# Trauma-Related Symptoms in Veterans of Operation Desert Storm: A Preliminary Report

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*Objective: This study was designed to examine prospectively the development of trauma-related symptoms over time in two reserve units of Operation Desert Storm veterans. Method: One month and 6 months after returning from the Persian Gulf area, 84 National Guard reservists, from one medical unit and one military police unit, completed questionnaires on their exposure to combat and to specific stressors and rated the severity of their symptoms of posttraumatic stress disorder (PTSD) on two different scales. Differences in symptom severity at the two time points were analyzed. Results: Scores on the Mississippi Scale for Combat-Related Post-Traumatic Stress Disorder, but not severity ratings on a symptom scale based on DSM-III-R PTSD criteria, increased significantly from the 1-month to the 6-month rating time. At both time points, symptoms of hyperarousal were more severe than symptoms of reexperiencing or avoiding trauma-related events. Level of exposure to combat, as reflected by the Combat Exposure Scale and a Desert Storm trauma questionnaire, was significantly associated with score on the Mississippi PTSD scale. There were no significant differences in combat exposure and PTSD symptoms between the male and female subjects or between the medical and police units. Conclusions: These preliminary findings suggest that a high percentage of Desert Storm veterans experienced some trauma-related symptoms after returning to the United States. Six months after the war, these symptoms, although relatively mild, had not significantly improved in this study group as a whole. For research on longer-term outcome, follow-up of these 84 reservists continues.*

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It is well known that posttraumatic stress disorder (PTSD) can be caused by a variety of severe traumatic stressors, such as natural disasters, violent crime, and war. The trauma of combat has been particularly well studied in the etiology of PTSD. For example, Kulka et al. (1) noted a PTSD prevalence rate of 15% and Helzer et al. (2) a rate of 2% in veterans of the Vietnam theater of operations approximately 20 years after the war. Similarly, Kluznik et al. (3) reported a prevalence rate of 47% and Goldstein et al. (4) a rate of 50% in former prisoners of war nearly 40 years after their imprisonment during World War II.

While it has become increasingly clear that PTSD is a common disorder and that it frequently persists over time, surprisingly little is known about its natural history. Symptom development seems to vary from one individual to another. In some cases PTSD develops immediately after the trauma, and in other cases the onset appears to be delayed. The course may wax and wane over time, or it may remain relatively steady. Further, for some individuals the disorder appears to resolve in a short period of time, but for others it runs a chronic course.

Proposed subtypes of PTSD based on longitudinal course include acute, chronic, delayed, intermittent, residual, and reactivated (5–16). However, there are limited empirical data to support such a classification. Prior to 1980, because PTSD was not yet recognized as a formal DSM psychiatric disorder, there was little systematic research in this area. The data on longitudinal course that do exist are generally anecdotal or retrospective in nature and thus are subject to the problem of inaccurate recall.

Nevertheless, in recent years much has been learned about the long-term impact of trauma on individual functioning, and much of what is now known comes

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from studies involving Vietnam and Israeli combat veterans. While most of these studies have not been prospective, the information gained has now made it possible to develop well-informed hypotheses that can be tested using prospective paradigms.

The recent military efforts in the Middle East (Operation Desert Shield and Operation Desert Storm) provide an opportunity to assess prospectively the acute and chronic effects of wartime stress. In this preliminary report we describe our study of 84 Desert Storm veterans 1 month and 6 months after their return home to the United States. The 84 subjects belonged to two National Guard reserve units, a medical company and a military police company.

Before meeting with the returning soldiers, we developed a questionnaire based on studies of the experiences and symptoms of veterans of World War II, Korea, Vietnam, and Israeli combat. The present investigation focused primarily on the pattern and sequence of symptom development over time. Although, in general, the degree of stress was far less in Desert Storm than in earlier wars, a large number of the Desert Storm veterans whom we interviewed did develop some PTSD-specific symptoms.

## METHOD

Arrangements were made to interview all returning members of the two reserve units during their first monthly training session after the war. Of the 240 members of the two units, 80 did not attend the first training session. Of these, 31 did not attend because they had already returned to their home bases in other areas of the country, two had died in the Middle East, seven were hospitalized with severe injuries, and 40 lived in Connecticut but did not attend. Of the 160 reservists who were present at the first training session, 119 agreed to fill out the questionnaire. The questionnaire was completed a second time during the routine training session 6 months later. Eighty-four reservists (65 men and 19 women) completed the questionnaire at both time points, and these were the subjects of this study.

The questionnaire included a PTSD symptom scale based on the DSM-III-R criteria for PTSD. Subjects rated the following 17 DSM-III-R symptoms: intrusive memories, nightmares, flashbacks, feeling worse with war reminders, avoidance of thinking about war, avoidance of war reminders, amnesia with respect to war, decreased interest, feeling cut off from other people, feeling less strongly about things, feeling numb, sleep disturbance, irritability, decreased concentration, being watchful or on guard, increased startle response, and reactivity to war reminders. Symptoms were analyzed as individual items and as parts of the three symptom clusters in DSM-III-R: reexperiencing, avoidance, and hyperarousal. The degree of severity of each symptom during the preceding month was rated on a scale on which 0=none, 1=slight, 2=moderate, 3=considerable, and 4=extreme. A total PTSD score was calculated by summing the ratings for each symptom, allowing for a possible total score of 68. The independence of time (time 1 versus time 2) and symptom severity (a rating of less than 2 versus a rating of 2 or higher) was tested using a matched-pairs chi-square analysis for each of the 17 symptoms.

The questionnaire also included the Mississippi Scale for Combat-Related Post-Traumatic Stress Disorder (17), the Combat Exposure Scale (18), and a Desert Storm trauma questionnaire. The Mississippi PTSD scale is a self-report inventory consisting of 35 items derived from DSM-III and associated features. It measures both symptom severity and the effects of symptoms on an individual's life. Scores can range from 35 to 175. The Combat Exposure Scale is a subjective scale that quantifies wartime stressors (1=light, 2=light to moderate, 3=moderate, 4=moderate to heavy, and 5=heavy exposure to combat). The Desert Storm trauma questionnaire was composed of 19 items dealing with stressors that, although sometimes overlapping, were not specifically included in the Combat Exposure Scale but were frequently experienced by Desert Storm personnel. These included extreme threat to personal safety, seeing others killed or wounded, death of a close friend, sitting with the dying, being stationed close to enemy lines, and witnessing grotesque disfigurement of bodies as a result of wounds. The total score consisted of the number of positive responses, with a possible range of 0–19.

Changes over time in the Mississippi PTSD scale scores and the total DSM-III-R-based PTSD scores were investigated by using repeated measures analysis of variance, where time was the within-subjects factor and sex and unit were the between-subjects factors. Differences in scores between the units (medical versus military police) and the sexes at each time point were examined as part of this analysis. Interactions between time and the two between-subjects factors were used to indicate whether changes in scores were significantly different between the two units or between the sexes.

Finally, the relationship of the Mississippi scale score to the scores on the Combat Exposure Scale and the Desert Storm stressor questionnaire was tested by means of linear regression with adjustments for age, sex, unit, and race.

## RESULTS

The numbers of subjects who rated the severity of each of the 17 DSM-III-R PTSD symptoms as 2 (moderate) or greater are shown in table 1. The four most frequently endorsed symptoms at 1 month included increased startle response (31%, N=26), being watchful or on guard (20%, N=17), sleep disturbance (19%, N=16), and irritability (19%, N=16). These four symptoms, all of which are included in the hyperarousal symptom cluster in DSM-III-R, were also among the most frequently observed at 6 months. When the PTSD symptoms were combined into the three DSM-III-R clusters, hyperarousal had a significantly higher mean value at both time points than the reexperiencing cluster (time 1, $t=-5.22$, $df=83$, $p<0.0005$; time 2, $t=-2.38$, $df=83$, $p<0.05$) and the avoidance cluster (time 1, $t=-4.52$, $df=83$, $p<0.0005$; time 2, $t=-3.24$, $df=83$, $p<0.005$). The values for the reexperiencing and avoidance symptom clusters were not significantly different from each other at either time point.

Statistically significant associations were observed between time (time 1 and time 2) and severity of intrusive memories, avoidance of war reminders, and irritability; a greater number of subjects reported moderate severity of these symptoms at 6 months than at 1 month. At 6 months, intrusive memories had increased in frequency to become, along with the hyperarousal symptoms, one of the most commonly endorsed items.

The Combat Exposure Scale scores ranged from 1 to 5, with a mean of 1.35 (SD=0.69). Total scores on the Desert Storm trauma questionnaire ranged from 0 to 11, with a mean of 3.17 (SD=2.58). The mean Mississippi PTSD scale score at 1 month was 58.43 (SD=12.28); at 6 months it was 64.13 (SD=15.17).

Using a score of 89 or greater on the Mississippi scale as the criterion for the presence of PTSD, we found that three subjects met the criterion at 1 month. In addition to these three, four other subjects met the criterion at 6 months. When the scale based on DSM-III-R criteria

**TABLE 1. Severity Ratings[a] of 17 DSM-III-R Symptoms of PTSD by Veterans of Operation Desert Storm 1 Month and 6 Months After Returning to the United States**

| Symptom | Number of Subjects (N=84) | | | | |
|---|---|---|---|---|---|
| | With Severity Rating ≥2 at 1 Month and at 6 Months | With Severity Rating ≥2 at 1 Month and <2 at 6 Months | With Severity Rating <2 at 1 Month and ≥2 at 6 Months | With Severity Rating <2 at 1 Month and at 6 Months | $\chi^2$ (df=1)[b] |
| Reexperiencing cluster | | | | | |
| Intrusive memories | 10 | 4 | 14 | 56 | 4.50[c] |
| Nightmares | 1 | 5 | 9 | 69 | 0.64 |
| Flashbacks | 2 | 2 | 8 | 72 | 2.50 |
| Feeling worse with war reminders | 2 | 4 | 11 | 67 | 2.40 |
| Avoidance cluster | | | | | |
| Avoidance of thinking about war | 5 | 4 | 10 | 65 | 1.79 |
| Avoidance of war reminders | 4 | 2 | 10 | 68 | 4.08[c] |
| Amnesia with respect to war | 0 | 4 | 9 | 71 | 1.23 |
| Decreased interest | 5 | 9 | 6 | 64 | 0.27 |
| Feeling cut off from other people | 7 | 9 | 8 | 60 | 0.00 |
| Feeling less strongly about things | 5 | 8 | 5 | 66 | 0.31 |
| Feeling numb | 3 | 4 | 7 | 70 | 0.36 |
| Hyperarousal cluster | | | | | |
| Sleep disturbance | 9 | 7 | 10 | 58 | 0.24 |
| Irritability | 12 | 4 | 15 | 53 | 5.26[c] |
| Decreased concentration | 6 | 7 | 11 | 60 | 0.50 |
| Being watchful or on guard | 9 | 8 | 8 | 59 | 0.06 |
| Increased startle response | 15 | 11 | 8 | 50 | 0.21 |
| Reactivity to war reminders | 1 | 1 | 5 | 77 | 1.50 |

[a]Symptom severity ratings: 0=none, 1=slight, 2=moderate, 3=considerable, and 4=extreme.
[b]Matched-pairs design with correction for continuity.
[c]$p<0.05$.

for PTSD was used, eight subjects qualified as having PTSD at 1 month and seven at 6 months. Two subjects had PTSD according to both sets of criteria at the first time point and four at the second.

The changes in scores on the DSM-III-R-based PTSD scale and the Mississippi scale are presented in table 2. No significant increase in total PTSD score on the DSM-III-R-based scale between the first and sixth month for the group as a whole was found. There were no significant differences in PTSD scores between the units or between the sexes at either time point. In addition, we found no significant interactions between changes in score over time and unit and between changes in score over time and sex of the subject.

On the other hand, the Mississippi PTSD scale score for the whole group changed significantly over time (table 2). The amount of the increase, however, was not different between the medical and military police units or between the male and female subjects. Furthermore, no differences in score between the units or between the sexes were found at time 1 or time 2.

There was a statistically significant relationship between Combat Exposure Scale score and total Mississippi PTSD scale score at time 1 ($t=2.12$, $df=78$, $p<0.05$) and at time 2 ($t=2.83$, $df=78$, $p<0.01$) after adjustment for age, sex, race, and unit. Total score on the Desert Storm trauma questionnaire was also found to be associated with score on the Mississippi scale at both time points (at time 1, $t=2.75$, $df=78$, $p<0.01$; at time 2, $t=3.67$, $df=78$, $p<0.0005$) after adjustment for Combat Exposure Scale score, age, sex, race, and unit.

## DISCUSSION

Nearly all subjects reported one or more PTSD-specific symptoms both 1 month (86.9%, N=73) and 6 months (90.5%, N=76) after returning from the Persian Gulf area. While rating of symptom severity as 2 (moderate) or more was relatively common, the mean severity rating for each symptom cluster was less than 1 (slight).

Consistent with accounts from other wars (5, 6, 9, 19, 20), symptoms of hyperarousal were clearly evident early on. Although combat exposure per se was relatively limited, most of these subjects had spent months responding to missile attacks and anticipating the possibility of a massive ground war. They recalled living in a nearly constant state of alert expectation while stationed in the Middle East. After returning home, many of the reservists described feeling aroused, vigilant, and often irritable, with insomnia and an increased startle response. At the 6-month follow-up, this heightened state of arousal was still present in many of these Gulf War veterans.

Although reexperiencing and avoidance symptom clusters were rated significantly less severe than hyperarousal at both time points, the ratings of the individual item concerning intrusive memories did increase over time, so that it became one of the most frequently endorsed symptoms at 6 months. None of the avoidance symptoms, on the other hand, was among the most frequently endorsed items at either time point. This finding is not inconsistent with the hypothesis that avoidance develops over time in response to persistent

**TABLE 2. Total Scores on a DSM-III-R-Based PTSD Scale and on the Mississippi PTSD Scale of Veterans of Operation Desert Storm 1 Month (time 1) and 6 Months (time 2) After Returning to the United States**

| Group | Total Score on DSM-III-R-Based PTSD Scale | | | Score on Mississippi PTSD Scale | | |
|---|---|---|---|---|---|---|
| | Time 1 | Time 2 | Change | Time 1 | Time 2 | Change |
| Total (N=84) | 8.70 | 11.25 | 2.55 | 58.43 | 64.13 | 5.70[a] |
| By unit | | | | | | |
| Medical (N=41) | 9.46 | 12.22 | 2.75 | 59.78 | 65.32 | 5.54 |
| Military police (N=43) | 7.98 | 10.33 | 2.35 | 57.14 | 63.00 | 5.86 |
| By sex | | | | | | |
| Male (N=65) | 7.74 | 9.98 | 2.25 | 57.03 | 62.49 | 5.46 |
| Female (N=19) | 12.00 | 15.58 | 3.58 | 63.21 | 69.74 | 6.53 |

[a]Significant overall effect of time ($F=8.49$, $df=1, 80$, $p<0.005$).

hyperarousal and reexperiencing (21). Individuals learn to avoid situations that are reminiscent of the trauma or that cause fear. Gradually, they begin to lead restricted lives. If this hypothesis is accurate, we would expect the subjects in our study group who complain of persistent and distressing traumatic memories to report increasing symptoms of avoidance in future follow-up assessments.

The number of reservists who met the full diagnostic criteria for PTSD was relatively small. When a cutoff score of 89 on the Mississippi PTSD scale (based on the National Vietnam Veterans Readjustment Study [1]) was used as the criterion, only three subjects were considered to have PTSD at 1 month and seven subjects at 6 months. However, when self-rated DSM-III-R symptoms were applied, eight subjects met the criteria for PTSD at 1 month and seven at 6 months. Two subjects met PTSD criteria according to both instruments at 1 month and four at 6 months.

Ten of the 84 subjects in this study requested and received treatment in our outpatient PTSD clinic. Seven of the 10 met the DSM-III-R criteria for PTSD according to a consensus diagnostic team. However, only two of the seven had a Mississippi PTSD scale score of 89 or greater at the 1-month time point, just prior to seeking treatment. Therefore, the number of subjects meeting criteria for PTSD in the total group of 84 subjects appears to have been greater than that reflected by the Mississippi scale.

Most subjects were confronted with multiple stressors while they were in the Persian Gulf area. Both units were frequently exposed to incoming SCUD missile attacks. Some members of the military police company were stationed as guards at the entrance to their compound and were prevented from taking refuge in bunkers during missile attacks. At least one missile reportedly exploded within one-half mile of the compound. Members of the military police unit were particularly concerned about missile attacks because they were stationed near a U.S. munitions storage site.

In addition to SCUD missile attacks, members of the medical unit were exposed to enemy small arms fire. During an alleged ambush, many members of the unit witnessed the deaths of a physician and a nurse. The nurse was dismembered when an explosion occurred next to her. Evacuation was not possible, and the nurse bled to death. The medical unit was then moved farther into Iraq, where members reported seeing burned and charred bodies, "melted" human beings, and flattened corpses. Others reported walking over body parts in the road and seeing piles of rotting or burning corpses at the side of the road. Subsequently, members of the medical unit reportedly suffered an accident involving an explosive device, leaving a number of unit members seriously wounded.

It is well known that PTSD can follow a single pronounced stressor such as a violent crime or an automobile accident. The incidents just described suggest that many of the soldiers in these two units were exposed to stressors intense enough to cause PTSD. However, the prevalence of PTSD and the severity of symptoms as reflected by the Mississippi scale appeared to be relatively low.

As has been shown in studies of Vietnam combat veterans, the degree of exposure to trauma was significantly related to PTSD symptoms. In this group of Desert Storm reservists, scores on the Combat Exposure Scale and the Desert Storm stressor questionnaire were significantly associated with Mississippi PTSD scale scores at both time points. This finding suggests that current PTSD symptoms are related to the degree of trauma experienced.

This study had a number of limitations. First, the study group was not complete. Only those reservists who attended their monthly meetings participated in the interviews. A number of reservists had been assigned to both units from other areas of the country. Before the first reservist meeting after the war, these individuals had already returned home and thus were not available to be interviewed. However, there is no reason to believe that the temporarily assigned reservists were different in any relevant way from the reservists living in Connecticut.

Of the reservists living in Connecticut, not all who attended the 1-month meeting were also present at the 6-month meeting. However, Mississippi scale scores at 1 month were not significantly different between the group of 84 reservists who attended both meetings (mean=58.43, SD=12.28) and the 22 who attended the 1-month meeting only (mean=57.68, SD=15.36).

This study also relied on self-rated reports. It is generally believed that such reports are less reliable and less valid than assessments made by clinicians. Further, not

all questions came from published questionnaires with established reliability and validity. For example, our DSM-III-R-derived PTSD scale has not yet been tested for reliability and validity, and therefore it is not to be viewed as a diagnostic tool. In fact, this study was primarily focused on the longitudinal course of symptoms rather than formal DSM-III-R diagnoses themselves, since structured clinical interviews are generally necessary for the accurate assessment of psychiatric conditions.

Finally, there may have been a tendency for the subjects to underreport the presence and severity of their symptoms. Despite reassurances that the questionnaires were strictly confidential and only to be used for research purposes, there is reason to believe that some subjects may have been hesitant to report too many symptoms for fear that knowledge of their psychological problems would affect their military careers. Our clinical experience with the subjects who completed questionnaires at 1 month and then later sought treatment at our medical center supports this tendency to underreport. On the other hand, it may be that differences in severity of PTSD symptoms between the two time points can be accounted for by an alteration in reporting style. That is, with the passage of time, some subjects may have become more aware of their symptoms and/or more comfortable with reporting them.

In this group of 84 Desert Storm veterans, PTSD symptoms, as measured by both the Mississippi Scale for Combat-Related Post-Traumatic Stress Disorder and the DSM-III-R-derived scale, appeared to be relatively mild. However, at 6 months the level of PTSD symptoms had not decreased from the level at 1 month. We are continuing our follow-up of all 84 reservists and will formally assess the group at regular intervals. Future research will also include the impact of precombat factors, such as childhood trauma and depression, on the development of PTSD. Using a prospective design, we hope to elucidate more fully the unfolding course of trauma-related symptoms.

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