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The Relationship between Trauma due to Winter Storm Alexa, PTSD, Mental Health of Palestinians in the Gaza Strip

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Abstract

Aim: This study investigated the relationship between trauma due to winter storm Alexa, PTSD and other mental health problems of Palestinian in Gaza Strip. Method: The sample consisted of 105 males (50%) and 105 females (50%) selected from three of the most affected areas by flooding in 2014 due to Alexa storm in Gaza Strip. Participants age range was 20-65 years, with a mean age 40.88 (SD = 9.8), with a mean age of years. Mental health status was assessed by a sociodemographic scale, the Trauma Due to Flood Scale, PTSD scale, and General Health Questionnaire (28 items). Results: Mean traumatic events experienced were 7.8. There were no statistically significant differences between males and females in reporting traumatic events. Mean post-traumatic stress disorder was 18.65, re-experiences symptoms was 6.4, avoidance symptoms was 5.7 and mean arousal symptoms was 5.73.

The study showed that 34.8% reported full criteria of PTSD. There were no statistically significant differences in PTSD total scores and subscales and sex of participants. Mean GHQ-28 was 12.12, somatization mean was 3.21, anxiety was 3.31, social dysfunction was 3.34, and depression was 2.27, 91% of the participants were rated as psychiatric morbidity cases and need further investigation. Males significantly scored more in social dysfunction than females. Traumatic events were significantly correlated with PTSD and general mental health and all subscales. Conclusion and implications: This study has important implications for need of establishing and implementing psychosocial intervention programs for in the Gaza Strip not only for those victims of political violence but also for people exposed to other types of traumatic events such as natural disasters.

Keywords

flood, Gaza Strip, GHQ, PTSD, trauma

1. Introduction

In Gaza, where around two-thirds of the 1.7 million populations are classified by the United Nations as refugees dating from the 1948 war, serious flooding followed the first snowfall in around two decades in December 2013. Thousands of people evacuated from their homes were sheltering in schools as the Gaza health ministry declared a state of “extreme emergency”. Heavy snowfalls, torrential rain and icy winds have caused havoc, bringing down power lines, blocking roads and trapping people in homes and cars in.

Authorities said the storm, named Alexa, was the worst to hit the city for 60 years. Raw sewage mixed with flood waters was increasing the risk of disease. Gaza has been unable to pump sewage for more than a month, as power plants have shut down for lack of fuel. The fuel shortages—which were causing daily power cuts of 12-16 hours even before the crisis caused by storm Alexa—are mainly a result of closure of Gaza Strip borders. 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 percent 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 (UN Relief Works Agency (UNRWA), 2013, http://www.unrwa.org/what-we-do/gaza-strip-emergency).

Disaster survivors are at risk of developing chronic posttraumatic stress disorder (PTSD; American Psychiatric Association [APA], 2013), which can persist for several years. The disorder most commonly found in people exposed to natural disasters is Post-Traumatic Stress Disorder (PTSD) (Breslau et al., 2002; Norris, 2005). The symptoms include trauma re-experiencing, emotional numbing and/or avoidance and exaggerated arousal (American Psychiatric Association, 2000). Exposure alone however does not fully explain the onset of PTSD as many individuals do not develop such symptoms. Indeed, events are not inherently "traumatic", but may be appraised as such. Research suggests that the type of disaster (e.g., flood, earthquake, fire) is not crucial in determining the psychological outcomes in those exposed to these events. Galea et al. (2005) reviewed the literature on disaster-related PTSD and found that the prevalence rates varied from 5 to 60% in the first 1-2 years following disaster, although most studies report prevalence rates in the lower half of this range. Studies of flooding in the UK have also found considerable psychological trauma in this population (Reacher et al., 2004; Tapsell et al., 2003). Exposure to post-disaster stressors also appears to impact upon the psychological health of people exposed to events, for example lack of water, sanitation, electricity, adversity in housing reconstruction, were associated with an increased risk of developing PTSD following hurricane Katrina (Galea et al., 2008; Tunstall et al., 2006). Furthermore, there is also evidence to suggest that depression and anxiety are common sequelae of natural disasters. Norris (2005) found that depression was the second most commonly found disorder among people exposed to disaster after PTSD. Prevalence estimates for depression after disasters also vary widely. It is likely that the same sampling and methodological issues that affect prevalence rates for PTSD affect estimates of prevalence rates of depression. In a review of psychological sequelae following disasters, the third most common psychological consequence was anxiety (Norris et al., 2002). In particular, generalized anxiety disorder is diagnosed in higher than normal rates in people exposed to disasters, and self-report anxiety is higher than in controls (Norris, 2005). In Bangladesh, a study of flood-related mental health effects found higher household income and better employment predicted better access to food and water, resulting in better coping post-flood. Similarly, higher educational achievement allowed better access to pre-flood warnings, decreasing

vulnerability and increasing coping capacity. However, prolonged flooding with higher water levels and household location in closer proximity to riverbanks caused increased external stressors and decreased coping post-flood (Paul & Routray, 2010). Mason et al. (2010) in a cross-sectional study investigated symptoms of distress following extensive flooding in the UK. Almost a third (27.9%) of participants scored over the threshold to be classified as potentially meeting criteria for PTSD. On the HSCL anxiety scale, a quarter (24.5%) of participants scored over the threshold to be classified as potentially meeting criteria for psychiatric disorder, and on the depression scale over a third (35.1%). In their study Chen et al. (2015), of a sample of 528 migrant workers 4 years after the 2008 snowstorm in China, Changsha, the capital of Hunan Province, the rate of PTSD was 17.4%.

In the last decades we studied the impact of trauma due to war and continue conflict which showed the cause relationship between trauma due to war and other types of violence and PTSD, depression and anxiety (Thabet et al., 2008, 2015). The aim of this was to investigate the relationship between trauma due to winter storm Alexa, PTSD and mental health problems of Palestinians in Gaza Strip.

2. Method

2.1 Participants

This study was conducted in three of the most affected areas by flooding due to Alex storm in 2014 in the Gaza Strip. The sample consisted of 105 males (50%) and 105 females (50%) (Table 1). According to the selection criteria, the age range was 20-65 years, with a mean age 40.88 (*SD* = 9.8). Participants were approached until 210 agreed to participate, which was a convenience sample. Data collection was carried out by four 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.

2.2 Measures

2.2.1 The Traumatic Events due to Flood Checklist

Based on the DSM-IV A1criteria and previous studies on similar disasters 11 questions of objective flood exposure were developed (Acierno et al., 2004). Furthermore, focus group of 10 professionals who assessed the damage of the houses during the flood were consulted for the most common exposure events people reported to them. Later on this checklist was send to panel of experts in the field of trauma and they agreed on the items of trauma list. 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.

2.2.2 The Posttraumatic Stress Disorder Checklist (DSM-IV)

The checklist contains 17 items adapted from the DSM-IV (APA, 2000) PTSD symptom criteria. Respondents are asked to rate on a 5-point Likert scale (0 = not at all to 4 = extremely) the extent to which symptoms troubled them in the previous month. A total score was provided, as well as subscales

scores for re-experiences, arousal and avoidance PTSD symptoms. The characteristic symptoms of PTSD resulting from the exposure to extreme traumata included re-experiencing the traumatic event (criterion B), avoidance of stimuli associated with the trauma and numbing of general responsiveness (criterion C), and symptoms of increased arousal (criterion D). The full symptom picture must be present for more than one month and the disturbance must cause clinically significant distress or impairment in social, occupational, or other important areas of functioning (American Psychiatric Association, 2000). We used the Arabic version of the scale which was widely used in the same area in the last decade (Thabet et al., 2008, 2015). The reliability and validity of the scale was calculated using alpha Cronbach which was (a = 0.87).

2.2.3 General Health Questionnaire (GHQ-28) (Goldberg & Bridges, 1987)

Mental health ratings were based on the General Health Questionnaire (GHQ-28). It covers severe depression and suicidal risk, anxiety and insomnia, social dysfunction, and somatic symptoms (59). Emphasis is on changes in condition, so items compare the present mental state to the person's normal mental health status. GHQ-28 scores above the cut-off of 4/5 are considered to be possible psychiatric "cases". This scale had been validated in Arabic culture and showed reliability and validity. The internal consistency of the scale calculated using Cronbach's alpha, was α = 0.91 and split half was 0.88 (Thabet et al., 2005). In this study the Cronbach's alpha was α = 0.82.

3. Statistical Analysis

All analyses were carried out using Statistical Package for the Social Sciences SPSS ver. 20 for data entry and analysis. Frequencies and percentages of trauma items and psychological symptoms were calculated. Chi Square for categorical variables was used, T- independent test, 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 scores. Linear regression investigated the association between independent (traumatic events) and PTSD and GHQ-28 as dependent variable was conducted to find the predictor factors of trauma.

4. Results

4.1 Demographic Characteristics

As shown in table one, the sample consisted of 210 participants. According to the selection criteria, the age range was 20-65 years, with a mean age 40.88 years (*SD* = 9.8). Regarding area of residence, 33.3 % live in west Gaza city, 33.8 % live in east Gaza city and 32.9 % 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.

Table 1. Sociodemographic Information of the Study Sample (N = 210)

	No.	%
Gender		
Male	105	50.0
Female	105	50.0
Age Mean = 40.88 (SD = 9.8)		
Place of residence		
West Gaza city	70	33.3
East Gaza city	72	33.8
North Gaza	69	32.9
No of siblings		
4 and less	72	34.3
5-7	91	43.3
8 and more	47	22.4
Family monthly income		
Less than $450	190	90.5
$451-600	16	7.6
More than $601	4	1.9

4.2 Traumatic Events Experienced

The most common reported traumatic events were: 98% reported that they stopped going to their work, 91% were trapped in house, 87.6% lost the properties due to floodwaters, 84% lost the main source of income.

Table 2. Traumatic Event due to Storm and Flood Waters (N = 210)

	Yes		No	
Traumatic events	No.	%	No.	%
1. Stopped going to work	205	98	4	2
2. Trapped in house	192	91	18	9
3. Losing the properties due to flood waters	184	87.6	26	12.4
4. Lost the main source of income	177	84	33	16
5. Unable to get food and clean water	175	83	35	17
6. Shortage of medicine due to inability of leaving home	151	72	59	28
7. Forced to leave home and stayed in the superdome/convention center	150	71	60	29

8. Had to get out by boat	148	70	62	30
9. Partial home destruction	140	66.7	70	33.3
10. Family member/someone close injured	93	45	117	56
11. Complete destruction home	22	10	188	90

4.3 Mean Traumatic Events and Sex Differences

Palestinians experiences variety of traumatic events due to Alexa storm, the traumatic events ranged from 1-11, total number of traumatic events experienced by each participants was 7.80 events (*SD* = 2.02). The results showed that mean traumatic events reported by males was 7.78 (*SD* = 2.05) compared to mean in female = 7.81 (*SD* = 2.06). There were no statistically significant differences between males and females in reporting traumatic events (t (210) = -0.62, p = 0.52).

4.4 Prevalence of PTSD and Subscales

Using PTSD scale, the mean post-traumatic stress disorder was 18.65 (*SD* = 7.1), mean re-experiences symptoms was 6.4 (*SD* = 2.63), mean avoidance symptoms was 5.7 (*SD* = 2.68) and mean arousal symptoms was 5.73 (*SD* = 2.67).

Using scoring of DSM-IV of one re-experiences symptom, three avoidance, and two arousal symptoms, 22.4% of the sample reported no PTS symptoms, 14.3% reported one criteria (B or C or D), 28.6% reported partial PTSD (C and B, C and D, B and D), and 34.8% reported full criteria of PTSD. There were no statistically significant differences in PTSD total scores and subscales and sex of participants.

One Way ANOVA was performed in which the total PTSD and subscales (re-experiences, avoidance and arousal) were entered as the independent variable as well as other sociodemographic variables such family monthly income as dependent variables. Post Hoc test showed that there were no statistically significant differences in total PTSD due to flood and family monthly income.

4.5 Prevalence of Mental Health Problems (GHQ-28)

The study showed than mean GHQ-28 was 12.12 (*SD* = 7.51), somatization mean was 3.21 (*SD* = 2.44), anxiety mean was 3.31 (*SD* = 2.43), social dysfunction mean was 3.34 (*SD* = 2.41), and depression mean was 2.27 (*SD* = 2.12). Using the previous cut-off point of the GHQ-28 (4/5), the result showed that 91% of the participants were rated as psychiatric morbidity cases and need further investigation, while 9% were not cases. The results showed that males significantly scored more in social dysfunction than females (Mean = 3.55 vs. 2.98) (t = 2.32, p = 0.02). No significant sex differences in other subscales of GHQ-28 were found.

4.6 Relationships between Trauma, PTSD and General Mental Health

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 total GHQ total scores (r = .34, p = 0.01), somatic symptoms (r = .30, p = 0.01), anxiety and insomnia (r = .26, p = 0.01), social dysfunction (r = .30, p = 0.01), and severe depression (r = .24, p = 0.01). In addition, traumatic events were correlated to total PTS (r = .40, p = 0.01), with re-experiences symptoms (r = .38, p =

0.01), avoidance (r = .36, p = 0.01), and arousal (r = .29, p = 0.01).

Table 3. Correlations between Trauma Exposure-Related to Storm, PTSD Symptoms and GHQ

	1	2	3	4	5	6	7	8	9
1. Total trauma	1.00								
2. Total GHQ	.34**	1.00							
3. Somatic Symptoms	.30**	.76**	1.00						
4. Anxiety and Insomnia	.26**	.79**	.44**	1.00					
5. Social Dysfunction	.30**	.76**	1.00**	.44**	1.00				
6. Severe Depression	.24**	.72**	.43**	.33**	.43**	1.00			
7. Total PTSD	.40**	.67**	.52**	.45**	.52**	.55**	1.00		
8. Re-experiences	.38**	.56**	.40**	.45**	.40**	.38**	.84**	1.00	
9. Avoidance	.36**	.55**	.45**	.34**	.45**	.47**	.86**	.60**	1.00
10. Arousal	.29**	.62**	.49**	.40**	.49**	.53**	.85**	.60**	.59**

4.7 Prediction of PTSD by Traumatic Events due to Storm

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 PTSD scores as the dependent variable, three traumatic events were significantly associated with PTSD: family member/someone close injured (B = 3.92, p = 0.01), lost the main source of income (B = 5.14, p = 0.001), and forced to leave home and stayed in the superdome/convention center (B = 3.02, p = 0.002) (F = 19.23, p < 0.001, R^2 = 0.17).

Table 4. Linear Regression Analysis for Predictor Variables of Trauma for the PTSD

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
Family member/someone close injured	3.928	.893	.275	4.399	.001	2.167	5.689
Lost the main source of income	5.140	1.211	.264	4.245	.001	2.753	7.528
Forced to leave home and Stayed in the evacuation center	3.021	.976	.193	3.097	.002	1.098	4.945

4.8 Prediction of General 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 GHQ scores as the dependent variable, three events were significantly associated with GHQ: family member/someone close injured (B = 2.70, p = 0.01), partial home destruction due to flood waters (B = 2.59, p = 0.01), and lost the main source of income (B = 2.55, p = 0.01) (F = 12.3, $p < 0.001$, R^2 = 0.15).

Table 5. Linear Regression Analysis for Predictor Variables of Trauma for the GHQ

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
Family member/someone close injured	3.612	0.959	0.244	3.767	0.001	1.722	5.503
Partial home destruction due to due to flood waters	2.707	1.042	0.174	2.598	0.01	0.653	4.762
Lost the main source of income	3.463	1.354	0.172	2.557	0.01	0.793	6.134

5. Discussion

The study aimed to find the relationship between trauma due to winter storm Alexa, PTSD and mental health problems of Palestinians in Gaza Strip. This study showed that 34.8% of participants reported full criteria of PTSD. This high prevalence rates identified in the present study may be questioned. Indeed, it is possible that methodological issues affected upon the rates found. For example, questionnaires were only sent to flood-affected households; therefore, we can assume that only those directly affected by the floods were assessed. We can expect these individuals to have lower prevalence rates than those found in the study impact of war on Gaza Strip in which showed that 66.6% rated as PTSD and 90.9% were rated as cases according to GHQ-28 and need further investigation (Thabet et al., 2013) and higher prevalence rates in general population sample following a disaster (Neria et al., 2008; Reacher et al., 2004). In another survey of adults who lived in the Gulf Coast region at the time of the storm, and found that the prevalence of probable mild/moderate or serious mental illness barely declined from 44.3% between 4 and 7 months after the hurricane to 41.8% a year later (Kessler et al., 2008). Paxson et al. (2011) in a longitudinal surveys of 532 low-income mothers from New Orleans were conducted approximately one year before, 7-19 months after, and 43-54 months after Hurricane Katrina, found nearly 30% had levels of psychological distress high enough to indicate probable mental

illness. Symptoms of PTSD have also declined but remain high: the fraction of the sample with scores suggesting probable post-traumatic stress disorder was 33% between 43 and 54 months after the hurricane. In many previous studies, it is not possible to be sure whether only those directly affected were studied (Neria et al., 2008). Our high prevalence rate of PTSD could be due to the use of self-report methodology and that only those individuals who were most distressed and affected by the flood and its aftermath completed and returned the questionnaire. Our study found that participant exposed to flooding was associated with increased risk of psychological sequelae such as PTSD, anxiety, and depression according to GHQ. Our study was only targeted people exposed to this natural disaster and we excluded other previous traumatic events due to wars on Gaza. Our study found that there were common traumatic events, which predicted PTSD and other mental health problems such as family member/someone close injured, lost the main source of income, and forced to leave home and stayed in the evacuation center. Previous research in this field has found that both degree of exposure (e.g., Neria et al., 2008; Norris et al., 2002; Vernberg et al., 1996) and relocation (e.g., Acierno et al., 2007; Bland et al., 1996; Galea et al., 2005; Yzermans et al., 2005) are associated with an increased risk of poor psychological outcomes. Similarly, in the UK, Tunstall et al. (2006) found that the degree of flooding was a predictor for psychological distress. This study rate of PTSD was higher than found by Uttervall et al. (2014) in study of Swedish adolescents aged 16-19 years, who had experienced the 2004 tsunami and participated in a follow-up study 19 months' post-disaster females seemed to a higher extent than males to suffer from mental health problems after the tsunami disaster, 26.9% compared with 17.3% for males. In other area of disaster, such PTSD rate in Palestinian adults victims of flooding was less than found by Cofini et al. (2015) in study of aimed to investigate the prevalence of Post Traumatic Stress Disorder (PTSD) in 281 people aged living in temporary housing after the earthquake who had left their damaged homes and were still living in temporary housing more than a year after the April 2009 L'Aquila (Italy) earthquake. The prevalence of PTSD was 43%. Women and the non-employed were more vulnerable to PTSD, while, age and level of education were not associated with PTSD.

5.1 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, another limitation of this study was not using control group, but to due to continuous trauma in Gaza, it was difficult to have control groups with previous political trauma.

5.2 Implications of the Current Study

In summary, this study not only supports the findings of the body of research as it relates to traumatic experiences in victims of natural disasters such as hurricanes and flooding, but also has serious implications for establishing and implementation of different psychosocial intervention programs for the adults in Gaza Strip. Such programs should concentrate on helping people to develop coping strategies in face of continuous trauma and conflict and increase their awareness about the post disaster

psychological reactions and ways of dealing with such reactions. 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 not only due to war and conflict but also due to community violence and natural disasters.

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