Mental Health Consequences of the Trauma of Super-Cyclone 1999 in Orissa

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ABSTRACT

A super-cyclone hit 12 coastal districts of Orissa in October 1999 and caused over 20,000 deaths and a considerable damage to property. The psychiatric sequelae of the super-cyclone was studied using a semi-structured proforma for disaster experience, Self Reporting Questionnaire, Impact of Event Scale, Post Traumatic Symptoms Scale, Hopelessness Scale, Suicidality Screening Questionnaire, Hospital Anxiety and Depression Scale and Presumptive Stressful Life Event Scale. The coping style of the victims was also studied. It was observed that 80.4% of the subjects had probable psychiatric disorder. Posttraumatic stress disorder was found in 44.3%; anxiety disorder in 57.5% and depression in 52.7%. A considerable proportion (63.4%) of cases had comorbidity. Children and adolescents, elderly persons, lower socioeconomic status, lower educational levels, unemployment, physical injury, degree of exposure, need for evacuation, death in the family, fear of imminent death during the event, hopelessness, increased stress before disaster and past psychiatric history were associated with adverse psychological sequelae. Increase in suicidality was observed. Implications of these findings are discussed.

Key words: disaster, psychiatric disorder, depression, anxiety disorder, posttraumatic stress disorder

Introduction

The frequency as well as intensity of natural disasters are increasing globally and in India (Juvva and Rajendran, 2000). There is a growing awareness of mental health consequences of disasters all over the world (WHO 1992a, Murthy, 2000, Kar, 2000). Disasters increase the prevalence of psychopathology by approximately 17% on an average compared to pre-disaster control group (Rubonis & Bickman 1991).

The impact of a disaster is felt more in developing countries due to borderline economic status of the vulnerable population, high population density and limited resources (Juvva and Rajendran, 2000). In India, Sharan et al (1996) reported a 59% prevalence of psychiatric disorders in the adults following Marathwada earth-quake (23% had posttraumatic stress disorder (PTSD) and 21% had depression). Three months after the Bhopal Gas tragedy a 22.6% prevalence rate for mental disorders were reported (Murthy, 1997).

Proportion of victims experiencing psychiatric problems following disasters has been variable. The reported figures are 41% following a supertanker explosion (Elklit, 1997),

55% following a volcanic explosion (Lima et al, 1987); 45% following Oklahoma city bombing (North et al, 1999); 50% one year after a cyclone (Patrik and Patrik, 1981). More specifically, the prevalence of PTSD has been reported to be 28.5% (Asarnow et al, 1999), 26-95% (Goenjian et al, 1995) 13% (McMillan et al 2000), 23% (Sharan et al, 1996) following earth quakes; 34.3% following Oklahoma city bombing (North et al, 1999) and more than 5% following a hurricane (Shanon et al, 1994).

Various vulnerability factors for psychiatric morbidity after disasters have been reported. Severity of the stressor (for example threat and loss) has been strongly correlated in most studies with severity of the resultant psychiatric morbidity, although other vulnerability factors are also important (WHO, 1992a). Vulnerability for disaster related psychiatric manifestations has been reported to be more in females (Sharan et al, 1996; Caldera et al, 2001; North et al, 1999; Shannon et al, 1994); children and adolescents (Shannon et al, 1994); illiterates (Caldera et al, 2001); those with past psychiatric history (Caldera et al, 2001; McMillan et al, 2000; North et al 1999; Asarnow et al, 1999). It is also related to dose of trauma / degree of exposure (Goenjian et al, 2001; North et al, 1999); perceived stress (Asarnow et al, 1999); resource loss (Asarnow et al, 1999);

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loss of relatives (Caldera et al, 2001); fear that parents might have died (McDermott & Palmer, 1999); trait anxiety (McDermott & Palmer, 1999, Lonigan et al, 1994); evacuation experiences (McDermott & Palmer, 1999) and more frequent use of cognitive and avoidance coping strategies (Asarnow et al, 1999). Time may not heal the suffering of the disaster victims (McFarlane, 1987), however, psychological morbidity tends to affect some 30-40% of the disaster population within the first year following it, and at two years, levels are generally less but with persistent level of morbidity that seems to become chronic for some individuals and for some disasters (Raphael, 1986).

The super-cyclone of Orissa

On October 29, 1999 a cyclone ravaged the lives of over 15 million people in the 12 coastal districts of Orissa, in the East Coast of India. It continued for 72 hours with a wind speed of 260 to 300 kilometer per hour. Tidal waves from sea at a height of 7 meters swept across inland up to 15 kilometers at various places and washed away almost every thing back. Almost 20 000 persons were killed, and there were massive loss to houses, properties and cattle (Juvva and Rajendran, 2000). Thousands of villages were marooned for over two weeks before they could even gain access to relief services. The total damage was estimated at 39680 million INR (around one billion US dollar) (Source: Government of Orissa).

Objectives

We intended to study the psychiatric consequences of 1999 super-cyclone in Orissa. We specifically considered studying disaster experiences, screening for probable psychiatric cases, effect on hope, perceived crisis support, coping methods; and stress related anxiety, depression and post-traumatic stress reactions in the victims; and the vulnerability factors for psychiatric morbidity considering different variables like demographic profile, past psychiatric history and disaster experiences and support.

Material and Method

Sites: The districts covered in this study were the worst affected Jagatsinghpur (Olara village), along with the adjacent Balasore (Kharasahapur, Anantapur villages), Bhadrak (Khaparapada and Lunia villages), Jajpur (Mallikapur village), Kendrapara (Pundalo village) and Khurda (Vanivihar and Badagada areas) districts. Olara of Jagatsinghpur, which is close to the sea and experienced high tides and maximum loss of property and life, was

selected as an area of high exposure. Other places were considered low exposure areas.

Sample*:* We selected the participants for the study by a two-stage random selection. In the first phase the house (family) in the village/ locality was randomly identified. Amongst the family members random selection of one member was done in the second phase. Informed consent was taken from the person participating in the study.

In a cross sectional design, information was gathered from the victims in a semistructured proforma in their homes by social and community workers involved in disaster work. They were specifically trained for disaster work and were working in the affected areas. They received additional training for this study, on the scales used and the data collection proforma. The proforma elicited demographic details and also contained various questionnaires. All the items had specified responses to maintain uniformity. However there was scope for qualitative responses also. The victims responded to the items in the proforma themselves. However the interviewer helped the victims when there was a problem in comprehension and the whole proforma was read to the victims who were unable to read. The items were explained to the participants whenever necessary to avoid misinterpretation during reporting. The data collection was started in March 2000, and was completed at the last site in December 2000.

The structure of the pro-forma and the instruments:

1. Demographic details enquired were age, sex, education, occupation, marriage, socioeconomic status and family size. Past history of psychiatric disorder and psychiatric treatment were noted.

2. Information about and preparedness for disaster were collected under 4 areas, viz. the type of warning available, adequacy of time to prepare for cyclone, need for evacuation to safer places and the degree of preparedness.

3. Questions on disaster experiences (26 items) were prepared from General Inventory of Disaster Experiences and Brief Disaster Questionnaire, (Raphael et al, 1989). These contained questions on the damage to property, physical difficulty faced, medical problems, communication problems, need for rescue, experiences with death, change of attitude on human life, God, and a degree of the cyclone as a stressor.

4. Self Reporting questionnaire (SRQ) (WHO, 1994) were used to screen the probable caseness in the victims. It contained 20 questions for non-psychotic morbidity and 4 for psychotic symptoms. A cut off score of 7 was used to identify persons with probable psychiatric morbidity. It has been used extensively in epidemiological studies. It has been standardized for use in Indian setting (WHO, 1995).

5. Impact of Event Scale, (IES) (Horowitz et al, 1979) is a 15 item self rated scale that assesses the severity of intrusive thinking and avoidance tendencies in the face of highly stressful life events. The responses are given as 'never to very often' in a 4 point scale. The authors have reported the scale to be a sensitive indication of change in the level of subjective distress.

6. Post traumatic symptom scale (PTSS) is a self-rated scale consisting of PTSD symptoms (10 items) with yes and no answers (Raphael et al, 1989). These responses help in suggesting PTSD syndrome.

7. Hopelessness Scale (Beck et al, 1974) is a 20 item self-rating scale, consisting of general statements about the views of the future with 11 items keyed as true and 9 as false. The scale assesses the degree to which the respondent's cognitive schemata are characterized by pessimistic expectancies. The score ranges from 0 to 20 with higher scores indicating greater degrees of hopelessness.

8. Suicidality Screening (Paykel et al, 1974) is a questionnaire consisting of 5 items on worthiness of living, death wishes, suicidal ideas, contemplation and attempt. The suicidality was recorded for various periods: ever in life (before the cyclone), immediately after the cyclone (within 6 months) and within a month preceding the interview.

9. Hospital Anxiety and Depression Scale (HADS) (Zigmond et al, 1983), a self rated scale (14 items) has been extensively used in the community studies to search for presence of anxiety and depression (Haggarty et.al, 2000). The severity of anxiety and depression is rated separately using seven items each, on a 0-3 point scale and a cut off score of 11 is used for caseness in each subscale. This has been standardised in Indian population (Krishnamohan, 1993)

10. Presumptive Stressful Life Events Scale (PSLES) (Singh et al, 1984) was used to elicit life events unrelated to disaster. Events occurring six-month prior and six-month after the cyclone were recorded.

11. Crisis Support Items (CSI) is a semi-structured, 14-item questionnaire (Joseph et al, 1992). This measure comprises of seven questions asked separately for each time frame (a) within three months after the disaster (time 1) and (b) at the present time (one to three months prior to interview) (time 2). Each item is rated on a seven point scale (never to always). The scores reflect the support actually received and the satisfaction with support.

12. Simple Scale to Measure Coping Styles (12 items) which covers different ways a person tries to cope with the stress (Raphael et al, 1989) was used to study coping methods. It has items on social, emotional, behavioural and cognitive coping and spiritual methods for coping.

All the questionnaires were prepared in Oriya (the local language), by bilingual psychiatrists and the language experts. The process included translation to Oriya and back-translation to English by another group of experts. Discrepancies if any were discussed and the final version was prepared by a consensus approach. A pilot study was conducted using the questionnaires of both the languages with 15 bilingual persons. There were very few differences in the response to the two language versions and the total scores were comparable. It was found that the administration of the proforma by trained volunteers was feasible and the out come was comparable to that by psychiatrists. As the ratings were done by subjects, no interrater reliability exercise was conducted. The syndromes of PTSD, depression and anxiety were considered by the symptom complexes reported by the individual to the specific questions in the proforma, the threshold of PTSS, HADS, and correlating these with ICD-10 DCR criteria (WHO, 1992b) for diagnoses. The data was analysed by chi-square and t-test using statistical package for social sciences (SPSS) version 7.5.

Results

The sample consisted of 540 individuals (selected randomly from 3119 persons of 540 households) consisting of 327 males and 213 females with a mean age of 41.12 ± 15.1 and 38.8 ± 13.8 years respectively. Out of this 403 persons were from the area of high exposure. The demographic variables along with associated SRQ caseness, and PTSD, depressive and anxiety disorders are presented in a composite table I.

Table I

SOCIO-DEMOGRAPHIC VARIABLES AND THE PSYCHIATRIC MORBIDITY

Description of variable	Sample (N = 540)		Persons with SRQ caseness (n=415)	Persons with PTSD (n=239)	Persons with depressive dis. (n=285)	Persons with anxiety dis. (n=311)
	n	%	%	%	%	%
Age in years						
17 or less	16	2.9	93.8#	56.3	61.8	75.0*
18-29	96	17.8	68.8	35.4	50.0	47.9
30-39	190	35.2	74.7	42.6	51.1	56.3
40-59	174	32.2	77.0	46.0	53.4	57.5
60 and above	64	11.8	90.6	54.7	56.2	71.9
Gender						
Female	213	39.4	80.8	43.2	42.7$	53.5
Male	327	60.6	74.3	45.0	59.3	60.2
Education						
Illiterates	142	26.3	84.5$	44.4	57.0*	60.6
School	297	54.9	77.8	44.4	49.8	58.2
High school	60	11.1	71.7	45.0	65.0	58.3
College	34	6.3	55.9	44.1	47.1	44.1
Post graduate	7	1.3	28.6	28.6	14.3	28.6
Occupation						
Unemployed	39	7.2	82.1#	61.5#	64.1#	61.5
Housewives	113	20.9	74.3	41.6	37.2	53.1
Labourers	219	40.6	77.6	42.5	57.1	59.8
Agriculture	108	19.9	87.0	51.9	61.1	63.9
Others	61	11.3	57.4	31.1	44.3	44.3
Marital status						
Never married	47	8.7	80.9$	55.3	63.8	59.6
Married	414	76.6	73.4	42.5	51.2	55.8
Others	79	14.6	92.4	46.8	54.4	65.8
Socioeconomic status						
Lower	332	61.5	80.4$	44.6	50.0#	60.8*
Upper lower	121	22.4	82.6	46.3	66.1	57.9
Middle / upper	87	16.1	55.2	40.2	44.8	44.8
Past psychiatric history						
Absent	438	81.1	73.7$	41.3#	48.2$	57.3
Present	102	18.9	90.2	56.9	72.5	58.8

Figures are in percentages of person having caseness in that category of variable. Statistical test employed: chi square test. * p < 0.05; # p<0.01; $ p<0.001

The disaster experience: The cyclone was described as catastrophic by 79.6% and as extremely dangerous by 15.4% of the sample. Most (75.6%) had no preparation whatsoever for the cyclone with whatever minimum information was available to them. A large proportion of victims felt that they were definitely (45.6%) or probably (39.3%) going to die. Almost 30.6% had lost somebody in their family out of which 8.7% had not seen their dead bodies and 7.0% had seen mutilated bodies. Majority of the victims (80%) had seen dead bodies, and 60% had seen mutilated bodies or heaps of corpses. While 21.1% had seen their family members dying (not rescued) in front of their eyes; 42.8% had seen them being washed away. The need for evacuation to safer places for a few days was felt by 79.1%. Almost 90% were trapped in water, 39.1% reporting being trapped for more than two days. Most (73.5%) felt the need to be rescued, while 38% reported that they would have died unless rescued. While 41.5% had their belief on God strengthened after the disaster, 19.6% started wondering about existence of God, and 25.9% had their idea on God reversed from what it was before cyclone. About 81% reported a significant change in their attitude to life; 51.7% felt it had completely reversed, and felt life was meaningless.

Hopelessness: More than half (55.6%) did not have the hope that they will ever be able to succeed in coping with the disaster (table II). The sample had a mean hopelessness score of 10.9 ± 3.3, with a median score of 11 out of a total score of 20. Hopelessness was significantly associated with positive status on SRQ, PTSD, anxiety disorder and depression.

SRQ positive: A significant proportion of victims (76.9%) had scored more than 7 in SRQ indicating probability of psychiatric disorders (table III). They were more in the highly exposed villages of Jagatsinghpur (79.4%) compared to 69.3% in low exposure areas (p<0.05). Significant association was observed for perceived dangerousness, damage to home, starving, loss of valuables, observing family members being washed away or dying and seeing dead bodies. They were significantly older than those who were SRQ negative. Perception of damage, quantified as percentages, has differentiated persons positive (mean 90.8) or negative (78.0) on SRQ.

PTSD was present in 44.3% persons according to ICD-10-DCR criteria. Perceived dangerousness, damage to home, valuables, physical injury, starving, loss of cultivation, were not associated with the PTSD diagnosis. However unemployment, death in family, seeing family member being washed away, seeing dead body, fear of death were associated with PTSD. There was no difference in the mean age of PTSD cases and non-cases.

Depressive disorders was present in 52.7% of the victims considered by a cut off score of 11 in depressive sub-scale of HADS and other relevant items from the questionnaire. There was no difference in the age of depressed individual from that of non-depressed ones. In addition to the variables presented in the Table I and III, perceived dangerousness of the cyclone, damage to home, starving, loss of cultivation and valuables, seeing dead bodies and unemployed status were significantly associated with a diagnosis of depressive disorder.

Anxiety disorders: Around 57.5% of the victims had anxiety disorders considered by a cut off score of 11 in anxiety sub-scale of HADS, and other relevant items from the questionnaire. Persons with anxiety disorders were significantly older by age than the individuals without anxiety disorders. Anxiety disorder diagnosis was significantly associated with damage to home, starving, loss of cultivation and valuables, seeing family members drowning and dead bodies.

Presence of any psychiatric diagnosis was noted in 80.4% of the victims, and amongst them 63.4% had more than one diagnosis.

Suicidality: There was a significant increase in the suicidality in general after the cyclone compared to the pre-cyclone period. There was a 12 fold increase in the proportion of persons reporting the idea that 'life is not worth living'; 14.9 fold increase in death wishes, 9.76 fold increase in suicidal idea; 7.1 fold increase in suicidal plan and 9.7 fold increase in the suicidal attempt figures. Sixty-eight persons (12.6%) of the sample had made suicide attempts after the cyclone.

Stress: Considering the stress within a period of 6months before the disaster we found that the persons who were SRQ positive, had PTSD, depression and anxiety disorder, had significantly more level of stress (PSLES score) than their counterparts. Similarly, the degree of stress (unrelated to the cyclone) after the cyclone was also more in these cases. (Table: II)

Coping : Many victims reported of using various coping methods and were benefited by them. The proportion of persons who benefited, in contrast to those who did not, in various methods are as follows: seeking help from others (46.7% Vs. 32.5%); seeking financial assistance (36.4% Vs. 39.5%); ventilation (34.0% Vs. 48.9%); having someone empathetic to talk to (42.4% Vs. 31.1%); avoiding to think about cyclone and damages (20.7% Vs. 52.5%); believing in self (51.1% Vs. 35.9%); in God (39.3% Vs. 36.6%); hoping that things will be fine (41.0% Vs. 33.7%); accepting nothing can possibly be done (19.8% Vs. 28.0%). A majority had tried to view the trauma in a different perspective (cognitive coping: 89.2%). Most of the victims (64.3%) reported that significant support has come from relief workers.

Support: The support received at time-1 and time-2 were rated lower by the persons who were positive on SRQ. Similar findings were noticed for anxiety and depressive disorders. PTSD cases had significantly low scores compared to non-cases only at time-1. Satisfaction with support at time-1 and time-2 was not different in SRQ positive and negative persons. PTSD and depressed patients reported dissatisfaction with the support received at time-1, which did not persist at time-2. Patients with anxiety disorder had no difference in satisfaction level at time-1 but they were dissatisfied at time 2 (Table III).

Table II:

COMPARISON OF CASES OF DIFFERENT DISORDERS AND NON-CASES ON CERTAIN VARIABLES

VARIABLES	PTSD		Depressive disorder		Anxiety disorder	
	Non-case (n=301)	Case (n=239)	Non-case (n=255)	Case (n=285)	Non-case (n=229)	Case (n=311)
Mean age in years	39.52 (14.12)	41.12 (15.25)	39.93 (13.9)	40.50 (15.29)	38.55 (13.16)	41.46* (15.55)
Damage by the cyclone in percent	86.51 (22.18)	89.55 (16.47)	86.69 (22.12)	88.91 (17.65)	88.88 (23.66)	90.05* (16.29)
Hopelessness	10.40 (3.31)	11.58* (3.39)	10.19 (3.64)	11.58* (3.02)	9.96 (3.94)	11.63* (2.72)
Life event score before cyclone	171.24 (108.61)	218.89* (123.36)	157.96 (103.87)	223.08* (120.92)	152.42 (10316)	221.72* (119.19)
Life event score after cyclone	115.23 (102.32)	136.74* (103.66)	105.67 (100.26)	141.82* (103.30)	93.93 (102.77)	147.44* (97.95)
Crisis support within 3 months of disaster	27.08 (5.91)	24.23* (7.83)	28.96 (5.91)	23.02* (6.64)	27.69 (6.06)	24.45* (6.92)
Crisis support currently	21.00 (6.14)	20.79 (5.58)	21.65 (6.30)	20.24* (5.43)	22.88 (5.13)	19.45* (6.00)
Satisfaction in support received within 3 months of disaster	3.62 (2.28)	2.64* (1.95)	3.82 (2.24)	2.62* (1.99)	3.27 (1.97)	3.13 (2.34)
Satisfaction in support available now (in last 3 months)	2.07 (2.00)	1.81 (1.57)	1.91 (1.80)	1.99 (1.86)	2.15 (1.87)	1.81* (1.79)

Non-cases mentioned under the disorders are persons not having that particular disorder. Figures in the parentheses are standard deviations. Statistical test employed: t-test. *p<0.05.

Discussion

The super-cyclone of 1999 in Orissa was a catastrophic event, which has resulted in massive loss to life and property. The study investigated various mental health issues following disaster. The instruments utilised in the study have been used in community setting. There were no culturally alien or unacceptable items in the instruments. SRQ, HADS, PSLES have been standardized for use in Indian setting. It looked at various components of the trauma in disaster situation and its effects, hopelessness and suicidality, besides the psychiatric disorders. The effects in high and low exposed areas were compared. It also looked into the various methods used by the victims to cope with the trauma.

A considerable proportion of victims of super-cyclone (80.4%) had psychiatric morbidity. Prevalence rates of psychiatric morbidity after disasters have been variable, and similar high rates have been reported (87% by Araki et al 1998; 78% by Lima et al 1993; 75% by Penick et al 1976). The prevalence of PTSD in the index study (44.2%) was higher than that reported elsewhere (34.3% by North et al 1999, 28.5% by Asarnow et al 1999; 23% by Sharan

et al 1996, 13% by McMillan et al 2000). The next major group was anxiety disorders (57.6%), which appeared as extreme forms of stress reactions to severe psychological trauma. Almost half (52.8%) of the sample had depression. These figures suggest the extent of psychiatric problems after the supercyclone. It is known that degree of exposure to different grades of severity may produce variable prevalence figures as have been found by Goenjian et al (1995). The trauma of the super-cyclone was most severe and it continued for almost three days and most areas could not be reached for relief even after weeks. In addition, the population was possibly more vulnerable because of economic backwardness, and its related factors like poor housing, lack of infrastructure to face the calamity.

Suicidality is known to increase after traumatic events and natural disasters (Krug et al. 1998). In the index study, we found multifold increase in death and suicide related cognitions, plans and attempts. It highlights the fact that suicidal behaviours following disasters are a significant mental heath concern.

It was seen that persons with past history of psychiatric

Table III

TRAUMA ATTRIBUTES AND PSYCHIATRIC MORBIDITY

Description of variable	Sample (N = 540)		Persons with SRQ caseness (n=415)%	Persons with PTSD (n=239) %	Persons with depressive dis. (n=285)%	Persons with anxiety dis. (n=311)%
	n	%	%	%	%	%
Exposure						
High	403	74.6	79.4*	38.5$	47.6$	57.6
Low	137	25.4	69.3	61.3	67.9	57.7
Need for evacuation						
No	113	20.9	74.3*	32.7*	31.9$	57.5
Within Less than 24 hrs	65	12.0	81.5	44.6	50.8	58.5
Within 24-48 hours	81	14.9	88.5	44.4	61.7	59.3
Within >48 hours	281	52.0	73.3	48.8	59.1	56.9
Physical injury to self						
Nil	140	25.9	66.4#	40.0	42.9$	45.7$
Mild	263	48.7	79.1	42.6	50.2	56.7
Moderate needing medical help	76	14.0	85.5	57.9	68.4	72.4
Severe (needing admission)	61	11.3	80.3	44.3	67.2	70.5
Death in the family						
No	375	69.4	73.1*	48.5#	53.6*	54.1#
Yes, seen dead body	80	14.8	85.0	36.3	38.8	73.8
Yes, not seen the dead body	47	8.7	83.0	44.7	61.7	68.1
Yes, seen mutilated dead body	38	7.0	89.5	18.4	63.2	44.7
Fear of death						
No	43	7.9	44.2#	25.6$	25.6$	30.2$
Had fear, aware that it was not possible	39	7.2	64.1	23.1	28.2	25.6
Had fear, that he may die	212	39.2	77.8	41.5	51.4	55.2
Felt death is imminent	246	45.5	83.7	53.3	62.6	69.5

Figures are in percentages of persons having caseness in that category of variable in left-hand column. Statistical test employed: chi square test. * = p < 0.05; # = p<0.01; $ = p<0.001

illness were significantly more vulnerable for psychiatric morbidity in the index study similar to that reported by Lewin et al (1998), and specifically for PTSD (McMillan et al, 2000) and depression. However we did not find same for anxiety disorders.

Many socio-demographic variables were identified as vulnerability factors for developing psychiatric morbidity after disasters. Considering the age groups, adolescents and elderly had more vulnerability. PTSD was more common in these age groups. Though overall morbidity was more in females, the difference did not reach statistical significance. Similarly, there was no difference in gender in anxiety disorder or PTSD. In contrast significantly more males were depressed than the females. Widowed, divorced and single persons were more vulnerable than the married for probability of caseness. But this difference was not significant for individual disorders studied.

A negative association in the probability of psychiatric illness and level of education was noticed, persons with less or no education having more psychiatric morbidity. There was no difference in the proportion of victims in different educational grades for PTSD or anxiety disorders, but depression was significantly less in postgraduates. Unemployed persons and cultivators were most severely affected, and most of them had case-ness according to SRQ. There was no work for daily labourers and cultivators after the cyclone. This increased the misery brought about by the disaster. Persons with lower socio-economic status were more affected especially by anxiety and depressive disorders. However, all the economic strata were equally affected by PTSD. Lower economic status and psychiatric morbidity are often found to be associated, and in the disaster situations the findings suggest their increase vulnerability. Education, job status and economic status may also variably influence post disaster mental health.

Loss of property including home and valuables has been associated with psychiatric morbidity, depression and anxiety disorders but not with PTSD. It seems that the severity of psychological stress or the meaning of the stress for the individual may be associated with PTSD than the physical nature or degree of loss. Similarly physical injury to self has been associated with psychiatric morbidity, anxiety and depressive disorders, but not with PTSD.

Psychiatric morbidity in the high exposure population was more than that elsewhere. Degree of exposure to trauma has been reported to be a determining factor for psychiatric morbidity (Goenjian et al 1995; Elklit, 1997). However, in contrast to many reported findings, depression and PTSD were more common in the low exposure group in our study. This suggests that there may be other confounding factors or a different mechanism than a direct relationship between degree of stress and specific psychiatric manifestation. This issue needs further clarification.

Death in family as evidenced in the study is a significant factor increasing the vulnerability for psychiatric morbidity, PTSD, anxiety disorders and depressive disorders. Similarly observing family members dying or being washed away has also been associated with psychiatric morbidity, anxiety and showed a trend for depression. These disorders were also significantly more in persons who had fear of imminent death during the cyclone or who had seen dead bodies.

The degree of stress before the disaster may also be a predisposing factor for morbidity later. As found out in this study persons with psychiatric morbidity**,** PTSD, anxiety and depressive disorders had significantly more stress scores before the event. They also had more scores after the cyclone. However, it may be possible that stress and psychiatric disorders may have a cause and effect relationship both ways.

Various methods like social, emotional, behavioural and cognitive coping was observed with their relative usefulness in the study. While seeking help from others, having somebody to talk to, having self-confidence, trying to do as much as possible by self, believing that gradually things will become better has helped in coping with stress to a considerable number of victims. Proportions of persons who did not find improvement using methods like accepting that nothing is possible, or avoiding thinking on the trauma or ventilation, was more than that who found benefit from these methods. Ninety percent of persons tried to see the trauma from a different angle, however, considering the proportion of victims who had psychiatric disorder, it is questionable whether these methods really worked.

The support received during relief work and the satisfaction with it has major contribution to mental health after disaster (Elklit, 1997; Joseph et al 1992). The support received within three months of disaster was rated lower by the persons who were having psychiatric morbidity. Support received could be low or might be perceived low. As the morbid group significantly reported less support it could be a function of their perception. Patients with PTSD and depression reported dissatisfaction with the support received immediately after the disaster while the patients with anxiety disorder were dissatisfied later. These observations suggest the importance of support provided during relief work and the scope for psychological support in disaster work.

Limitations

We have used translated versions of the scales, which may be a limitation as use of standardized versions is ideal. Acute stress related syndromes (acute stress reactions, adjustment disorders with brief depressive reactions and acute cases of PTSD, brief lasting depressive episodes and acute and transient psychotic disorders) might have been missed as the study commenced four months after the cyclone because of logistic problems. The passage of time after the trauma might have affected the morbidity status. No information was collected on substance abuse, which was initiated or worsened after the cyclone.

Conclusion

A significant proportion of victims had psychiatric morbidity

following the super-cyclone in Orissa. Multiple factors seemed to influence the mental health after disasters. Children and adolescents, elderly persons, and individuals with lower socioeconomic status, lower educational levels, unemployment, physical injury, degree of exposure, need for evacuation, death in the family, fear of imminent death during the event, hopelessness increased stress before disaster and past psychiatric history were found to be more vulnerable for developing psychiatric disorders. The mental health needs of a community after a disaster can take massive proportions. It is important to target interventions to the most vulnerable to manage the resources in a efficient manner. Knowledge about factors which make people decompensate is important in this respect. This study has found several such vulnerability factors, which, if replicated, would help finding out the at-risk population to direct the resources towards them. Future studies may also look into psychiatric manifestations immediately following disaster, long term consequences, intervention issues in community set up and preventive methods for more vulnerable individuals.

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References

Araki K., Nakane Y., Ohta Y., Kawasaki N. (1998) The nature of psychiatric problems among disaster victims. Psychiatry and Clinical Neurosciences, 52 Suppl:S 317-9.

Asarnow J., Glenn S., Pynoos R.S., Nahum J., Guthrie D., Cantwell D.P., Franklin B. (1999). When earth stops shaking: Earthquake sequalae among children diagnosed for pre-earthquake psychopathology. Journal of American Academy of Child and Adolescent Psychiatry. 38: 8; 1016-1023.

Beck A.T., Weissman A., Lester D., Trexler L. (1974) The measurement of pessimism: The hopelessness scale. Journal of Consulting and Clinical Psychology. 42: 861-865

Caldera T., Palma L., Penayo U. and Kullgren G. (2001). Psychological impact of the hurricane Mitch in Nicaragua in a one-year perspective. Social Psychiatry and Psychiatric Epidemiology, 36 (3): 108-114.

Elklit A. (1997). The aftermath of an industrial disaster. Acta Psychiatrica Scandinavica 96 (Suppl 392): 1-25.

Goenjian A.K., Molina L., Stenberg A.M., Fairbanks L.A., Alvarez M.L. Goennian H.A., Pynoos R.S. (2001). Post traumatic stress and depressive reaction among Nicaraguan adolescents after Hurricane Mitch. American Journal of Psychiatry 158: 788 – 784.

Goenjian A.K., Pynoos R.F., Steinberg A.M., Najarian L.M., Asarnow J.R., Karayan I., Ghurabi M., Fairbanks L.A. (1995). Psychiatric comorbidity in children after the 1988 earthquake in Armenia. Journal of American Academy of Child and Adolescent Psychiatry 34: 1174-1184.

Haggarty J., Cernovsky Z., Kermeen P. and Merskey H. (2000) Psychiatric disorders in an Arctic community. Canadian Journal of Psychiatry 45 (4):357-62.

Horowitz M., Wilner N., Alvarez W. (1979). Impact of Event Scale. Psychosomatic Medicine 41: 209-218.

Joseph S., Andrews B., William R., William Y. (1992). Crisis support and psychiatric sympotomatology in adult survivors of the Jupitor Cruise ship disaster. British Journal of Clinical Psychology, 31, 63-73.

Juvva S., and Rajendran P. (2000) Disaster mental health Current perspective. Indian Journal of Social Work, 61, 4, 527-541

Kar G.C. (2000). Disaster and Mental Health. Indian Journal of Psychiatry, 42,(1), 3-13.

Krishna Mohan P. (1993) Standardization and validation of hospital anxiety and depression scale in Kannada. Dissertation submitted to the Mangalore University in partial fulfillment of requirement for the MD Degree examination.

Krug E.G., Kresnow M., Peddicord J.P., Dahlberg L.L., Powel K.E., Crosby A.E. and Annest J.L. (1998) Suicide after natural disaster. New England Journal of Medicine, 338(6) 373-378.

Lewin T.J., Carr V.J., Webster R.A. (1998) Recovery from post-earthquake psychological morbidity: who suffers and who recovers? Australian and New Zealand Journal of Psychiatry; 32(1):15-20.

Lima B.R., Pai S., Toledo V., Caris L., Haro J.M., Lozano J., Santacruz H. (1993) Emotional distress in disaster victims: A follow up study. Journal of Nervous Mental Disease, 181, 388-393.

Lima B.R., Pai S., Santacruz H., Lozano J., Luna J.. (1987) Screening for the psychological consequences of a major disaster in a developing country: Armero, Colombia. Acta Psychiatrica Scandinavica, 76(5):561-567.

Lonigan C.J., Shannon M.P., Taylor C.M., Finch A.J. Jr, Sallee F.R. (1994) Children exposed to disaster II. Risk factors for the development of posttraumatic symptomatology. Journal of American Academy of Child and Adolescent Psychiatry, 33, 1: 94-105.

McDermott B.M., Palmer L.J. (1999) Post-disaster service provision following proactive identification of children with emotional distress and depression. Australian and New Zealand Journal of Psychiatry; 33(6): 855-63.

McFarlane A.C., Policansky S.K. and Irwin C. (1987) A longitudinal study of the psychological morbidity in children due to a natural disaster. Psychological Medicine 77: 727 – 738.

McMillan J.C., Norht C.S. and Smith E.M. (2000) What parts of PTSD are normal: intrusion, avoidance or arousal? Data from the Northridze, California, Earth quake. Journal of Traumatic Stress. 39 (1): 57-5.

Murthy R.S. (1997) Psychological consequences of Bhopal disaster. Proceedings of National Workshop on psychosocial consequences of disasters, December 4-6, 1997. Bangalore: National Institute of Mental Health and Neurosciences.

Murthy R.S. (2000) Disaster and mental health: responses of mental health professionals. Indian Journal of Social Work, 61, 4, 675-692.

North C.S., Nixon S.J., Shariat S., Mallonee S., McMillan C.J., Spitznagel E.L., Smith EM. (1999) Psychiatric disorders among survivors of Oklahoma city bombing. Journal of the American Medical Association, 282 (8): 755-762.

Patrik V. and Patrik W.K. (1981) Cyclone '78 in Sri Lanka – the mental health trail. British Journal of Psychiatry. 138: 210-216.

Paykel E.S., Myers J.K., Lindenthal J.J., Tanner J. (1974) Suicidal feelings in general population: A prevalence study. British Journal of Psychiatry, 124, 460-469.

Penick E.C., Powell B.J., Sieck W.A. (1976) Mental health problems and natural disaster: tornado victims. Journal of Community Psychology; 4(1):64-8.

Raphael B. (1986) When disaster strikes. Hutchinson, London.

Raphael B., Lundin T., Weisaeth L. (1989) A research method for the study of psychological and psychiatric aspects of disaster. Acta Psychiatrica Scandinavica, Supplementum No. 353. Vol. 80 p: 1-75.

Rubonis A.V. and Bickman L. (1991) Psychological impairment in the wake of disaster: the disaster psychopathology relationship. Psychological Bulletin. 109: 384 – 399.

Shannon M.P., Lonigan C.J. Finch A.J. Jr, Taylor C.M. (1994) Children exposed to disaster: I. Epidemiology of post traumatic Symptoms and Symptom profiles. Journal of the American Academy of Child and Adolescent Psychiatry, 33, 1:80-93 .

Sharan P., Chaudhary G., Kavathekar S.A. and Saxena S. (1996) Preliminary report of psychiatric disorders in survivors of a severe earthquake. American Journal of Psychiatry 153: 556-558.

Singh G., Kaur D., Kaur H. (1984) Presumptive stressful life event scale – A new stressful event scale for use in India. Indian Journal of Psychiatry, 26, (2),107-114.

World Health Organization (1992a) Psychosocial consequences of disasters: prevention and management. Division of Mental Health. Geneva: WHO.

World Health Organization (1992b) The ICD – 10 classification of mental behavioural disorders – diagnostic criteria for research. Geneva: WHO.

World Health Organization (1995) Catalogue of WHO psychiatric assessment instruments. Division of mental Health, Geneva: WHO.

World Health Organization. (1994) Self Reporting Questionnaire. WHO: Geneva .

Zigmond A.S., Snaith R.P. (1983) The Hospital Anxiety and Depression Scale. Acta Psychiatrica Scandinavica, 67: 361-370.