POST TRAUMAUTIC SYNDROM DISORDER (PTSD) PADA ANAK PASCA GEMPA: STUDI META-ANALYSIS

Yonathan Kristian Yuan Putra[1*], Mustikasari[2], Achmad Setya Roswendi[3], Akemat[4], Chong Mei Chan[5], Derra Afrah Amirah[6]

[1] Master of Nursing Study Program, Faculty of Health Science and Technology, Jendral Achmad Yani University, Cimahi, Indonesia.
[2] Associate Professor, Education and Laboratory Building,Department of Mental Health Nursing, Faculty of Nursing, Universitas Indonesia
[3,6] Bachelor of Nursing Study Program, Faculty of Health Science and Technology, Jendral Achmad Yani University, Cimahi, Indonesia
[5] Associate Professor, Departement of Nursing Science Faculty Medicine, University Malaya, Malaysia

Corresponding Author: Yonathan Kristian Yuan Putra,
Email: yuanputra320@gmail.com

Abstract

Post Traumatic Stress Disorder in Children After the Earthquake Disaster: Meta-analysis. This study aims to synthesize the results of PTSD research on post-earthquake children using the Meta-Analysis method. This study uses Meta Analysis of database sources which include: Science Direct, Pubmed and Google Schoolar directly by selecting articles published in 2012-2022. Keywords used include "Post Traumatic Syndrome Disorder" or "PTSD", "Children" and "Earthquake". Inclusion criteria were full paper articles with cohort and cross sectional studies, English, Scopus indexed international journals Q1, Q2 and Q3, multivariate analysis with adjusted odds ratio. The results of the study were 11 articles included in the Meta Analysis. The findings of this study underline that injured children are the most significant factor causing PTSD in post-earthquake children, followed by female sex and child age. Earthquake disasters have an impact on the psychological condition of children with post-traumatic stress that leads to PTSD. Based on the research results, it is recommended that it is important to provide support and attention to children after an earthquake. Psychiatrists, psychiatric nurses and psychologists must pay more attention to children who experience traumatic stress with special conditions of child age, injured children, and gender (female), so as to reduce the risk of PTSD.

Keywords: *children, earthquake, PTSD, meta-analysis.*

1. Introduction

Natural disasters, especially earthquakes, have become a serious problem worldwide in recent years (Turale, 2015).Earthquakes are caused by the sudden movement of rock layers in the earth's crust due to the movement of tectonic plates (Sunarjo, M. Taufik, and Sugeng, 2010).Data from various sources show that earthquakes occur frequently and can cause huge losses, especially in the Asian region.

Based on data, in 2017 and 2018 there were 820 earthquakes worldwide, with 11,804 deaths and more than 68 million people affected. In 2019, there were 1,637 earthquakes with magnitudes between 5.0-8.0 on the Richter scale and hundreds of

thousands of casualties. Asia experienced the highest impact with 45% of catastrophic events, 80% of deaths, and 76% of people affected. Indonesia is the third country with the most deaths after China and Haiti, with 876,478 deaths (US Geological Survey, 2019).

In Indonesia, earthquakes occur an average of 5,000 times a year. The incidence of earthquakes increased to 7,000 times in 2017 and 11,920 times in 2018 (BMKG, 2018).Data from the National Disaster Management Agency (BNPB) released the total number of natural disaster events in Indonesia in 2017 as many as 2,766 events including 20 earthquakes. In 2018 the incidence of natural disasters increased to a total of 3,397 events in which there were 28 earthquakes and 1 tsunami (BNPB, 2017). This shows that earthquakes still occur frequently in Indonesia and are a problem that needs to be addressed.

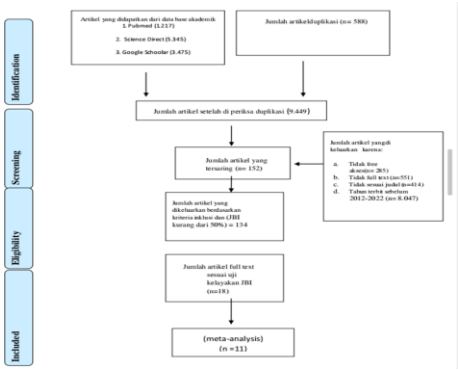
Research on risk factors for PTSD in children after earthquakes has been conducted. However, findings regarding the relationship between child age and post-traumatic reactions/PTSD are inconsistent, One study reported older children were more likely to report PTSD after the earthquake (Jin et al., 2018, while another study involving children after the earthquake reported the opposite findings (Fan et al., 2011). Girls experienced higher PTSD (Carmassi et al., 2018; Jin et al., 2018; Wang et al., 2012; Zhang et al., 2012). But different studies (Du et al., 2018; Eksi et al., 2007). found that males reported more female PTSD. These inconsistent findings are still unclear which aspects play a more important role, motivating researchers to conduct research on synthesizing study results using a meta-analysis approach within a 10-year period between 2012-2022.

2. Method

This study used a meta-analysis design conducted for Post Traumatic Syndrome Disorder studies in post-earthquake children, following the PRISMA statement criteria (Hutton, Catala-Lopez, & Moher, 2016). Data were collected by searching published research collections and journals through systematic reviews, using electronic databases consisting of Science Direct, PubMed, and Google Scholar to identify relevant studies. Each search was limited to peer-reviewed, cross-sectional, and cohort methods published in Indonesian and English during 2012-2022.

A search using the PubMed database using MeSH (Medical Subject Healing) with the keywords post-traumatic stress disorder" OR 'children' AND earthquake, PTSD* OR Children OR earthquake yielded 1,217 search results. Searches using the ScienceDirect database with keywords and diet obtained 5,345 journal search results. Searching the Google Scholar database with the keywords, PTSD, Children, and earthquake, 3,475 journal search results were obtained. The PRISMA flowchart of the search strategy is shown in Figure 1.

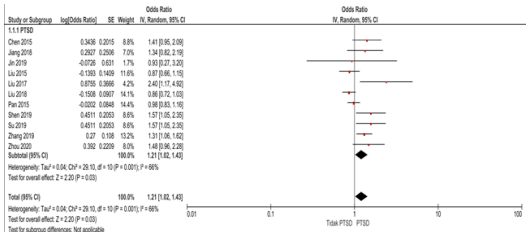
After identifying 10,037 journals, the articles were screened and eliminated based on the inclusion criteria, critical appraisal instrument, and CAT test, leaving 18 journals that passed the identification, screening, and eligibility stages. However, in order to proceed with the meta-analysis study, there was no need for a meta-analysis.

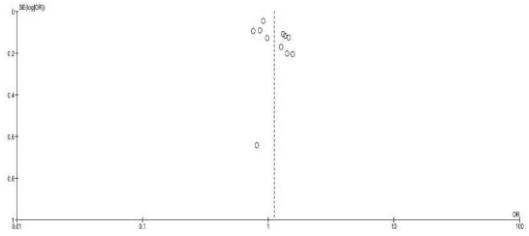


3. Results

3.1 Meta-analysis of childhood age factors with PTSD

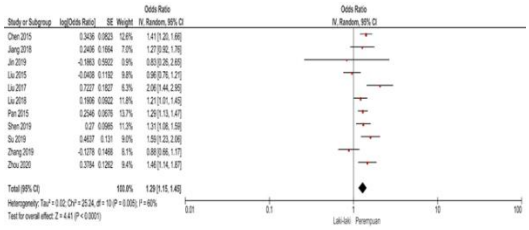
A meta-analysis of 11 research articles showed that there was an association between children's age and post-earthquake PTSD in Asia, with an odds ratio of 1.21 (95% CI, 1.02-1.43) (Figure 2). Although the variation between studies was heterogeneous, the analysis showed that children were 1.21 times more likely to experience earthquake-induced PTSD. In addition, there was no indication of publication bias in this study, as evidenced by using the funnel plot technique which showed a symmetrical and balanced distribution of studies between 5 to the left and 6 to the right of the center line (Figure 3). This suggests that the conclusions of this meta-analysis are valid and reliable.

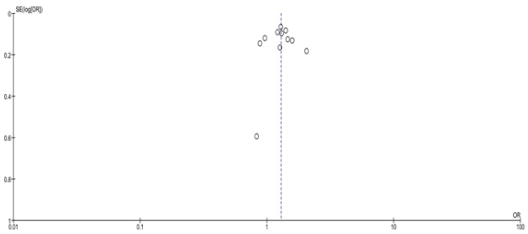




3.2 Meta-analysis of gender female factor with PTSD

A meta-analysis of 11 research articles on the female gender factor and the incidence of earthquake-induced PTSD showed a significant effect with a pooled odds ratio of 1.29 (95% CI, 1.15-1.45) (Figure 4). Although the study variation was heterogeneous, the analysis showed that women had a 1.29 times higher risk of experiencing earthquake-induced PTSD than men. The funnel plot technique was used to identify publication bias and found no publication bias in the relationship between female gender and the incidence of earthquake-induced PTSD. Figure 5 shows that the distribution of research looks asymmetrical, where the distribution of research is balanced between to the left of 5 and to the right of 6 midlines, with a total of 11 articles analyzed. So it can be concluded that there is no publication bias that affects the relationship between female gender and the incidence of PTSD.

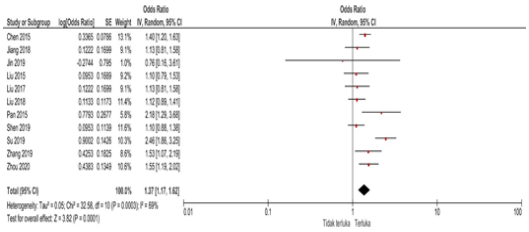


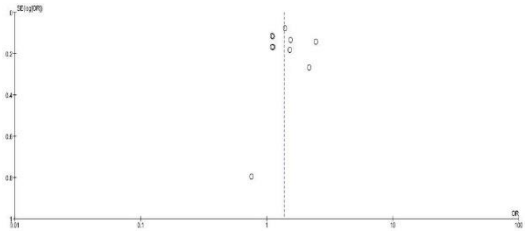


3.3 Meta-analysis of factors child injury with PTSD

A meta-analysis of 11 research articles on factors of injured children with earthquake-induced PTSD showed a significant effect with a pooled odds ratio of 1.37 (95% CI, 1.17-

1.62) (Figure 6). Despite the heterogeneous study variation, the analysis showed that injured children had a 1.37 times higher risk of experiencing earthquake-induced PTSD compared to uninjured children. Funnel plot analysis did not reveal any publication bias affecting the relationship between injury and PTSD (Figure 7).





The findings of the 11 included studies, along with their quality assessment, are reported in Table 1. The Critical Appraisal Tool was used for the quality assessment of the included studies.

Research name (release)	Research time	Subject research	Measuring device	Definition of risk factor	Adjusted odds ratio (aOR)	Information
Qi, Junjun, dkk (2020)	1 years (Longitudinal)	Participants were 1241 youth who survived in Jiuzhaigou .	Data were collected using the PTSD Checklist Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, and Center for Epidemiology c Studies Depression Scale for Children Chinese version	1. Child age >15 years is the time elapsed since the child was born. 2. Female gender is the visible difference between men and women in terms of their behavior. 3. Wounded is the state of being injured by an individual's individual injury	Age : 1,46 (0,96 - 2,28) Gender (Female) : 1.48 (0.96-2.28) State of injury : 1.31 (1.00- 1.70)	The RR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was enough data to analyze. aOR was obtained based on the available data.

Pan, dkk (2015)	6 month (studi Cross-sectional)	377 junior high school students of (grades 2-7) in the mao district.	PTSD symptoms were assessed using the Impact of Event Scale-Revised (IES-R) Chinese version.	1. Child age >15 years is the time elapsed since the child was born. 2. Female Gender, visible differences between men and women seen from their behavior 3. Injured is the state of being injured by someone	Age : 1,36 (1,08 – 1,71) Gender (Female) : 0.90 (0.68-1.19) State of injury : 1.30 (1.01-2.23)	The RRR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was enough data to analyze. aOR was obtained based on the data that was available data.
Liu, dkk (2017)	2 years (survey cross-sectional)	1369 participants were recruited from two different locations in areas severely affected by the earthquake.	PTSD Symptomatics was assessed by the Event Impact Scale-Revised (IES-R).	1. Child age >15 years is the time elapsed since the child was born. 2. Female Gender, there are differences between men and women in terms of their behavior. 3. Injured is the state of being injured by someone.	Age : 1,10 (0,46,2,64 Gender (Female) : 1.80 (1.19,2.73)) State of injury : 1,81 (1,15,2,86)	The RR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was sufficient data for analysis. aOR is obtained based on available data
Jiang, dkk (2018)	3 years (studi cross-sectional)	A total of 867 Tibetan youth who mourn the consequences 2010 earthquake investigated.	PTSD symptomatology was evaluated by the PTSD Checklist-Civilian Version. And coping style is evaluated with the Coping Style Scale. Exposure to trauma from the 2010 Yushu earthquake evaluated using a list of earthquakes containing sociodemographic variables.	1. A child's age >15 years is the time that has passed since the child was born. 2. female gender: visible differences between men and women seen from behavior. 3. Injured is the condition of being injured by an individual.	Age : 1,34 (0,82 – 2,17) Gender (Female) : 1.27 (0.91 – 1.76) State of injury : 1.13 (0.81- 1.59)	The RR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was sufficient data for analysis. aOR is obtained based on available data.

Liu dkk, (2018)	3 years (long)	A cross-sectional survey was conducted in two different areas affected by the earthquake, and data was collected from 4,118 respondents	These instruments include a demographic information questionnaire, seismic exposure questionnaire, PTSD questionnaire Checklist- Civilian Version (PCL-C), Posttraumatic Growth Inventory (PTGI), Perceived Social Support Scale (PSSS) and Simple Coping Style Questionnaire (SCSQ).	1. Child's age >15 years is the time that has passed since the child was born. 2. Type female gender, visible differences between men and women seen from their behavior. 3. Injured is the condition of being injured by an individual.	Age : 0,96 (0,76 – 1,20) Gender (Female) : 1.10 (0.79 – 1.52) State of injury : 0.87 (0.66- 1.15)	The RR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was sufficient data for analysis. aOR is obtained based on available data.
Liu dkk, (2015)	2 years (long)	A total of 1,573 Teenage survivors will be followed up on 6, 12, 18 and 24 months after the earthquake	Participants resolve Posttraumatic Stress Disorder Self-Rating Scale (PTSD-SS), Adolescent Self-Rating Life Events Checklist, Social Support Level Scale, and Simplified Coping Styles Questionnaire. Distinct patterns of PTSD symptom trajectories were established through grouping participants based on time-varying changes in the development of PTSD (i.e. reaching clinical limits	1. A child's age >15 years is the time that has passed since the child was born. 2. Female gender, visible differences between men and women seen from their behavior 3. Injured is the condition of being injured by an individual.	Age : 1,41 (0,95 – 1,86) Gender (Female) : 1.40 (1.20 – 1.72) State of injury : 1.07 (1.01- 1.15)	The RR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was sufficient data for analysis. aOR is obtained based on available data.
Shen et al, (2019)	6 month	sample of 2299 children and adolescents who survived the earthquake	Patient Health Questionnaire (PHQ) Scale -13, a shortened version of the PHQ-15 scale that removes two items involving sexual pain/problems and menstrual problems, and a project-developed questionnaire was administered to participants three and six months after earthquake.	1. A child's age >15 years is the time that has passed since the child was born. 2. Female gender, visible differences between men and women seen from their behavior 3. Injured is the condition of being injured by an individual.	Age : 0,76 (0,63– 0,92) Gender (Female) : 1.31 (1.08 – 1.60) State of injury : 1.10 (0.88- 1.39)	The RR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was sufficient data for analysis. aOR is obtained based on available data.

Jin , dkk, (2019)	18 month	153 children who survived the earthquake.	Participants are assessed using an impact scale children's revised events (CRIES) and brief mood and feelings questionnaire (SMFQ), after that the t test, Chi square test, and multivariate logistic regression were carried out to test differences in LBC and identify related predictors.	1. A child's age >15 years is the time that has passed since childhood born. 2. Female Gender, visible differences between men and women can be seen from their behavior. 3. Injured is the condition of being injured by an individual.	Age : 0,86 (0,73– 0,98) Gender (Female) : 0,83 (0,26 – 2,66) State of injury : 0,76 (0,16- 3,63)	The RR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was sufficient data for analysis. aOR is obtained based on available data.
Liu dkk (2018)	4 years	In total, 304 students from the school are located in Lushan.	Methods: UCLA PTSD-RI at 1.5, 6, 12, 24 and 48 months after the earthquake. The child's age ranges from 9 to 17 years at the time of the first assessment, and the sample consisted of 140 men men and 164 women injured by an individual.	1. A child's age >15 years is the time that has passed since the child was born. 2. Female Gender, visible differences between men and women can be seen from their behavior. 3. Hurt is circumstances	Age : 0,86 (0,72– 0,93) Gender (Female) : 1.21 (1.01 – 1.41) State of injury : 1,12 (0,89 1,20)	The RR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was sufficient data for analysis. aOR is obtained based on data
Zhang dkk, (2019)	18 month (Longitudinal)	241(male/female: 116/125) from Hirono, Fukushim a participated in this research.	Measurement of PTSD and depressive symptoms among adolescents at 6, 12, and 18 months after the Wenchuan earthquake was investigated using PTSD Checklist Civilian Version and Beck Depression Inventory (BDI).	1. A child's age >15 years is the time that has passed since the child was born. 2. Female Gender, visible differences between men and women can be seen from their behavior. 3. Injured is the condition of being injured by someone individual.	Age : 1,31 (1,00 – 1,70) Gender (Female) : 0,88 (0,66– 1,18) State of injury : 1,53 (1,07- 2,19)	The RR listed is the adjusted odds ratio (aOR). This article was included in the meta-analysis because there was sufficient data for analysis. aOR is obtained based on available data.
Su dkk, (2019)	5 years	1976 Tibetan youth response	Methods: A large-scale school-based mental health survey was conducted 5 years after the earthquake among Tibetan	1. A child's age >15 years is the time that has passed since the child was born. 2. Female	Age : 1,57 (1,05 – 2,29) Gender (Female) : 1.59 (1.23– 2.05)	The RR listed is the adjusted odds ratio (aOR). This

			students in Yushu city using the ASAS and the PTSD Checklist.	Gender, visible differences between men and women can be seen from their behavior. 3. Injured is the condition of being injured by an individual.	State of injury : 2.46 (1.86- 3.46)	article was included in the meta-analysis because there was sufficient data for analysis. aOR obtained based on available data.

4. Discussion

4.1 Meta-analysis of age factors with PTSD

A meta-analysis conducted on the relationship between age and PTSD after an earthquake showed a significant relationship between age and PTSD, with a combined OR of 1.21 (95% CI, 1.02-1.43), indicating that children have a 1.21 times greater risk of developing PTSD after an earthquake. Weems (2007) theory, PTSD can occur in all age groups but children, are an age group that is more vulnerable to PTSD, because children have special needs and vulnerabilities when compared to adults, At the same time, children are believed to be in an important developmental period where the foundations for their long-term emotional health are still being built, even after a major disaster earthquake. unique characteristics, have skills and experiences that are still lacking, and are still dependent on family to meet their needs, such as economic needs, the need for emotional support (Garcia ortega, et al, 2012).

The results of research conducted in Wenchuan China, 3 years after the earthquake on 4606 children found that 5.6% of respondents (261 respondents) experienced PTSD (Tian et al, 2014). The results of the study (Liu, et al, 2012) 6 and 12 months after the Wenchuan earthquake in China, the prevalence rates were 11.2% and 13.4%, respectively, among children in Qushan city, in Beichuan County.

Based on the description above, the researcher argues that the characteristics of children's age are significantly related to the incidence of PTSD after an earthquake disaster, because the psychological, cognitive and emotional growth of children is immature, still dependent on parents and does not yet have adaptive / good individual coping.

4.2 Meta-analiysisof female gender factors with PTSD

The meta-analysis conducted showed a significant association between gender and post-traumatic stress disorder (PTSD), with a combined OR of 1.29 (95% CI, 1.15-1.45) indicating that women are 1.29 times more likely to experience PTSD after an earthquake. Women are more likely to experience PTSD due to differences in coping strategies. Women tend to show emotional reactions to stress and are more likely to spend a lot of time seeking support and talking about problems with friends or family. Research has shown that women who have experienced a traumatic event such as an earthquake are more likely to remember the event and experience excessive fear, increased heart rate, pale face, sweating, and covering their ears .(Hanifah dan Pratiwi, 2020).

In addition, research has shown that women are more prone to

psychological depression when exposed to disasters and are generally vulnerable when exposed to traumatic events. Women have a subjective view of threat, which is different from men's objective view (Anam, Martiningsih, and Ilus, 2016).Women's sensitivity to external stimuli, different psychological characteristics, and their tendency to interpret disasters more negatively than men may be factors that make them more vulnerable to PTSD, Women are also more sensitive to stress and threat hormones, less likely to use effective coping strategies, and more likely to experience stress in their social environment, which may make them less able to change stressful environments. Researchers believe that gender affects PTSD in children affected by earthquakes, and this may be influenced by factors such as differences in coping strategies, hormone sensitivity, and gender role socialization.

4.3 Meta-analysis of factors of child injury with PTSD

The meta-analysis showed that there was a significant association between child physical injury and post-earthquake PTSD, with a pooled OR of 1.37 (95% CI, 1.17-1.62). Children who were injured were 1.37 times more likely to experience PTSD after the earthquake. Trauma to the limbs is most common among child earthquake victims due to their weak and poor protective capabilities. This can cause trauma with rapid development, easy shock, and even cause death (Handayani et al., 2019). In addition, children are more sensitive to traumatic images and may experience horrific memories that return to their lives months or years later (Tang et al., 2017).

Research in Taiwan found that many students experienced post-disaster trauma stress problems six weeks after the earthquake occurred. Physical injuries to children and loss of family members due to disasters are the main causes of PTSD problems in children (Thoyibah et al., 2019).Therefore, there is a need for special attention to child victims of disasters and the need for appropriate interventions to help them overcome PTSD and post-disaster trauma problems.

5. Conclusion

Based on a meta-analysis of 11 research articles, it was found that children who are victims of earthquakes have a risk of developing Post Traumatic Stress Disorder (PTSD) after the event. Factors that influence the risk of developing PTSD in children are age, gender and the incidence of injury. Child age, gender (female), and injured/injured/amputee are at higher risk of developing PTSD after an earthquake. In this study, there was no publication bias affecting the relationship between risk factors and the incidence of PTSD in children. Therefore, the results of this meta-analysis provide important information for health professionals and social service providers to pay attention and provide appropriate interventions for child victims of earthquake disasters to address PTSD and post-disaster trauma more effectively.

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