POSTTRAUMATIC STRESS DISORDER AMONG INDONESIAN CHILDREN 5 YEARS AFTER THE TSUNAMI

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Abstract. Children are at risk for developing posttraumatic stress disorder (PTSD) due to experiencing or living in a disaster area. The factors that increase the likelihood of a child developing PTSD need further clarification. We studied the factors associated with PTSD among children who experienced the tsunami in Sumatra, Indonesia. We conducted a cross sectional study in 2 subdistricts of Sumatra 5 years after experiencing a tsunami. Children aged 7-13 years were enrolled using stratified cluster sampling. A tsunami-modified version of The PsySTART Rapid Triage System was used to question children about their tsunami-specific traumatic experiences. Trauma symptoms were evaluated using the Trauma Symptom Checklist For Children (TSCC). The diagnosis of PTSD was made using the Child PTSD Symptom Scale (CPSS) and DSM-IV criteria. The data were analyzed with chi-square tests and multivariate logistic regression analysis with 95% confidence intervals (CI). A total of 262 children were enrolled in this study. The prevalence of PTSD in these children was 20.6%. On multivariate analysis, having experienced a delay in evacuation (PR=4.5; 95%CI: 2.794-13.80; $p<0.001$) and being unable to escape (PR=13.07; 95%CI: 5.884-64; $p<0.001$) were significantly associated with PTSD 5 years after the tsunami. Children who experienced a traumatic event in which they were unable to escape or when there is a delay in evacuation are at risk of developing PTSD and need appropriate treatment.

Keywords: children, tsunami, posttraumatic stress disorder, trauma experiences

INTRODUCTION

Disasters, like the tsunami in 2004, have caused public and mental health professionals in Indonesia to be aware of the need for psychological support for victims. Disasters can have a psychological effect on large portions of the population, not only directly through the victims, but indirectly among other members of the same region (Gurwitch *et al*, 2004; Hagan, 2005; Margolin *et al*, 2012).

On December 26, 2004, a major earthquake of 9.3 on the Richter scale occurred in the depths of the sea off West Sumatra, Indonesia, causing huge tsunami waves. The tsunami caused damage in Indonesia, Sri Lanka, India, Thailand and other countries. More than 200,000 people died. In Indonesia, The Nangroe Aceh Darussalam (NAD) Province was the most affected. The mortality rate among children aged < 10 years was 21.1% (95% CI: 17.0–25.7)

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and among adults aged > 60 years was 28.0% (95% CI: 20.6-36.5) (Rofi *et al*, 2006). Children are fragile, susceptible to outside influences, often not able to cope with some problems or express their feelings, except by crying. Children are not able to look after themselves or control their feelings (Gurwitch *et al*, 2004; Hagan, 2005; Schreiber, 2011; Margolin *et al*, 2012).

Some studies have reported higher numbers of psychological trauma cases and mental illness among children from the tsunami area (Thienkrua *et al*, 2006; Kar *et al*, 2007; Piyasil *et al*, 2007; Ularntinon *et al*, 2008; Usami *et al*, 2012, 2013, 2014; Iwadare *et al*, 2014). Posttraumatic stress disorder (PTSD) and depression can develop weeks or months after trauma. We conducted an assessment of PTSD 5 years after the tsunami disaster in NAD Province, Indonesia and the traumatic factors associated with PTSD. The information is important to inform caregivers and other personnel about the need for psychological support for children and to develop mental health programs for those children after experiencing trauma.

MATERIALS AND METHODS

We conducted this cross sectional study in Batee and Kota Sigli Pidie Subdistricts of NAD Province, Indonesia, from August 1 to September 30, 2009, 5 years after the tsunami. The two subdistricts studied were the most affected (Batee) and least (Kota Sigli) affected by the tsunami.

The study population consisted of 262 children, aged 7-13 years, chosen by stratified clustered sampling of subdistric data. Sample size was based on the total number. Parents or guardians gave written informed consent prior to their children's participation. The impact of severe stressors along with "what happened" to the person, such as ongoing post-even stressors, traumatic loss of loved ones, injury/illness in self or family and feeling panic was assessed using the PsySTART Rapid Triage System, which consists of 20 questions (Gurwitch *et al*, 2004; Schreiber *et al*, 2012). A modification of the Trauma Symptom Checklist for Children (TSCC) which consists of 54 questions, was used to assess the effect of the trauma based on the symptoms (Briere, 1996). The questions were translated from the original English into Indonesian. For each item, the child stated the frequency with which the statement applied to her/him using a 4-point scale ranging from 0 (never) to 3 (almost all the time). T scores at or above 65 for any clinical scale were considered clinically significant. The diagnosis of PTSD was made using the Child PTSD Symptom Scale (CPSS) and DSM-IV criteria. The CPSS is a 26-item self-reported evaluation of PTSD diagnostic criteria and symptom severity among children aged 8 to 18 years (Foa *et al*, 2001).

Data were analyzed with a chi-square test and multivariate logistic regression with 95% confidence intervals (CI). Analyses were performed using SPSS 16.0 (IBM, Armonk, NY). Questionnaires were sent to the investigators at the study sites. The investigators were social workers from the health ministry for Pidie District, NAD Province, who were trained to collect data. Investigators went to the subjects' homes and asked questions on the questionnaires of the children and their parents.

This study was approved by the Ethics Committee, Faculty of Medicine, Airlangga University, Surabaya, Indonesia.

RESULTS

Demography

Two hundred sixty-two children participated in the study, 145 (55.3%

Table 1
Characteristics of children with and without PTSD.

Characteristics	PTSD *N*=54	No PTSD *N*=208	*p*-value
Gender			0.39
Male	29	116	
Female	25	92	
Age group (year)			0.79
7-10	38	158	
11-13	16	50	
Subdistrict			<0.01*
Batee	51	65	
Kota Sigli	3	143	

(* Significant if $p<0.05$)

were boys. One hundred sixteen children (44.3%) came from the most affected subdistrict and 146 (55.7%) came from the least affected subdistrict. Sex and age were not associated with PTSD, but the impact of the tsunami disaster on the affected subdistrict was significantly correlated with PTSD (Table 1).

PTSD prevalence and experiencing trauma

The prevalence of children experiencing PTSD overall was 20.6% but 2.1% and 40.0% of children studied had PTSD in the least affected and most affected subdistricts, respectively. The most common symptoms reported were sleep disorders (100% of subjects with PTSD), nightmares (84% of subjects with PTSD) and avoidance reactions (8% of subjects with PTSD).

The prevalence of PTSD was higher among children who experienced the tsunami directly, such as witnessing the approach of the tsunami wave, seeing a loved one die, hearing loud shouting, experiencing a delay in evacuation, seeing relatives in danger, being unable to escape, having anxiety, losing a family member, and losing their home (Table 2).

After adjusting for the disaster burden, factors significantly correlated with PTSD were: seeing the tsunami wave, seeing loved ones die, experiencing a delay in evacuation, feeling unable to escape, and experiencing anxiety. On multivariate analysis, the top two traumatic experiences associated with PTSD were experiencing a delay in evacuation (PR=4.5; 95% CI: 2.79-13.80; $p<0.001$) and feeling unable to escape (PR=13.07; 95% CI: 5.88-64; $p<0.001$).

DISCUSSION

Five years after the tsunami, one-fifth of the children studied had PTSD. Most came from Batee Subdistrict which was the subdistrict most affected. Girls and boys were equally affected. Sleep disorders and nightmares were the most common symptoms, avoidance reaction was seldom seen. The independent risk factors for PTSD after adjusting for area, were witnessing the tsunami wave, seeing a loved one die, experiencing a delay in evacuation, feeling unable to escape and experiencing anxiety.

Prevalence of PTSD in our study differs from those from Thailand, India and Japan. In Thailand, the prevalence of PTSD among children post-tsunami from displacement camps, affected villages, and

Table 2
Correlation between experiencing a traumatic event and having PTSD.

Traumatic experience	PTSD	No PTSD	Unadjusted OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value
Witnessing the tsunami wave						
Yes	50	162	3.5 (1.2-10)	0.01	8.8 (2.9-27)	<0.01 *
No	4	46				
Seeing a loved one die						
Yes	47	98	7.5 (3.2-17)	<0.01	4.7 (1.8-11.5)	<0.01*
No	7	110				
Hearing loud shouting						
Yes	53	175	9.9 (1.4-74)	0.06	8 (0.9-65)	0.146
No	1	33				
Experiencing a delay in evacuation						
Yes	46	100	6.2 (2.8-13)	<0.01	4.6 (1.9-11.3)	<0.01*
No	8	108				
Seeing relatives in danger						
Yes	37	100	2.3 (1.2- 4.4)	<0.01	1.7 (0.8-3.7)	0.15
No	17	108				
Feeling unable to escape						
Yes	51	97	19 (5.9-64.0)	<0.01	10 (2.8-35.5)	<0.01*
No	3	111				
Experiencing anxiety						
Yes	53	191	4 (0.6-36)	0.10	4.6 (1.9-11.3)	0.03*
No	1	17				
Losing a family member						
Yes	38	83	3.6 (1.9-6.8)	0.01	0.9 (0.6-1.5)	0.08
No	16	125				
Losing a home						
Yes	52	174	5 (1.2-21.8)	0.01	4.4 (0.9-21.3)	0.44
No	2	34				
Being injured						
Yes	4	9	1.7 (0.5-5.9)	0.35	1.2 (0.3-5)	0.73
No	50	199				

*Adjusted to disaster burden.

unaffected villages were 13%, 11%, and 6%, respectively and declined sharply at two years to 7.6% (Thienkrua *et al*, 2006; Piyasil *et al*, 2007; Ularntinon *et al*, 2008). After a super-cyclone in Orissa, India, 30.6% of children had PTSD (Kar *et al*, 2007). After the earthquake and tsunami in 2011 in Japan, 42.6% children have a risk of PTSD based on Post-Traumatic Stress Symptoms for Children-15 (PTSSC-15) (Usami *et al*, 2012, 2013, 2014; Iwadare *et al*, 2014). The prevalence of PTSD in our study maybe different from those studies due to a differences in the lenght of time after the event.

There were no differences found in the prevalences of PTSD between males or females in our study or by age groups. Thienkrua *et al* (2006) found similar results to ours in a study from Thailand but Usami *et al* (2012, 2013, 2014) found

a higher prevalence of PTSD in females (p<0.001) than males.

PTSD has three main components: re-experiencing the traumatic experience, avoidance, and hyperarousal (McNally, 2004; Shalev, 2009). In our study, all the children with PTSD had sleep disorders and hyperarousal, 43 had nightmares and were re-experiencing the traumatic memories and 4 had avoidance. In children with PTSD, somatic of PTSD complaint may occur due to the psychological trauma. The sleep disorder may persist for months and children can have restless sleep. When awake, a child with PTSD have hyperarousal (Gurwitch *et al*, 2004; Hagan, 2005; UNICEF, 2007; Margolin *et al*, 2012).

Children may have limited verbal responses to stress. They may not fulfill the diagnostic criteria for DSM IV, even though they may have the disorders. Children may lack the numbing and withdrawal experienced by adults. We assessed PTSD using TSCC and CPSS, based on DSM IV criteria (Briere, 1996; Briere *et al*, 2001; Scheeringa *et al*, 2002; Strand, 2005; Schreiber, 2011). We recommend changing PTSD criteria for toddlers due to their inability to express their feelings, such as re-experiencing the event and having symptoms of numbness or avoidance. Traumatic experiences can cause long term problems for children. The effect of the disaster on the child depends on many factors, such as separation from parents, length of time until evacuated, traumatic memories, such as witnessing death, and being involved in dangerous situations. PTSD in our subjects could have been caused not only by the tsunami, but also by the Acehnese rebellion that has occured over the past 20 years. On univariate analysis children trapped by the tsunami who felt unable to escape had a 10 times greater risk of having PTSD than those who did not have this expereience. Children who heard cries of fear during the disaster, had 8 times greater chance of having PTSD (Table 2). After adjusting for traumatic experiences, children who were trapped by the tsunami and who felt helpless and unable to escape, still had a greater chance of developing PTSD. Thienkrua *et al* (2006) found religion played a role in PTSD. In our study, religion was not assessed, since all the subjects were moslem. The tsunami in Aceh caused trauma for the whole community, but particularly for the children. A life-threatening incident can affect children psychologically.

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