

# Assessment of Psychopathological Consequences in Children at 3 Years after Tsunami Disaster

Sirirat Ularntinon MD\*,  
Vinadda Piyasil MD\*, Panom Ketumarn MD\*\*,  
Nantawat Sitdhiraksa MD\*\*, Nuttorn Pityaratstian MD\*\*\*,  
Tiraya Lerthattasilp MD\*\*\*, Wallapa Bunpromma MD\*\*\*,  
Thanvaruj Booranasuksakul MD\*\*\*, Sunsanee Reuangson MD\*\*,  
Salakchit Teeranukul MD\*\*, Wanrawee Pimratana MD\*\*

\* Division of Child and Adolescent Psychiatry, Department of Pediatrics,  
Queen Sirikit National Institute of Child Health, College of Medicine, Rangsit University, Bangkok

\*\* Department of Psychiatry, Siriraj Hospital, Mahidol University, Bangkok

\*\*\* Department of Psychiatry, King Chulalongkorn Memorial Hospital, Chulalongkorn University, Bangkok

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**Background:** At 1 year after the Tsunami disaster, 30% of students in two high risk schools at Takuapa district of Phang Nga Province still suffered from post traumatic stress disorder (PTSD). The number of patients was sharply declined after 18 months. The psychological consequences in children who diagnosed PTSD after the event were reinvestigated again at 3 years, as there were reports of significant comorbidity and continuing of subsyndromal post traumatic stress symptoms in children suffered from other disasters.

**Objective:** To assess psychological outcomes and factors contributed at 3-year follow up time in children diagnosed PTSD at 1-year after the Tsunami disaster.

**Material and Method:** There were 45 students who were diagnosed PTSD at 1-year after the disaster. At 3-year follow up time, clinical interview for psychiatric diagnosis was done by psychiatrists.

**Results:** 11.1% of students who had been diagnosed as PTSD at 1-year after Tsunami still had chronic PTSD and 15% had either depressive disorder or anxiety disorder. 25% of students completely recovered from mental disorders. Nearly 50% of students were categorized in partial remission or subsyndromal PTSD group. Factors which influenced long-term outcomes were prior history of trauma and severe physical injury from the disaster.

**Conclusion:** Although the point prevalence of PTSD in children affected by Tsunami was declined overtime, a significant number of students still suffer from post traumatic stress symptoms, depressive disorder or anxiety disorder which need psychological intervention.

**Keywords:** Post-traumatic stress disorder, Tsunami victims, psychological trauma, long-term outcomes

**J Med Assoc Thai 2008; 91 (Suppl 3): S69-75**

**Full text. e-Journal:** <http://www.medassocthai.org/journal>

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The Tsunami Disaster occurred on December 26<sup>th</sup>, 2004, when series of giant wave hit many shores around the Andaman Sea. In Thailand, Phang Nga province was the most severely affected area. More than 4,200 people died and estimated 4,000 people were displaced<sup>(1,2)</sup>. Apart from damage to physical health and

property, psychological damage especially in young people is one of the major adverse consequences from the incident and needs great attention, as children is highly susceptible to negative life experiences.

From empirical review of literatures<sup>(3-5)</sup>, post disaster psychiatric morbidity in children continued for years and presented different types of psychopathology which were characterized by specific psychological problems or disorder in Diagnostic and Statistical Manual of Mental Disorder 4<sup>th</sup> edition

Correspondence to: Ularntinon S, Child and Adolescent Psychiatry Department, Queen Sirikit National Institute Of Child Health, Bangkok 10400, Thailand. E-mail: [sirirat@childrenhospital.go.th](mailto:sirirat@childrenhospital.go.th), [siriratul@yahoo.com](mailto:siriratul@yahoo.com)

(DSM- IV) diagnosis particularly post traumatic stress disorder (PTSD), depression and anxiety disorder , non specific distress or subsyndromal elevation of PTSD symptoms (re-experience, avoidance or hyperarousal symptoms) associated with reaction to extreme stress and externalizing behaviors. However, there were groups of resilient children who were fully recovered from PTSD during follow-up years.

As part of a long term mental health rehabilitation program for helping children affected by the disaster, Queen Sirikit National Institute of Child Health (QSNICH), in collaboration with Department of Psychiatry, Siriraj Hospital, Mahidol University, developed a school-based follow-up program for psychological problems in children affected by Tsunami in 6 schools in Takuapa district of Phang Nga and reported series of earlier works from 2 schools (Bangmuang and Suttinanusorn school) under the project describing psychological findings, particularly PTSD in children at 6 months, 1 year and 2 years after the event<sup>(6-8)</sup>. The report from other schools under this project that had different circumstances was described elsewhere<sup>(18)</sup>.

From previous study by Piyasil et al<sup>(6-8)</sup>, the prevalence of PTSD in children affected by the Tsunami disaster was gradually declined from 46.1% of total affected students to 31.6% at the end of the first year period, significantly decreased to 10.4% at 18 months and dropped further to 7.6% at 2 years. Although there were a number of reports on acute psychological response of children and long-term follow-up of PTSD in children from other traumatic causes, there were few longitudinal studies concerning the long-term psychological effects associated with Tsunami-related PTSD.

## Objectives

To assess psychological outcomes and factors contributed at 3-year follow-up time in children diagnosed PTSD at 1 year after the Tsunami disaster.

## Material and Method

### Study population

At 1 year after the Tsunami disaster, there were 86 students diagnosed for PTSD from Bangmuang and Suttinanusorn school<sup>(7)</sup>. However, due to relocation of students and limitation in follow up process, only 45 students in this group were available for the study.

### Methods

The data were collected on November 2007, almost 3 years after Tsunami. The students were interviewed by psychiatrists. The psychiatrists made

independent diagnoses for PTSD, Depressive disorder and Anxiety disorder by using the DSM- IV criteria for each disorder<sup>(5)</sup>. The students who were still diagnosed PTSD, will be classified as chronic PTSD. Additional category was specified: partial remission PTSD which refers to person who fulfilled the A (expose to traumatic event) and E (duration of symptoms > 1 month) criteria but did not completely fulfilled the B (re-experiencing of the incident), C (avoidance of reminders) and/ or D (hyperarousal response) of DSM IV criteria for PTSD. Only students who failed to meet the criteria for PTSD, depression, anxiety disorder and our operational criteria for partial remission PTSD were considered to be in complete remission.

### Statistical analysis

Data are summarized with descriptive statistics, reported as raw number and proportion for categorical variables, as means and SD for numerical variables and compared by independent t-test and ANOVA. Comparison of categorical variables was accomplished using Chi-square (substituting Fisher-exact testing when expected cell sizes were less than 5). Significant value is set at 0.05.

## Results

### Characteristics of students (Table 1)

Table 1 shows characteristics of students, of the forty- five students studied, 46% are male and 53% are female with mean age of 11.35 years (SD = 2.37 yrs), the mean age at the incident was 8 years old. There was 33 students in primary school (included 5 in pre school) and 12 students in junior high school.

Regarding types of Tsunami exposure experiences, 23 students had no direct exposure by themselves but have other experiences related to the devastating effects of Tsunami.

Eight students were trapped in the waves and eight were exposed in life threatening scales. Eleven students had serious physical injury. Thirty-six students lost their family members with mean number of family members' death in the event at 2.8 and maximum of 10 deaths in 2 families. Houses of sixteen students in this group were totally destroyed in the incident as shown in Table 1.

### Psychiatric outcomes of students at 3- year after Tsunami (Table 2)

At 3-year after the disaster, 45 out of 86 students diagnosed PTSD at 1 year after the disaster, were followed up. There were 12 students (24.4 %) who

**Table 1.** Students characteristics

Items	n = 45
Age (mean)	11.35 (SD = 2.37)
Age at event (mean)	8.31 (SD = 2.4)
Gender: Male	21 (46.66 %)
Female	24 (53.33 %)
Religious: Buddhist	42 (93.33 %)
Other	3 (6.66 %)
Education: Primary school	33 (73.33%)
High school	12 (26.66%)
Previous history of trauma	4 (8.8 %)
Tsunami-exposure experience:	
No direct exposure	23 (51.1%)
Witness the event and death of others	6 (13.3%)
trapped in the waves	8 (17.77%)
Life threatening scale exposure	8 (17.77%)
Being physically injured	11 (24%)
Having death in family	36 (80%)
Index of post Tsunami adversities:	
House destruction	16 (35.5 %)
Loss of property	21 (46.6 %)
Separate from parents/ living in foster home	3 (6.6 %)

**Table 2.** Psychiatric outcome at 3 years after Tsunami in children who had been diagnosed as PTSD at 1 year

Psychological outcomes	n = 45
Psychiatric disorder	Total = 12
Chronic PTSD	5 <sup>(1)</sup>
Depressive disorder	5 <sup>(2)</sup>
Anxiety Disorder	5 <sup>(3)</sup>
Partial remission PTSD	21 (46.66%)
Fully Recovery	12 (24.44%)

<sup>(1)</sup> = 2 cases had comorbidity with major depressive disorder, 1 case had separation anxiety disorder

<sup>(2)</sup> = 2 cases had comorbidity with chronic PTSD, 2 cases had partial remission PTSD

<sup>(3)</sup> = 3 cases had symptoms of separation anxiety disorder, 2 cases had partial remission PTSD

still had psychiatric disorder, 5 for chronic PTSD, 5 for depressive disorder and 5 for anxiety disorder. Some students had more than 1 diagnosis.

Twenty-one students (46.66%) had partial remission PTSD (clinical improvement with some residual symptoms), and there were only 12 students (24.44%) who had full recovery after 3 years.

### Comparison of sociodemographic variables (Table 3)

From this study, only 2 factors contribute to different outcome at 3- year after disaster (recovery vs chronic impairment); physical injury from tsunami and history of previous trauma ( $p < 0.05$ ). There were no difference between groups in other variables ( $p > 0.05$ )

### Discussion

The study demonstrates that children who had been diagnosed as PTSD at first year after Tsunami disaster still exhibited a wide range of post traumatic emotional symptoms. We found that there was high association between chronic PTSD and major depressive disorder. This is the same as the other studies<sup>(9)</sup>. The correlation varied from 13-75%. The results emphasize the importance of looking for comorbidities in post disaster psychiatric surveys. This study is not an epidemiologic survey, hence, we did not study PTSD and depressive disorder in all students, only the students diagnosed PTSD at 1 year after Tsunami disaster were studied. However, from previous study of PTSD in natural disaster<sup>(10)</sup>, 90 % of cases will emerge before 1 year.

Although we had no data of 3-year follow-up of PTSD in students suffered from the Tsunami incidents from other schools, the rate of PTSD in 2 selected schools, of which our psychiatrists and school psychologists' team offered psychological intervention and long-term rehabilitation program from 2 weeks after the incident until 3 years, was gradually lower. We believed that the lower prevalence of PTSD in these 2 schools might be the result of our program which included screening for high risk group, early intervention, continuous support and coordination with the teachers<sup>(3-5)</sup>. Further report from other groups of children which underwent the same disaster, but had different circumstances after the event, are needed in order to emphasize the impact of early intervention, particular in high risk group or high impact schools as it has been reported that post disaster psychosocial support influences the long term psychiatric morbidity<sup>(11-13)</sup>.

Corresponding with previous study about natural course of PTSD in adolescents<sup>(14)</sup>, almost one half of the sample with full DSM IV PTSD at baseline remained symptomatic for more than 3 years and categorized as partial remission PTSD at follow-up period. It needs to be explored in long-term study, whether these results are stable in the longer course of illness, or are there tincture of time or natural

**Table 3.** Relationship between predisposing factors and outcomes at 3-year post event

Items	Chronic disorder (n = 12)	Partial remission (n = 21)	Fully recovery (n = 12)	p-value (p ≤ 0.05)
Age (mean)	11.33 (SD = 3.11)	10.68 (SD = 1.93)	12.72 (SD = 1.79)	0.063
Gender: Male	8	8	5	0.238
Female	4	14	6	
Previous history of trauma	3	0	1	0.035
Tsunami-exposure experience:				
No direct exposure	4	14	5	0.294
Witness the event and death of others	1	3	2	
Trapped in the event	2	3	3	
Life threatening exposure	5	2	1	
Being physically injured	6	2	3	0.027
Having death in family	3	5	1	0.892
Index of post tsunami adversities:				
House destruction	2	9	5	0.263
Loss of property	9	9	3	0.461
Separate from parents/living in foster home	0	3	0	

attenuation. We speculate that the continuing high level of symptoms in children were related not only to unavoidable exposure to “ reminders “of natural disaster but also due to the process after trauma, for example, unemployment of parents, immigrants from other area, traumatic reminders such as warning sirens or signs and continuing adversity in the family. These factors had been interpreted and many times stated by children themselves as enduring secondary stressors. While a disaster may be well circumscribed in time and quickly dissipates, the enduring effects, associated with the destruction of a community and the reminder of the trauma, continue to have an impact on the victims.

Regarding factors that lead to chronic impairment versus recovery from PTSD, the relationship of traumatic event and PTSD involves interaction among multiple factors<sup>(15)</sup>.

The exposure-experience was found to be one of the most important factors in the development of psychiatric symptoms. The exposure experience can be measured by an objective measure and subjective appraisal, which we chose the objective measure. And our findings is corresponded with the past study<sup>(16,17)</sup>, which found that the risk factors best predicted continuing post traumatic symptomatology was degree of life threat and past history of trauma. There are no age and gender differences in development of chronic disorder in this study.

It is important to note the limitations associated with small sample sizes and the limits of generalization. In addition, we did not have information on various

factors related to development of chronic impairment rather than recovery from psychopathology in victims such as pre-tsunami psychiatric morbidity, individual vulnerable factors, data related to family circumstances after the event also was limited in this study. Data in long-term follow-up periods might help us see a clearer picture of students in the transitional period between recovery or evolving into other forms of psychopathology and which vulnerable factors moderate all these processes in order to provide appropriate mental health care in high risk population. Furthermore, a variety of mental health aspects as previously indicated in many studies as long-term outcomes of victims of trauma; somatoform, panic disorder, phobia and substance abuse, but have not been identified in this study. However, this is just a preliminary report in limited population about long-term course of Tsunami disaster-related PTSD in children. Further study, particularly longitudinal studies in larger populations, is needed in order to develop long-term mental health programs to boost protective factors in these high risk children.

### Conclusion

A considerable proportion of children, diagnosed as PTSD at 1 year after Tsunami, still suffer from various post traumatic stress symptoms. Most common reported symptoms are in avoidance criteria. Twenty-five percent of the patients have full recovery at 3-year after the incident. Factors that influenced the outcomes are the history of previous trauma and physical injury.

### Acknowledgement

We would like to thank the Directors of Bangmuang and Suttinanusorn School for their co-operation in this long-term project and all their effort to help children affected by the Tsunami disaster.

We also wish to thank our school psychologist team for their assistance in data-collecting process, Dr. Wiboon Kanjanapattanakul for his assistance in statistical analysis. We are grateful to Dr. Vandee Ningsanond, Director of Queen Sirikit National Institute of Child Health, Ministry of Public Health, Thailand and Prof. Dr. Teerawat Kulthanan, Dean of Faculty of Medicine, Siriraj Hospital, Mahidol University for funding support of this project and their support of the field investigation.

### Abbreviation

PTSD, Post traumatic stress disorders; DSM-IV, Diagnostic and Statistical Manual of Mental Disorder 4<sup>th</sup> edition

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## การประเมินภาวะทางจิตใจในเด็กที่เวลา 3 ปี ภายหลังภัยพิบัติสึนามิ

ศิริรัตน์ อุพารตินนท์, วินัดดา ปิยะศิลป์, พนม เกตุมาน, นันทวัช สิริธิรักษ์, ภัทธร พิทยรัตน์เสถียร, ติรยา เลิศหัตถศิลป์, วัลลภา บุญพรหมมา, ธันวรุจน์ บุรณสุขสกุล, ศันสนีย์ เรืองสอน, สลักจิต อีรณกุล, วันรวี พิมพ์รัตน์

**ภูมิหลัง:** การสำรวจสุขภาพจิตของนักเรียนในโรงเรียนสองแห่งที่อำเภอตะกั่วป่า จังหวัดพังงา ที่ได้รับผลกระทบจากภัยพิบัติสึนามิ ที่เวลา 1 ปี ภายหลังภัยพิบัติพบว่า 30% ของนักเรียนในโรงเรียนทั้ง 2 แห่ง ยังคงมีภาวะความเครียด ภายหลังเหตุการณ์รุนแรง หรือ post traumatic stress disorder (PTSD) จำนวนของผู้ป่วยที่มีภาวะนี้ได้ลดลงอย่างมากที่ระยะเวลา 18 เดือน ภายหลังเหตุการณ์ เนื่องจากมีการศึกษาในระยะยาวในเด็ก ที่มีภาวะ PTSD ภายหลังเหตุการณ์ภัยพิบัติอื่น ๆ พบภาวะโรคร่วมทางจิตเวชสูง รวมถึงยังคงมีอาการต่อเนื่องของภาวะความเครียด ภายหลังเหตุการณ์หลายอาการโดยที่ยังไม่ถึงระดับการวินิจฉัยโรค แต่ส่งผลกระทบต่อคุณภาพชีวิต คณะผู้ศึกษา จึงได้ทำการศึกษาผลกระทบทางจิตใจในผู้ป่วยเด็กกลุ่มนี้อีกครั้งที่เวลา 3 ปี ภายหลังภัยพิบัติ

**วัตถุประสงค์:** เพื่อศึกษาภาวะทางจิตใจที่เวลา 3 ปีในผู้ป่วยเด็กที่ได้รับการวินิจฉัย PTSD ภายหลังภัยพิบัติสึนามิ รวมทั้งศึกษาถึงปัจจัยที่มีผลต่อผลระยะยาวในผู้ป่วย PTSD

**วัสดุและวิธีการ:** นักเรียน 45 คนที่ได้รับการวินิจฉัย PTSD ภายหลังภัยพิบัติ ได้รับการสัมภาษณ์และตรวจสอบสภาพจิตโดยจิตแพทย์ที่เวลา 3 ปีภายหลังเหตุการณ์

**ผลการศึกษา:** ร้อยละ 11.1 ของนักเรียนที่ได้รับการวินิจฉัย PTSD ที่เวลา 1 ปีภายหลังเหตุการณ์สึนามิยังคงมีภาวะ PTSD แบบเรื้อรัง ร้อยละ 15 มีโรคซึมเศร้าหรือโรควิตกกังวล เกือบร้อยละ 50 ของนักเรียนจัดอยู่ในกลุ่ม partial remission หรือ subsyndromal PTSD ร้อยละ 25 ของนักเรียนหายจากภาวะ PTSD และไม่มีภาวะโรคทางจิตเวชอื่นร่วมด้วย ปัจจัยที่พบว่ามีส่วนต่อการฟื้นตัวจากโรคคือ เคยมีประวัติการบาดเจ็บทางจิตใจในอดีต และการบาดเจ็บทางร่างกายที่รุนแรงจากเหตุการณ์สึนามิ

**สรุป:** แม้ว่าความชุกของภาวะ PTSD ในเด็กที่ประสบภัยพิบัติสึนามิจะลดลงตามเวลา แต่ยังมีเด็กจำนวนหนึ่งที่ยังคงมีอาการของภาวะความเครียดภายหลังภัยพิบัติ คือโรคซึมเศร้าหรือโรควิตกกังวลซึ่งต้องการการดูแลทางจิตใจต่อไป

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