Somatization and Psychiatric Symptoms among Hospital Nurses Exposed to War Stressors

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ABSTRACT

Objective: Research regarding nurses' reactions during armed conflict is scarce. The current study compared somatization and psychiatric symptoms of exposed and unexposed hospital nurses in two studies.

Method: Two studies were conducted during 2009 and included a survey of two random samples of hospital nurses (exposed vs. unexposed), one conducted during the Gaza War, and the other conducted six months later. The design was repeated cross-sectional study.

Results: In Study 1, exposed nurses had higher level of PTSD symptoms, depressive symptoms and psychosomatic symptoms. In Study 2, exposed nurses did not differ from unexposed nurses in the level of PTSD symptoms and depressive symptoms. However, in Study 2, unexposed nurses reported a higher level of psychosomatic symptoms (10.68 vs 5.62) compared to the exposed group. Moreover, multivariate analysis of covariance revealed a significant interaction effect of Exposure X Study ($F = 12.838$; $p < 0.001$; $\eta p2 = .076$; Observed power = 0.945) for somatization.

Conclusions: These results are in line with Selye's general adaptation syndrome and the allostatic model. This may suggest that nurses exposed to continuous severe stress that ended and then returned from the exhaustion phase back to daily work stress may have undergone an oscillation period (distress to Eustress).

INTRODUCTION

Nurses who practice in general hospitals face heavy workloads, occupational stress, ethical dilemmas, and conflicting demands as part of their everyday life (1). These may result in psychological stress, psychiatric morbidity and psychosomatic symptoms (1, 2). While these stressful conditions are well studied in general hospitals, less is known when nurses are exposed to continuous severe stress. However, on some uncommon occasions, hospital personnel were exposed to extreme conditions and stress due to the treatment of terror victims (3, 4), and being exposed to harsh conditions and mass victims of natural disaster such as Haiti's earthquake in 2010 (5). Not much is known about hospital personnel in the midst of direct exposure to war-related stress and in its aftermath. Studies on hospital personnel during war add another important factor to the above extreme conditions by its immediate threat to life and the life of colleagues (6, 7). These studies have shown that there was an increase in the level of post-traumatic stress disorder (PTSD) symptoms and depressive symptoms along with significant comorbidity of PTSD symptoms and depressive symptoms. This extreme situation led to extreme workload and stress on hospital personnel due to overwhelming mass of casualties and severe injuries, while the hospital itself was targeted by rockets and missiles. Another important factor that is not widely measured among hospital personnel is somatic symptoms. Previous studies found an association between stress and somatization (8-10). Somatization is the tendency to experience and communicate psychological distress in the form of physical symptoms (11). Based on the above, there is rationale to investigate somatization among hospital personnel who work under extreme circumstances (e.g., working in an unsheltered hospital targeted by rockets during war).

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Moreover, the potential for impairment in functioning as a result of the psychosomatic symptoms in the context of extreme stress is understudied among nurses. This is important as nurses conduct important tasks that can be fatal if conducted incorrectly.

In the current study, we compared the psychosomatic symptoms and psychiatric symptoms (PTSD symptoms and depressive symptoms) of randomly sampled hospital personnel directly exposed to war-related stress during the Gaza War to those of unexposed hospital personnel. This comparison was conducted on two occasions; the first sampling took place three weeks after the beginning of the war (when the war was still raging; Study 1) and the second took place six months after the end of the war (Study 2). The current study encompassed more factors than previous research (3, 4, 6, 7, 12, 13), including additional background characteristics, and markers of psychosocial functioning. These additional factors gave us a broader scope of the mental state of exposed hospital personnel.

The conceptual theory for this study was derived from Selye's general adaptation syndrome (GAS) (14, 15). The general adaptation syndrome has three stages. Stage one - alarm. The stressor is perceived as threat and lead to stress reactions. These reactions involve arousal of sympathetic nervous systems, hormonal system via the hypothalamic-pituitary-adrenal (HPA) axis and along with cortisol secretion. Stage two – resistance. When the stressor continues, the person endeavors to cope with the stress. This process is energy depleting and the adaptation to stress is temporary. Stage three – exhaustion. When the body resources are depleted, there is a decline in functioning due to the inability to cope with the stress. The longer stage three takes, the more severe the consequences will be. Manifestations of both psychological and physiological symptoms may appear. These may lead to physical and mental disorders. Another conceptual theory relevant to this study is the allostasis model (16). This model postulates that homeostasis is the regulation of the body to a balance. However, allostasis proposes maintenance of stability outside of the normal homeostatic range where the organism will adapt to chronic demands. This has both protective and damaging effects on the body. In the short run, allostasis is essential for adaptation, maintain of homeostasis, and survival. Yet, over time there is an allostatic load that will have both mental and physical toll. Studies showed that job stress among nurses is related to the GAS model and the allostatic load model (17-21).

Based on previous research, we derived the following hypotheses: First, according to Seyle's GAS model, nurses exposed to prolonged severe stress will be more exhausted and strained, meaning they will exhibit higher level of psychosomatic symptoms and psychiatric symptoms (depressive and PTSD symptoms) in comparison to nurses who were not exposed to severe stress. Secondly, based on Seyle's GAS model, it is expected that when the prolonged and severe stress will cease, nurses who were previously exposed, will show similar level of psychiatric and psychosomatic symptoms compared with those who were not exposed.

METHOD

EVENT

On 28 December 2008, an armed conflict erupted between Israel and Gaza. During the war more than 750 rockets

Table 1. *Demographic and dependent variables for Study 1 and Study 2*

	Study 1 (During Gaza War)				Study 2 (Six Months After the Gaza War)			
	Exposed Group (n=46)	Unexposed Group (n=41)	Test Statistics	P Value	Exposed Group (n=45)	Unexposed Group (n=31)	Test Statistics	P Value
Age, years (SD)	38.37 (9.55)	38.29 (9.17)	t= 0.037	P = 0.970	38.98 (10.04)	39.39 (9.92)	t= -0.176	P = 0.861
Gender, Women, No. (%)	41 (89.1)	37 (90.2)	χ^2 = 0.169	P = 0.866	42 (93.3)	29 (93.5)	χ^2 = 0.037	P = 0.971
Marital status, Married, No. (%)	36 (78.3)	24 (58.6)	χ^2 = 3.895	P = 0.048	26 (57.8)	24 (77.4)	χ^2 = 3.105	P = 0.078
Income, No. (%) Below average Average Above average	 28 (60.9) 13 (28.2) 5 (10.9)	 15 (36.6) 21 (51.2) 5 (12.2)	χ^2 = 1.965	P = 0.049	 16 (35.6) 18 (40.0) 11 (24.4)	 15 (48.4) 11 (35.5) 5 (16.1)	χ^2 = 1.192	P = 0.233
IES-R Score, mean (SD)	26.28 (12.68)	16.93 (14.43)	t = 3.220	P = 0.020	21.00 (13.89)	16.00 (11.86)	t = 1.635	P = 0.106
CES-D Score, mean (SD)	17.22 (7.46)	13.78 (7.71)	t = 2.112	P = 0.038	13.27 (6.84)	13.61 (8.11)	t = --0.201	P = 0.841
PSP Score, mean (SD)	11.24 (7.21)	7.37 (7.21)	t= 2.501	P = 0.014	5.62 (6.75)	10.68 (8.93)	t= -2.810	P = 0.006

Abbreviations: IES-R, Impact of Event Scale – Revised; CES-D, Center Epidemiologic Studies Depression; PSP, Psychosomatic Problems Scale

were launched into southern Israel, approximately 100 of which targeted the city of Ashkelon. During this time, the unsheltered Barzilai Medical Center in Ashkelon treated 616 people (193 Israeli soldiers, and 423 Israeli and Palestinian civilians) admitted as a result of the armed conflict while under direct rocket attack. Apart from southern Israel, the rest of the country was not within missile range.

DESIGN

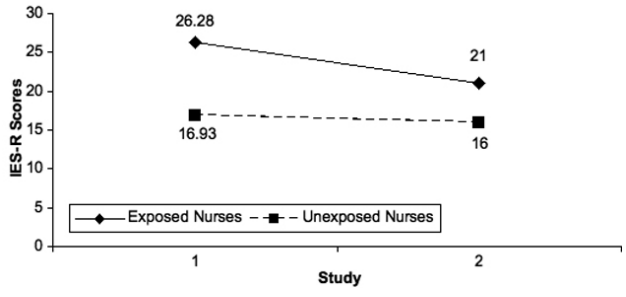
Two studies were conducted in different periods, thus forming a repeated cross-sectional design. The first study took place three weeks after the beginning of the war while the war was still raging (Study 1); the second study took place six months after the end of the war (Study 2).

PARTICIPANTS

Two studies with separate groups of participants were conducted. In Study 1, participants were comprised of hospital personnel selected at random from two hospitals during the week of January 12-15, 2009 (three weeks after the war began). The response rate in our study was 85% at Barzilai Medical Center (exposed) and 90% at Sourasky Medical Center (unexposed). Those who declined were asked about their reasons for refusal. A lack of time was the most frequent reason given for not participating. The two hospitals were the Barzilai Medical Center in Ashkelon (exposed nurses group; N = 46) and the Sourasky Medical Center in Tel Aviv (Unexposed nurses group; N = 41). Only participants who volunteered and gave their consent were interviewed.

In Study 2, participants were nurses randomly selected from the same two hospitals during the week of July 19-22, 2009, six months after the war ended. The response rate was 82% at Barzilai Medical Center (previously-exposed nurses; N = 45) and 87% at Sourasky Medical Center (unexposed; N = 31). The participants in Study 2 were not the same participants as in study 1 (i.e., exposed during the war but did not participate in Study 1). Exposed nurses and their families (in both Study 1 and Study 2) resided in the greater Ashkelon area, while the unexposed nurses and their families resided in the greater Tel Aviv area. Nurses from Barzilai Medical Center in both studies worked there during the war and were exposed to direct rocket attacks. Nurses in Study 1 did not participate in Study 2, thus rendering each study independent. Each participant who consented was interviewed in person and guaranteed complete anonymity.

Figure 1. *PTSD symptoms among exposed and unexposed nurses in Study 1 and Study 2*



INSTRUMENTS

INDEPENDENT VARIABLES

The instruments used in both studies were identical for the purpose of replication. Each participant was interviewed for background characteristics (age, gender, marital status, income). The following demographic variables were coded as following: Gender (1 = men; 2= women), marital status (1 = not married; 2 = married), and income (1 = below average; 2 = average; 3 = above average). War-related exposure was coded as (1 = unexposed, Sourasky Medical Center; 2 = exposed, Barzilai Medical Center).

Figure 2. *Depressive symptoms among exposed and unexposed nurses in Study 1 and Study 2*

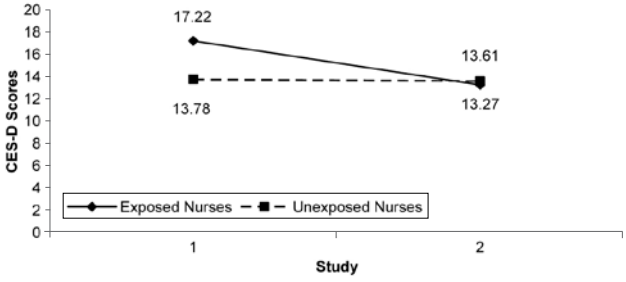
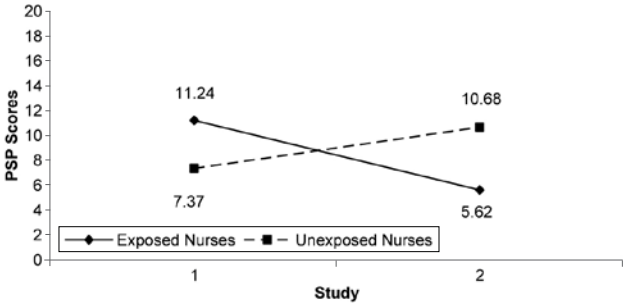


Figure 3. *Psychosomatic symptoms among exposed and unexposed nurses in Study 1 and Study 2*



DEPENDENT VARIABLE

Post-traumatic stress disorder symptoms were assessed by the impact of event scale-revised (IES-R) (22), which includes 22 items in three subscales (intrusion, avoidance, and hyperarousal). Respondents were asked to rate each item on a Likert scale of 0–4 (0 = not at all, 1 = a little bit, 2 = moderately, 3 = quite a bit, and 4 = extremely) while referring to the past seven days. The possible range for IES-R score is between 0 and 88. Internal reliability was excellent (Cronbach α = .913 and .918 for Study 1 and Study 2, respectively).

Depressive symptoms were assessed by the center for epidemiologic studies depression scale (CES-D) (23), which includes 20 items representing four subscales of depressive symptomatology (negative affect, positive affect, somatic symptoms, and interpersonal problems). Respondents were asked to rate each item on a Likert scale of 0–3 (0 = not at all, 1 = sometimes, 2 = most of the time, 3 = all the time) while referring to the past seven days. The possible range for a CES-D score is between 0 and 60. Internal reliability was very good (Cronbach α = .836 and .829 for Study 1 and Study 2, respectively).

Psychosomatic symptoms were measured by the Psychosomatic Problems Scale (PSP) (24). The PSP is an eight-item scale and it is scored by summation of responses (raw scores) across the following eight items: "had difficulty in concentrating," "had difficulty in sleeping," "suffered from headaches," "suffered from stomach aches," "felt tense," "had little appetite," "felt sad" and "felt giddy." The response categories for all of these items, which are in the form of questions, are (0 = never, 1 = seldom, 2 = sometimes, 3 = often, 4 = very often). The categories are ordered in terms of implied frequency in the past week and the greater the frequency, the greater the psychosomatic distress. Justification of the scoring procedure was examined by psychometric analysis using the Rasch model (9). Cronbach's alpha coefficient was .932 and .953 for Study 1 and 2 respectively.

STATISTICAL ANALYSIS

In both studies the two groups (exposed vs. unexposed) were compared for psychosomatic symptoms using t-tests. Following the basic examination, changes in psychosomatic symptoms in each group were examined (Study 1 vs. Study 2 for the exposed and unexposed groups respectively) using t-tests. Multivariate analysis of covariance (MANCOVA) was then conducted, with the IES-R, CES-D, and PSP scores as the dependent variable. The independent variables were exposure to war-related stress (exposed vs. unexposed) and study (Study 1 vs. Study 2). The covariates were background demographics (age, gender, marital status, income). The MANCOVA included effect size estimates (partial eta square). All analyses were performed using SPSS statistical software (version 16.0, SPSS Inc, Chicago, IL).

RESULTS

Comparison of exposed and unexposed nurses

In Study 1, the two groups differ in the background demographics marital status and income. Nurses in the exposed group had higher proportion of being married ($\chi^2 = 3.895$; P = 0.048) and lower income ($\chi^2 = 1.965$; P = 0.049) in comparison to nurses in the unexposed group. In Study 1, There was a significant differences in the level of PTSD symptoms (t = 3.220; p= 0.002), depressive symptoms (t = 2.112; p = 0.038) and psychosomatic symptoms (t = 2.501; p = 0.014) between the exposed and unexposed group showing more symptoms among nurses in the exposed group.

In Study 2, nurses in the previously exposed group had lower level of psychosomatic symptoms in comparison to nurses in the unexposed group (t= -2.810; p = 0.006).

Comparison between studies

Nurses in the exposed group in Study 1 had higher depressive and psychosomatic symptoms in comparison to nurses in the previously exposed group in Study 2 (t = 2.632; p = 0.010) and psychosomatic symptoms (t = 3.835; p <0.001). No differences were found between Study 1 and Study 2 for nurses in the unexposed group.

The MANCOVA revealed an interaction effect of Exposure X study for psychosomatic symptoms (F = 12.838; p < 0.001; η_p^2 = .076; Observed power = 0.945). In Study 1, nurses in the exposed group had higher psychosomatic symptoms during exposure to severe stress (Gaza War) than the unexposed nurses group. This tendency was inverted in Study 2, in which nurses in the previously exposed group had lower level of psychosomatic symptoms in comparison to the unexposed group. Another main effect was found, exposure to war related stress (F = 11.589; p = 0.001; η_p^2 = .070; Observed power = 0.915). Nurses in the exposed group and previously exposed group had higher level of PTSD symptoms in comparison to the unexposed group.

DISCUSSION

The results suggest that exposure to severe stress takes its toll on nurses by increasing the level of psychiatric and

psychosomatic symptoms. In line with our first hypothesis, exposure to prolong and extreme stress does exhaust the nurses as predicted by Selye's GAS model (14-17). This should not be surprising as nurses are strained and pressured in their daily work. Nurses conduct medical procedures with accuracy as part of their medical profession. Additionally, they tend the ill and the wounded with empathy and sympathy and maintain close relations with the patients. This emotional task is part of the profession. However, in times of prolonged extreme stress (with immediate threat to life of oneself, family, colleagues, and patients), the combination of physical and psychological burdens depletes the nurses' resources rapidly. This is also in line with other studies which measured nurses during time of war, and found that nurses were more vulnerable than physicians (6, 7). The explanation given by the researchers was that hospital physicians, contrary to nurses, are firmer with their patients as part of their profession due to time constraints. Having less psychological burden and emotional investment in forms of empathy and sympathy may lead to lower level of emotional distress. This is in line with the fact that physicians tend to use more detachment coping mechanisms contrary to nurses (6, 7). Our second hypothesis was partially confirmed. The results revealed that six months after the end of the war, the nurses in the exposed hospital had similar levels of psychiatric symptoms (i.e., PTSD symptoms and depressive symptoms). This is in line with Selye's GAS model and the Allostatic model that when the stressor is absent, no reservoirs are depleted and the person functions within daily life parameters. However, we found surprising results regarding psychosomatic symptoms. Ending the prolonged and severe stress led to an oscillation period, meaning moving from distress to Eustress (15). Psychosomatic symptoms that are related to biological factors (activation of the HPA axis as function of exposure level) have been reduced dramatically when compared to the unexposed nurses group. One explanation for these unexpected results may be related to the difference between psychosomatic symptoms and psychiatric symptoms. While psychosomatic symptoms are directly related to biological factors (autonomic nervous and endocrine systems), psychiatric symptoms are involved in more complex brain activities. These were reduced to a lesser extent and did not exhibit an oscillation period. Theses symptoms are mediated via more complex cortical systems and thus indirectly related. In sum, the exposure to severe stress will affect both psychosomatic symptoms and psychiatric symptoms alike. However, when the prolonged severe stress will come to an end, there will be a different pattern between psychosomatic symptoms and psychiatric symptoms. Both have been reduced, whereas psychosomatic symptoms have been reduced more saliently.

The current study has several limitations: First and foremost, the small number of nurses that participated in the study. Due to the emergency condition, it was extremely difficult to find and interview nurses. This problem is reported in other studies (5-7). The second limitation is that no longitudinal study was conducted due to the need for anonymity, specifically requested by the study participants. However, the use of random sampling in the two studies may have reduced this limitation to some extent. Indeed, participants in Study 1 and Study 2 did not differ in their demographic background. Moreover, the fact that exposed nurses had similar exposure histories (all exposed nurses in both studies were working at the hospital during the war) may also lend strength to this study's conclusions. The third limitation is that no actual psychiatric diagnosis was made. The fourth limitation is that although all the nurses were exposed to the main life threatening stressor of rocket attacks in an unsheltered hospital, other potential stressors such as workload and family burden were not assessed, hence losing important individual differences in the cumulative stress that might have led to more variance in the exposure group. Time constraints and the raging war did not enable a thorough clinical assessment of psychosomatic symptoms, and also affected the scope of the questionnaire battery that was used. On the other hand, as psychiatric symptoms were assessed in an unsheltered hospital that was being targeted by rockets, it is possible that the extreme circumstances enhanced the reliability of the psychosomatic problem scale, reducing the former limitation to some extent. As it is likely that hospital nurses will be affected by similar crises in the future, longitudinal studies targeting the same hospital personnel are needed. Future studies should perform prospective assessments of hospital personnel during wartime crisis and investigate ways to enhance their resilience and reduce their vulnerability, as recommended by other studies (4-7). Future studies should also document the nature of wartime exposures (patient contact versus personal threat of injury or death) in order to assess the relative effect of different exposure types.

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