

Impact of Tsunami on the Mental Health of Victims

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The effect of tsunami of 26th December 2004, on the residents of the coastal town of Nagapattinam, India was studied. The study was conducted on 134 adolescents (mean age =16) one month after the disaster. The affected group (n=52) was defined as those who had experienced loss of life of family member(s), and/or destruction of house due to the tidal waves. They were compared with a group of unaffected adolescents (n=82) who were living 12 kms from the affected area and had reported no loss of house or death of family member(s). The perceived stress, and avoidance, intrusion, hyper arousal symptoms of PTSD were assessed in their local language, Tamil. The affected and unaffected group differed significantly on perceived stress while differences were not significant for avoidance, intrusion, hyper arousal symptoms of PTSD. Gender differences were significant for perceived stress, intrusion, hyper arousal, and IES-R.

Keywords: Tsunami; Perceived Stress; PTSD; Avoidance; intrusion; Hyperarousal

On 26th December 2004, an earthquake of magnitude 9.1 off north Sumatra coast generated devastating Tsunami waves affecting several countries in South East Asia. In India, Andaman & Nicobar Islands, Tamilnadu, Pondicherry, Andhra Pradesh, Kerala and Lakshadweep have been affected, by which, about 9700 people lost their lives and about 6000 were reported missing (Government of India, 2005).

Victims of environmental disturbances were found to have trauma-related psychological disturbances (Lindemann, 1944). Natural disaster is a traumatic event that may cause posttraumatic stress disorder (PTSD), with primary symptoms including re-experiencing phenomena (e.g., recurrent thoughts or dreams of the disaster); avoidance or psychic numbing (e.g., avoidance of disaster related activities, feelings of detachment); and hyperarousal (e.g., difficulty in sleeping or concentrating).

When limited in duration to 1 month, these symptoms are characteristic of Acute Stress Disorder (American Psychiatric Association, 1994).

There are substantial individual differences in psychological reactions to trauma, even though most trauma victims may experience some symptoms at least to a mild degree (Burnam et al., 1988). In a study on the victims of 1999 earthquake in Turkey (Tural et al., 2004), higher rates of PTSD were found in persons who had higher levels of perceived life threat. Symptoms of PTSD are the most common types of psychological distress observed in children following a disaster (Lonigan, et al, 1991; Lonigan et al., 1994; Milgram et al., 1988; Shannon et al., 1994). Frightening, life-threatening events during the disaster and loss-disruption resulting from the disaster are two aspects of exposure that have frequently been linked to psychological distress in children (Vogel

& Vernberg, 1993). Studies of children's reactions to hurricane Hugo, South Carolina, found greater symptomatology to be associated both with more frightening experiences during the storm and with level of damage to their homes (Lonigan et al., 1991, 1994; Shannon et al., 1994). Loss, in the form of violent bereavement (as against loss of property and possessions), is believed to represent an especially severe risk for PTSD symptoms, especially if the death of a family member or friend during a disaster is directly observed (Pynoos & Nader, 1988).

Previous psychiatric disorders, female gender, and severity of earthquake have consistently been found to relate to worse psychological outcomes after earthquakes (Armenian et al., 2000). Gender differences have been reported in the prevalence (Steinglass & Gerrity, 1990) and expression of symptoms (Lavik et al., 1996; North et al., 1997; Springer & Padgett, 2000) of posttraumatic stress. Though studies have been done to explore gender differences in vulnerability to PTSD, little published research was available exploring whether gender differences occur in all the three PTSD symptom clusters for the same traumatic event ((Kimerling, Ouimette, & Wolfe, 2002; Vernberg et al., 1996; Fraser, 2005).

The present study aims; (i) to compare the affected and not affected groups, on perceived stress, and avoidance, intrusion, and hyper arousal symptoms & overall impact of the event, and (ii) to examine, if there are any significant gender differences, on perceived stress, and avoidance, intrusion, and hyper arousal symptoms & overall impact of the event.

Method

Participants:

134 adolescents of Nagapattinam district, India of which 52 (Mean age =16.88, Age

range =15 to 19, SD = 0.86) were affected (reported loss of life of family member(s) and/or loss of house) and 82 (Mean age =16.18, Age range =15 to 19, SD=0.88) were not affected (reported no loss of life of family member(s) and/or no loss of house) participated in this study. There were 20 males and 32 females in the affected group, and 16 males and 66 females in the not affected group.

Measures:

Perceived Stress Scale: It was developed by John and Catherine (Cohen et al., 1983; Cohen & Williamson, 1988) for participants with at least high school education. This instrument measures the perceived stress of the subject in the last one month due to a traumatic event(s) that happened in life. There are 10 items and the responses have to be recorded on a 5 point scale based on the frequency of the situation, ranging from 'never' to 'very often'.

Impact of Events Scale-Revised (IES-R): This scale developed by Weiss and Marmar (1997) to parallel the DSM-IV criteria for PTSD, is a self-report measure designed to assess current subjective distress for any specific life event. The three sub scales measure, avoidance (the tendency to avoid thoughts or reminders about the incident), intrusion (difficulty in staying asleep, dissociative-like re-experiencing of when experiencing true flash-back), and hyper arousal (feeling irritated, angry, difficulty in getting sleep). The score for an IES-R subscale is the mean of the scores of the items of that cluster. Therefore, the minimum score possible is 1 and maximum score possible is 5 for a subscale. In addition to the 3 subscale scores, IES-R also gives an overall impact of events score (IES-R total) (sum of the 3 subscale scores) also.

Procedure:

The Tamil translated version of the Perceived Stress Scale, and Impact of Events

Scale-Revised were administered to the participants. The sample of affected group (n=52) were from Akkarapettai and the sample of unaffected group (n= 82) were from Nagore both separated by 12 kms and in Nagapattinam district, India. The affected group reported either death of family member(s), or loss of house or both. The unaffected group reported no death of family

member(s) or loss of house. Two-way multivariate analysis of variance was done to compare the affected and not-affected groups on perceived stress and avoidance, intrusion, and hyper-arousal symptoms & overall impact of the event, and to examine if there were any significant gender differences among the measures.

Results

Table 1 Mean Psychometric Scores of Males and Females Not-affected and Affected by Tsunami

	Male		Female	
	Not-affected (n=16)	Affected (n=20)	Not-affected (n=66)	Affected (n=32)
Perceived stress	22.32(5.02)	24.55(3.69)	24.17(4.18)	27.66(3.17)
Avoidance	3.07(0.54)	3.09(0.64)	3.09(0.59)	3.14(0.56)
Intrusion	3.12(1.07)	2.61(0.92)	3.54(0.81)	4.00(0.74)
Hyperarousal	2.75(0.90)	2.37(0.70)	3.16(0.92)	3.48(0.82)
IES-R total	8.94(2.12)	8.07(1.64)	9.79(1.89)	10.64(1.62)

Note: Standard deviations occur in parentheses

Analysis was done using a 2 (Group: not affected, affected) x 2 (Gender: male, female) MANOVA. The affected and not-affected groups significantly differed in perceived stress, $F(1,133)=12.90$, $p<0.01$, while no significant differences were found for avoidance, $F(1,133)=0.12$, $p<0.73$, intrusion, $F(1,133)=0.013$, $p<0.91$, hyperarousal, $F(1,133)=0.03$, $p<0.86$, and overall impact of the event (IES-R Total), $F(1,133)=0.00$, $p<0.98$. There is significant gender differences in perceived stress, $F(1,133)=9.67$, $p<0.01$, intrusion, $F(1,133)=28.88$, $p<0.01$, hyperarousal, $F(1,133)=19.60$, $p<0.01$, and overall impact of the event (IES-R Total), $F(1,133)=22.04$, $p<0.01$, while gender difference is not significant for avoidance symptoms, $F(1,133)=0.11$, $p<0.74$. The interaction effect of affected vs. not-affected groups and gender was not significant for perceived stress, $F(1,133)=0.62$, $p<0.43$, and avoidance symptoms,

$F(1,133)=0.02$, $p<0.89$, while significant differences were found for intrusion, $F(1,133)=8.29$, $p<0.01$, hyperarousal, $F(1,133)=4.18$, $p<0.05$, and overall impact of the event, $F(1,133)=5.51$, $p<0.05$. Since the main variables (group & gender) had only two levels each, t-test was done for post-hoc analysis.

The perceived stress for not-affected male (M=22.31, SD=5.02) and not-affected female (M=24.17, SD=4.18) was not significantly different, $t(82) = -1.53$, *ns*. The avoidance symptoms for not-affected male (M=3.07, SD=0.54) and not-affected female (M=3.09, SD=0.59) was not significantly different, $t(82)=-0.14$, *ns*. The intrusion symptoms for not-affected male (M=3.12, SD= 1.07) and not-affected female (M=3.54, SD= 0.81) was not significantly different, $t(82) = -1.75$, *ns*. The hyperarousal symptoms for not-affected male (M=2.75, SD= 0.90) and not-affected female (M=3.16, SD= 0.92) was

not significantly different, $t(82) = -1.61$, *ns*. The IES-R total for not-affected male ($M=8.94$, $SD=2.12$) and not-affected female ($M=9.79$, $SD=1.89$) was not significantly different, $t(82) = -1.58$, *ns*.

The perceived stress for not-affected male ($M=22.31$, $SD=5.02$) and affected male ($M=24.55$, $SD=3.69$) was not significantly different, $t(36) = -1.54$, *ns*. The avoidance symptoms for not-affected male ($M=3.07$, $SD=0.54$) and affected male ($M=3.09$, $SD=0.64$) was not significantly different, $t(36) = -0.12$, *ns*. The intrusion symptoms for not-affected male ($M=3.12$, $SD=1.07$) and affected male ($M=2.61$, $SD=0.92$) was not significantly different, $t(36) = 1.53$, *ns*. The hyperarousal symptoms for not-affected male ($M=2.75$, $SD=0.90$) and affected male ($M=2.37$, $SD=0.70$) was not significantly different, $t(36) = 1.44$, *ns*. The IES-R total for not-affected male ($M=8.94$, $SD=2.12$) and affected male ($M=8.07$, $SD=1.64$) was not significantly different, $t(36) = 1.38$, *ns*.

The perceived stress for not-affected female ($M=24.17$, $SD=4.18$) and affected female ($M=27.66$, $SD=3.17$) was significantly different, $t(98)=-4.18$, $p<0.01$. The avoidance symptoms for not-affected female ($M=3.97$, $SD=0.59$) and affected female ($M=3.15$, $SD=0.56$) was not significantly different, $t(98)=-0.45$, *ns*. The intrusion symptoms for not-affected female ($M=3.54$, $SD=0.81$) and affected female ($M=4.00$, $SD=0.74$) was significantly different, $t(98) = -2.74$, $p<0.01$. The hyperarousal symptoms for not-affected female ($M=3.16$, $SD=0.92$) and affected female ($M=3.48$, $SD=0.82$) was not significantly different, $t(98) = -1.68$, *ns*. The IES-R total for not-affected female ($M=9.79$, $SD=1.89$) and affected female ($M=10.64$, $SD=1.62$) was significantly different, $t(98) = -2.16$, $p<0.05$.

The perceived stress for affected male ($M=24.55$, $SD=3.69$) and affected female ($M=27.66$, $SD=3.17$) was significantly different, $t(52)=-3.23$, $p<0.01$. The avoidance

symptoms for affected male ($M=3.09$, $SD=0.64$) and affected female ($M=3.15$, $SD=0.56$) was not significantly different, $t(52) = -0.33$, *ns*. The intrusion symptoms for affected male ($M=2.61$, $SD=0.92$) and affected female ($M=4.00$, $SD=0.74$) was significantly different, $t(52)=-5.99$, $p<0.01$. The hyperarousal symptoms for affected male ($M=2.37$, $SD=0.70$) and affected female ($M=3.48$, $SD=0.82$) was significantly different, $t(52) = -5.03$, $p<0.01$. The IES-R total for affected male ($M=8.07$, $SD=1.64$) and affected female ($M=10.64$, $SD=1.62$) was significantly different, $t(52) = -5.52$, $p<0.01$.

Discussion

Significant difference found in perceived stress between affected male and affected female indicate that the female adolescents perceived the situation as highly stressful while male adolescents didn't perceive the same natural disaster with similar nature of loss to be as much stressful. Though the not-affected and affected, male and female did not differ significantly in avoidance symptoms, the high scores indicate that the participants of the study have continued to stay away from reminders of the event, avoided thinking about it experienced numbness, and avoided discussing it. The affected female had significantly high intrusion symptoms compared to the not-affected females, and affected males had. Affected females had significantly higher hyperarousal symptoms than affected males. The affected female also showed significantly high overall impact of the event compared to the not-affected female, and affected male.

The possibility of gender differences in reactions to traumatic events is often based on variations in the acceptability of different expressions of psychological distress for boys and girls (Vogel & Vernberg, 1993). Greater subjective reaction to a trauma or the shattering of sex-identity script due to the trauma may also lead to increased female vulnerability (Kimerling, Ouimette & Wolfe,

2002). Deaux & Major (1987) proposed that gender-related behaviors are influenced by the expectations of perceivers, self-systems of the target, and situational clues. Iwasaki, Mackay & Ristock (2004), in a study exploring the experiences of stress among female and male managers, attribute gender differences to the way in which gender continues to be socially constructed in society, especially to the differing gender-role expectations and responsibilities for women and men. While female managers were found to experience 'emotional stress', primarily because of the pressure to meet expectations of being responsible and caring for people both inside and outside their homes, male managers tended to focus on themselves and regard other things as beyond their control or responsibility. This tendency to internalize or externalize the responsibilities may also be contributing to the gender differences found after the occurrence of the traumatic event. It may be possible that women who internalise responsibilities experience more stress than men who internalise it.

The lifetime prevalence for PTSD among women was found to be twice that for men (Kessler, Sonnega, Bromet, Hughes & Nelson, 1995). The female vulnerability to PTSD can be attributed to gender differences in perceptual sensitivity, which is further supported by the finding that girls encode life events in more detail than boys do (Seidlitz & Diener, 1998). Female gender has been found to be related to another psychopathology like depression. In adulthood, twice as many women as men are found to be depressed (Kessler, McGonagle, Swartz, Blazer & Nelson, 1993; Weissman & Klerman, 1977; Weissman, Leaf, Holzer, Myers & Tischler, 1984). Girls had been found to consistently recall more childhood memories than boys did, and they were faster at accessing the memories, and the age of earliest memory was less for girls than for boys (Davis, 1999). This gender difference was specific to events associated with

emotion and was consistent across positive and negative emotions. It can be assumed that girls tend to accumulate more memories of emotional events, including events evoking negative emotions (Else-Quest, Hyde, Goldsmith & Van Hulle, 2006) and these may be contributing to the gender differences in PTSD. This greater emotional memory in comparison to boys might have contributed to the higher intrusive, hyperarousal symptoms, and thereby the overall impact of the natural disaster among the females.

Another plausible explanation is the role of negative affectivity and the internalizing emotions of guilt/shame held only for girls (Rothbart, Ahadi & Hershey, 1994) whereas negative affectivity was linked to aggression among males. Studies show that individuals who described having intensely negative emotional responses (including fear, helplessness, horror, guilt, and shame) during or immediately after the traumatic event reported higher levels of PTSD (Bernat, Ronfeldt, Calhoun & Arias, 1998; Brewin, Andrews & Valentine, 2000; Ehlers, Mayou & Bryant, 1998; Epstein, Fullerton & Ursano, 1998; Roemer, Orsillo, Borkovec & Litz, 1998). This suggests that there may be gender differences in pathways to PTSD. Gender difference is common in PTSD and depression. A study by Spangler, Simons Monroe & Thase (1996) found that depressed women were more likely to have experienced a negative severe event before the onset of depression and supported the possibility of gender differences in pathways to depression. Depressive features of reduced interest, estrangement, numbing, poor concentration, and insomnia occur in PTSD whereas intrusive trauma-bound symptoms are not found in depression (Davidson, 1989).

Pubertal transition and recent stressful life events (Ge, Conger & Elder, 2001) were associated with depressive experiences, with

early-maturing girls representing highest rate of depressive symptoms. Fluctuation in reproductive hormones across the menstrual cycle and reproductive stage may influence the sympathetic system reactivity at the time of the trauma (Kimerling, Ouimette & Wolfe, 2002). Amygdala and hippocampus are key brain areas involved in the registration of potentially dangerous situations and in the later formation of memories for such events (Davis, 1992; LeDoux, 2000; McEwen, 1995), and gives the hypothalamic-pituitary-adrenal (HPA) axis a key role in the development and maintenance of PTSD (Yehuda, 1998). Hypothalamus and pituitary gland are closely associated with growth hormone and pubertal transition. Moreover, studies (McGaugh & Cahill, 1997) have found that memories formed under emotionally arousing situations can be altered by blocking the effects of adrenalin. Therefore, the female hormones during the pubertal transition and the HPA axis may have a key role in the female vulnerability to PTSD symptoms.

Gender differences in item endorsement have been found in a study on a measure of stress reaction (Smith & Reise, 1998). Women were more likely to endorse items describing emotional vulnerability and sensitivity, whereas men were more likely to endorse items describing tension, irritability, and being easily upset. Thus, the gender difference in endorsement might have contributed to the higher levels of perceived stress, intrusive, and hyperarousal symptoms of PTSD among women for the same natural disaster in comparison to the males.

In a study (Day & Livingstone, 2003), 186 undergraduates rated the perceived stressfulness of five scenarios, and it was found that women perceived three of them as significantly more stressful than men. Individuals who perceived that their life was in danger during the traumatic event reported higher levels of PTSD symptoms or higher rates of current PTSD (Ozer, Best, Lipsey &

Weiss, 2003). Similar result was observed in this study among females in perceived stress, intrusive, hyperarousal symptoms, and overall impact of the event.

A prospective study on gender differences in response to trauma (Freedman et al, 2002) indicated that a gender-neutral trauma does not cause more harm in women than in men. They argued that gender differences in response to traumatic event might therefore relate to differences in the meaning of a traumatic event or its gender specific attributes. However, the present study indicates that even in a gender-neutral trauma like a natural disaster, women are more vulnerable to PTSD. Freedman et al (2002) argue that women do not have an increased sensitivity to trauma but rather normally accentuated responses to certain specific elements of some traumatic events, whereas the findings of the present study suggests that women have higher perceived stress than men in a gender neutral trauma.

Implications

Understanding the increased vulnerability of women to PTSD and perceived stress along with their dynamics will equip therapists to initiate appropriate interventions after a traumatic event like a natural disaster. Women in natural-calamity prone areas can also be prepared through training like stress inoculation methods to prevent the occurrence of PTSD. Rescue and rehabilitation workers can be trained to be aware of increased vulnerability of women especially the girl child, to traumatic stress so that they can take necessary precautions and provide more psychological care to them.

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