

Research

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Relationship between Trauma due to Winter Storm Alexa, Post-Traumatic Stress Disorder and Other Mental Health Problems of Palestinian Children in Gaza Strip

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ABSTRACT

Aim: This study investigated the relationship between trauma due to winter storm Alexa, post-traumatic stress disorder (PTSD) and other mental health problems (MHPs) of Palestinian children in Gaza Strip.

Method: The sample consisted of 105 boys (50%) and 105 girls (50%) selected from 3 of the most affected areas by flooding in 2014 due to Alex storm in Gaza Strip. Participant's age ranged from 9 to 18 with a mean age of 13.05 years. Mental health status was assessed by a socio-demographic scale, the Trauma due to Flood Scale, the Revised Impact of Events Scale (IES-R), and the Strengths and Difficulties Questionnaire (SDQ)-parent form.

Results: Overall, there were no statistically significant differences between boys and girls in total traumatic events (5.98 vs. 6.41). Mean PTSD symptoms was 28.82, intrusion symptoms was 7.4, avoidance symptoms was 10.08, and arousal symptoms was 11.33, 47.6% of children were considered as PTSD. Girls reported significantly more PTSD symptoms and avoidance symptoms compared to boys. Total traumatic events were significantly correlated to post-traumatic stress reaction symptoms and with intrusion symptoms.

Using the SDQ-parent form, 40% of children were rated by parents as caseness, 24.3% as hyperactive, 51.9% as having emotional problems, 46.2% had conduct problems, 55.7% had peer problems, and 2.9% had abnormal prosocial behavior. Post-traumatic stress reaction symptoms were correlated only with emotional problems rated by parents.

Conclusion and Implications: This study has important implications for need of establishing and implementing psychosocial intervention programs for school-aged children in the Gaza Strip not only for those victims of political violence but also for children exposed to other types of traumatic events such as natural disasters.

KEYWORDS: Children; Flood; Gaza Strip; Post-traumatic stress disorder (PTSD); Strengths and Difficulties Questionnaire (SDQ); Trauma.

ABBREVIATIONS: PTSD: Post-Traumatic Stress Disorder; IES-R: Revised Impact of Events Scale; SDQ: Strengths and Difficulties Questionnaire; ANOVA: Analysis of variance.

INTRODUCTION

Winter Storm Alexa hits the West Bank and Gaza Strip from 11 to 14 December 2013. Precipitation levels reached up to 270 mm, which in some regions accounted for 60% of yearly average rainfall in a time span of merely 4 to 5 days. Due to the storm, 41% of the West Bank got covered with snow, and Gaza Strip was confronted with heavy flooding (www.apis.ps/up/1391593368.pdf Accessed August January 21, 2016)¹ Thousands of people evacuated from their homes were sheltered in schools as the Gaza health ministry declared a state of “extreme emergency”.

Gaza had been unable to pump sewage for more than a month, as power plants have shut down for lack of fuel. The fuel shortages—which caused daily power outages lasting 12-16 hours were not uncommon even before the devastations caused by winter storm Alexa. Ground floors in hundreds of apartment buildings across miles of city blocks remain damaged by the flood. The heavy, icy rains, amounting to about 85% of annual rainfall, also drowned large swaths of Northern Gaza’s fertile areas, destroying or degrading rich farmland and the greenhouses on which families rely for subsistence. In the hardest-hit areas, citizens used makeshift boats—some navigating the sewage using gondola-like oars—to rescue families from rooftops and transport them to overcrowded shelters in adjoining neighborhoods.¹

Natural disasters, such as earthquakes, floods, cyclones or tsunamis, have substantial impact on the mental health of children and adolescents. Children who have lived through a natural disaster may develop distressing symptoms, such as sleep or behavioral disturbance or severe emotional disturbance,² or specific disorders, such as depression³ or anxiety.⁴ Many post-disaster emotional, cognitive and behavioral effects manifest on a spectrum of stress responses, from individuals who report some post-disaster PTSD symptoms³ to others who report limited-symptom PTSD symptoms to full presentation of PTSD symptoms.³ Similarly, in a study of over 7,000 children from 4 parishes in Louisiana heavily affected by Hurricane Katrina.⁵ Based on a screening tool measuring symptoms of PTSD and depression, they found that 49% of fourth through twelfth graders exceeded the cut-off for a mental health referral in the year following the disaster and 41.6% of youth exceeded the cut-off the following year.⁶ Previous article regarding children in North Queensland, Australia, who experienced a category 5 cyclone, showed that, 3 months after exposure, 11.3% of children reported PTSD symptoms in the severe to very severe PTSD category.⁷ Also, in study of 71 children and 191 adolescents who were screened three months after a Category 5 Cyclone were rescreened 18 months post-disaster. Approximately 1-in-5 children and 1-in-12 adolescents endorsed cyclone-related PTSD symptoms at the moderate to severe level 18 months post-disaster. Of these approximately one-half (44.8%) of children were in the ‘high-persisted’ group at 18-month follow-up. Persistence of low symptoms was very common (97.6%) while late-onset PTSD was a rare phenomenon. This pattern was similar in adolescents: 25.0% were in the

‘high-persisted’ group and few students experienced late-onset PTSD.⁸ The aims of this was to study 1) types of traumatic events due to winter storm Alexa, 2) To investigate the prevalence of post-traumatic stress disorder and other MHPs in children, 3) to find the relationship between trauma due to winter storm Alexa, PTSD and other mental health problems of Palestinian children in Gaza Strip.

METHOD

Subjects

This study was conducted in 3 of the most affected areas by flooding due to Alex storm in 2014 in the Gaza Strip. The sample consisted of 105 boys (50%) and 105 girls (50%) (Table 1). According to the selection criteria, the age range was 9-19 years, with a mean age of 13.05 years (SD=2.9). Children were approached until 210 agreed to participate, which was a convenience sample. The study was approved by the local ethical committee (Helsinki Research Committee), part of Ministry of Health in the Gaza Strip. Parents gave informed consent before children were approached. Data collection was carried out by 4 trained mental health professionals of clinical psychology background (4 psychologists with BA in psychology), under the supervision of the first author. The data was collected during January of 2014.

	No.	%
Gender		
Male	105	50.0
Female	105	50.0
Age Mean=13.08 y (SD=2.9)		
9-12 years	103	49.0
13-15 years	51	24.3
16-18 years	56	26.7
Place of residence		
West Gaza city	70	33.3
East Gaza city	72	33.8
North Gaza	69	32.9
No of siblings		
Four and less	72	34.3
Five to seven siblings	91	43.3
Eight and more siblings	47	22.4
Family monthly income in US dollar		
Less than \$ 450	190	90.5
\$451-600	16	7.6
More than \$601	4	1.9

Table 1: Demographic characteristics of the study sample (N=210).

Measures

The traumatic events due to flood checklist: This checklist describing the most common traumatic experiences families could have faced in the Gaza Strip during the last storm and flood. The

checklist consisted of 11 items with “Yes” and “No” answer. In this study, the reliability and validity of the scale was calculated using Cronbach’s alpha was 0.62

Revised child impact of event scale⁹: Post-traumatic stress disorder (PTSD) symptoms were assessed by using the 13-item Children’s Revised Impact of Event Scale (CRIES-13). The CRIES-13 includes 4 items measuring intrusion, 4 items measuring avoidance and 5 new items measuring arousal.⁹ Items are scored on a non-linear scale as follows: 0 (not at all), 1 (rarely), 3 (sometimes) and 5 (often). Scores range from 0 to 65, and higher scores indicate more PTSD symptoms. The Arabic versions of CRIES-13 was used and showed high reliability.¹⁰ For this study, internal consistency for this scale using Cronbach’s alpha was 0.73.

Strengths and difficulties questionnaire (teachers, parents, self-report forms)¹¹: The Strengths and Difficulties Questionnaire (SDQ) is a brief behavioral screening questionnaire about 3-16 year olds. It exists in several versions to meet the needs of researchers, clinicians and educationalists. SDQ consists of 25 items, 14 describe perceived difficulties, 10 perceived strengths and one is neutral (‘gets on better with adults than with other children’). Each perceived difficulties item is scored on a 0-2 scale (not true, somewhat true, certainly true). Each perceived strengths item is scored in the reverse manner, i.e. 2: not true, 1: somewhat true, 0: certainly true. The 25 SDQ items are divided into scales of hyperactivity, hmotional problems, conduct problems, peer problems and prosocial scale (five items per scale). A score is calculated for each scale (range 0-10) and a total difficulties score for the four scales (excluding prosocial behavior, which was considered different from psychological difficulties), i.e. a range of 0-40. The SDQ has been previously used in 322 Arab children living in the Gaza Strip and was very promising as screening measure or rating scale in different cultural populations.¹² For this study, internal consistency for this scale using Cronbach’s alpha was 0.71.

STATISTICAL ANALYSIS

In this study, we used SPSS version 20 for data entry and analysis. Frequencies and percentages of trauma items and MHPs were calculated. Chi-Square for categorical variables was used, T-independent test, Analysis of variance (ANOVA) tests for between-group comparison of continuous variables. Pearson’s correlation coefficient tested the association between numbers of trauma scores, and mental health problems by children scores. Linear regression investigated the association between independent (traumatic events) and psychological problems as dependent variable. Pearson correlation coefficient test was conducted to investigate the relationship between trauma, PTSD, and other mental health problems.

RESULTS

Demographic Characteristics of the Study Sample

As shown in Table 1, the sample consisted of 210 children. The ages ranged from 9 to 18 years, with a mean of 13.05 years (SD=2.9). Regarding area of residence, 33.3% of children lived in west Gaza city, 33.8% of children live in East Gaza city and 32.9% of children live in North Gaza. Regarding family monthly income, 90.5% of families had income less than \$450, 7.6% of family income between \$451-600, 1.9% had a monthly income more than \$601.

Traumatic Events due to Winter Storm Experienced by Children

As shown in Table 2, children commonly reported traumatic event was complete destruction of home due to flood waters (94.8%).

Overall, children reported 0 to 11 traumatic events, with a mean=6.2 (SD=2.70). Mean traumatic experiences by boys was 5.98 (SD=2.79) and mean trauma for girls was 6.41

Traumatic event	Yes		No	
	No.	%	No.	%
1. Complete destruction of home due to flood waters	199	94.8	11	5.2
2. Family member/someone close injured	127	60.5	83	39.5
3. Partial Home destruction due to due to flood waters	77	36.7	133	63.3
4. Shortage of medicine due to inability of leaving home due to flood waters	72	34.3	138	65.7
5. Had to get out by boat	66	31.4	144	68.6
6. Forced to leave home and stayed in the superdome/convention center	61	29	149	71
7. Unable to get food and clean water due to flood waters	41	19.5	169	80.5
8. Lost the main source of income	39	18.6	171	81.4
9. Losing the properties due to flood waters	33	15.7	177	84.3
10. Trapped in house after the storm	21	10	189	90
11. Stopped going to school due to flood waters	1	0.5	209	99.5

Table 2: Reported traumatic event due to storm and flood waters (N=210).

($SD=2.61$). No statistically significant differences between boys and girls in total traumatic events ($t(208)=1.76, p=0.10$).

One-way ANOVA was performed to examine the difference in traumatic experiences and socio-demographic variables, in which the total traumatic events was entered as independent variable and other socio-demographic variables such as age, place of residence, and family monthly income, as dependent variables. Post-Hoc Tukey test showed that there were statistically significant differences in total traumatic events due to flood toward children living in East Gaza city area than children live in North Gaza and west Gaza city ($F(9,209)=3.57, p=0.02$). No statistically significant differences in reporting traumatic events and family monthly income or age of children.

Prevalence of PTSD

Using IES, the mean post-traumatic stress disorder was 28.82 ($SD=9.59$), mean intrusion symptoms was 7.4 ($SD=2.56$), mean avoidance symptoms was 10.08 ($SD=4.75$) and mean arousal symptoms was 11.33 ($SD=4.46$). Considering the previous cut-off point of 30 and above for IES-13, 47.6% of children were considered as PTSD.

In order to find differences in PTSD and subscales according to sex of children, Independent t test was done. Girls reported significantly more PTSD than boys (30.63 vs. 26.99) ($t(208) w=2.82, p=0.01$). Avoidance symptoms were significantly more in girls than boys (11.11 vs. 9.05) ($t(208)=3.22, p=0.001$). There no sex differences in reporting arousal and intrusion symptoms.

A one-way ANOVA was performed in which the total PTSD and subscales (intrusion, avoidance, and arousal) were entered as the independent variable as well as other socio-demographic variables such as age, and family monthly income as dependent variables. Post-Hoc test showed that there were statistically significant differences in total PTSD due to flood toward children with family income \$450 and less than the other groups ($F(9, 209)=9.48, p=0.001$).

Prevalence of General Mental Health Problems Using SDQ by Parents

Using SDQ for parents, 40% of children were rated as being

caseness (cut-off point=16-40), 18.6% (14-16) were borderline, and 41.4 (0-13) were normal, 24.3% of them were hyperactive (7-10), 51.9% had emotional problems (6-10), 46.2% had conduct problems (4-10), 55.7% had peer problems (5-10), and 2.9% had abnormal prosocial behavior (0-4) (Table 3).

Socio-Demographic Variables and SDQ-Rated by Parents

In order to find differences in total strengths and difficulties questionnaire and subscales (emotional, conduct, hyperactivity, prosocial behavior, and peer relationship) according to sex of children, Independent t test was done. No significant sex differences were found in mental health problems of children rated by parents.

One-way ANOVA was performed in which the total SDQ and subscales (emotional, conduct, hyperactivity, prosocial behavior, and peer relationship) was entered as dependent variable and other sociodemographic variables such as age, and family monthly income, and number of siblings. Post-Hoc test showed that there were no statistically significant differences in total SDQ and subscales and age, place of residence, and number of siblings.

Relationship between Trauma, PTSD, and Mental Health Problems

In order to find the relationships between the dependent and independent variables, Pearson correlation coefficient test was done. Total traumatic events were significantly correlated to post-traumatic stress reaction symptoms rated by Impact of events scale ($r=.12, p=0.01$), and correlated with intrusion symptoms ($r=.14, p=0.01$). No correlation between traumatic events and other mental health problems rated by SDQ. Post-traumatic stress reaction symptoms were correlated only with emotional problems rated by parents ($r=.16, p=0.01$) (Table 4).

Prediction of PTSD by Traumatic Events due to Storm

In a univariate linear regression analysis, each traumatic event of Alex storm was entered as an independent variable in a multiple regression model, with total PTSD scores as the dependent variable, 2 events were significantly associated with PTSD: had to get out by boat ($B=3.49, p=0.001$), and unable to get food and clean water due to flood waters boat ($B=3.96, p=0.002$) ($F=9.03$

Parents-report	Normal	Borderline	Abnormal
SDQ caseness parents	41.4 (0-13)	18.6 (14-16)	40.0 (17-40)
Conduct Problems	34.3(0-2)	19.5 (3)	46.2 (4-10)
Peer Problems	26.2 (0-2)	18.1 (3)	55.7 (4-10)
Prosocial behaviour	89.5 (6-10)	7.6 (5)	2.9 (0-4)
Emotional Problems	31.9(0-3)	16.2(4)	51.9 (5-10)
Hyperactivity	63.3 (0-5)	12.4 (6)	24.3 (7-10)

Table 3: Prevalence of general mental health problems using SDQ by parents.

	1	2	3	4	5	6	7	8	9	10
1. Total trauma										
2. Total PTSD	.12*									
3. Intrusion	.14*	.88**								
4. Avoidance	.05	.72**	.30**							
5. Arousal	.13	.88**	.99**	.30**						
6. Total Difficulties	-.10-	.13	.13	.06	.14*					
7. Emotional problems	-.12-	.16*	.14*	.11	.15*	.77**				
8. Conduct Problems	-.10-	.09	.09	.03	.11	.75**	.33**			
9. Hyperactivity	-.02-	.10	.10	.04	.10	.83**	.57**	.51**		
10. Prosocial behaviour	.08	.07	.03	.09	.03	-.45**	-.21**	-.38**	-.36**	
11. Peer problems	-.03-	.01	.02	-.01-	.03	.62**	.24**	.46**	.33**	-.45**

*p≤.05, **p≤.01, ***p≤.001

Table 4: Correlations between Trauma Exposure-Related to storm, PTSD Symptoms and Strengths and Difficulties.

p<0.001, R²=0.06).

Prediction of Children Mental Health by Traumatic Events

In a univariate linear regression analysis, each traumatic event of Alexa storm was entered as an independent variable in a multiple regression model, with total SDQ scores as the dependent variable, 2 events were significantly associated with SDQ: shortage of medicine due to inability of leaving home due to flood waters (B=3.49, p=0.03), and Family member/someone close injured (B=3.96, p<0.04) (F=5.2 p<0.001, R²=0.006).

DISCUSSION

The purpose of this study was to investigate the impact of winter Storm Alex on Palestinian children and adolescent's mental health. Palestinian children reported common storm related traumatic events such as: complete destruction of home due to flood waters (94.8%), family member/someone close were injured (60.5%), partial home destruction due to flood waters (36.7%), mean traumatic events was 6.2 events. Our study showed that there were no significant differences in exposure to traumatic events and other sociodemographic variables of children such as sex, number of siblings, and family monthly income. Disaster researchers considered exposure to loss and destruction in the immediate aftermath of the disaster to be an essential part of the traumatic experience.¹³ Loss of one's possessions or the destruction of one's community has the potential to seriously challenge a child's basic sense of safety and elicit the state of panic typically associated with traumatic exposure.¹³ In fact, existing research conceptualizes exposure to disasters as a multidimensional experience that involves both life threat and experiences of loss and destruction.^{14,15} Regardless of whether studies examine exposure as a composite measure that combines life threat, loss, and exposure to destruction^{16,17} or whether studies examine these dimensions of exposure separately¹⁸ findings across studies indicate a clear dose-response relationship: As exposure across these dimensions increases, emotional distress increases. This study showed that 47.6% of Palestinian children were

considered as PTSD. This study rate of PTSD was higher than a study of children examined the prevalence and predictors of PTSD symptoms in a sample of 533 students (aged 11 to 21), 28 months after the 1997 Flood in Southwestern Poland. The results showed that 18% of the participants met all diagnostic criteria for PTSD. PTSD criteria symptoms were positively correlated with the degree of exposure to trauma experienced during the disaster.¹⁶ Similarly, in study the prevalence of PTSD 436 students in the 4th-9th grade students in an affected school 23 months after tsunami showed that prevalence of PTSD was 15.1%.¹⁹

In this study, girls reported significantly more PTSD and avoidance symptoms than boys. Our finding were consistent with the study carried out one year after an earthquake in Taiwan showed a distinct division by age and gender in the prevalence of PTSD symptoms. Elementary school girls had more severe symptoms than junior high school boys.²⁰

Our study showed that mean scores of total difficulties score of the Strength and Difficulties was 15.07, while 40% of children fall in the abnormal Strength and Difficulties Questionnaire (SDQ)-Total Difficulties. Such results were consistent with previous studies using same instrument which showed that 42.7% of Palestinian children exposed to shelling in the Gaza Strip fall in the abnormal Strength and Difficulties Questionnaire.¹⁰ Rate of mental health problems using SDQ in this study were higher than found in study comparing the impact of a natural disaster versus a spate of communal riots that occurred in Gujarat, India. Children aged 8-15 years from highly exposed earthquake sites (n=128) and riot sites (n=171) were approached for participation. The study showed that the riots sample showed greater difficulties than the earthquake sample. Only 7.6% of the earthquake sample seemed to fall in the abnormal Strength and Difficulties Questionnaire (SDQ)-Total Difficulties score band in comparison to the 38.7% of riots group and significant differences between the 2 groups were detected.²¹ Such rate of MHPs in children was than rate found in another study using the SDQ, which showed that 59.9% of children rated themselves having psychiatric morbidity compared to 61.5% according to parents

report.²² Our study was inconsistent with Agampodi et al²³ study of mental health problems (MHPs) among adolescent school-children in Sri Lanka 8 months after the tsunami disaster found that of the total study sample, 11.0% (65) had abnormal scores and 21.2% (126) had borderline scores for the SDQ.²³ Our study showed no sex differences in total difficulties or subscales. This was inconsistent with study of children in the region of Antwerp (Belgium) which showed that girls scored higher than boys on the emotional scale according to parent ratings and self-report ratings, as well as on the prosocial behavior scale according to caregiver ratings. Girls scored lower than boys on the hyperactivity/inattention scale according to parent and caregiver ratings.²⁴

STUDY LIMITATIONS

The limited sample size of highly exposed groups and the use of a non-probabilistic sampling strategy both constitute major limitations to the present study. Also, in this study there no control group, due to continuous trauma in Gaza, it was difficult to have control groups with previous political trauma. Also another limitation was not knowing the premorbid conditions of the study sample.

IMPLICATIONS OF THE CURRENT STUDY

In summary, this study showed the effect of traumatic events due to natural disasters on children mental health. This study informs the need for policy initiatives that would allow for the treatment of individuals at risk of PTSD and other mental health problems. The intervention programs should incorporate personnel from both the mental health and education sectors of the society. Specifically, the collaborative effort of Ministry of Health combined with the mental health unit at the Ministry of Education should offer professional cognitive behavioral therapy interventions at the group and individual levels to at-risk adolescents as well as their families. From a community perspective, parents and teachers need to be sensitized in recognizing the symptoms associated with psychological trauma so that early intervention can be accessed.

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DISCLOSURE

No potential conflicts of interest were reported by the authors.

CONSENT

The patient has provided written permission for publication of the case details.

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