6):e1001834.
36. **Powell T.** A review of post-disaster child protection and psychosocial programming in high and middle income countries. *WIT Trans Built Environ.* 2015;168:997–1007.
37. **Kantor V, Knefel M, Lueger-Schuster B.** Perceived barriers and facilitators of mental health service utilization in adult trauma survivors: a systematic review. *Clin Psychol Rev.* 2017;52:52–68.
38. **Noorbala A, Yazdi SB, Yasamy M, Mohammad K.** Mental health survey of the adult population in Iran. *Br J Psychiatry.* 2004;184(1):70–73.
39. **Kaminer D, Seedat S, Stein DJ.** Post-traumatic stress disorder in children. *World Psychiatry.* 2005;4(2):121–125.

https://doi.org/10.1017/dmp.2020.411 Published online by Cambridge University Press

40. **Jones L.** Responding to the needs of children in crisis. *Int Rev Psychiatry.* 2008;20(3):291–303.
41. **Schonfeld DJ, Demaria T.** Providing psychosocial support to children and families in the aftermath of disasters and crises. *Pediatrics.* 2015;136(4): e1120–1130.
42. **Zhou X, Kang L, Sun X, *et al.*** Prevalence and risk factors of post-traumatic stress disorder among adult survivors six months after the Wenchuan earthquake. *Compr Psychiatry.* 2013;54(5):493–499.
43. **Chen X, Xu J, Li B, *et al.*** The role of personality and subjective exposure experiences in posttraumatic stress disorder and depression symptoms among children following Wenchuan earthquake. *Sci Rep.* 2017;7(1):17223.
44. **Wade D, Fletcher S, Carty J, Creamer M.** Post-traumatic stress disorder in women. In: Castle DJ, Abel KM, eds. *Comprehensive Women's Mental Health*. UK: Cambridge University Press; 2016:208.
45. **Baig MN, Sharif R**, eds. Gender perspective considerations in disasters like earthquakes and floods of Pakistan. Proceedings of World Academy of Science, Engineering and Technology. New York: World Academy of Science, Engineering and Technology (WASET); 2013.
46. **Santiago PN, Ursano RJ, Gray CL, *et al.*** A systematic review of PTSD prevalence and trajectories in DSM-5 defined trauma exposed populations: intentional and non-intentional traumatic events. *PLoS One.* 2013;8(4): e59236.
47. **Self-Brown S, Lai BS, Thompson JE, *et al.*** Posttraumatic stress disorder symptom trajectories in Hurricane Katrina affected youth. *J Affect Disord.* 2013;147(1-3):198–204.
48. **Paykel E, Norton K.** Self-report and clinical interview in the assessment of depression. In: Sartorius N, Ban TA, eds. *Assessment of Depression*. Springer Berlin Heidelberg; 1986:356–366.

https://doi.org/10.1017/dmp.2020.411 Published online by Cambridge University Press