

# Current Research in Complementary & Alternative Medicine

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## Research Article

### Veterans with Post-traumatic Stress Disorder are Less Stressed Following Massage Therapy

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#### Abstract

The purpose of this randomized controlled study was to assess the effects of massage therapy on Posttraumatic Stress Disorder (PTSD) and comorbid conditions including sleep disturbances, depression and suicide ideation in veterans. Massage therapy was expected to be effective for reducing these comorbid conditions in veterans given that massage therapy has reduced these problems in non-veterans. Forty veterans were recruited and, following informed consent at their first session, they were randomly assigned to a massage therapy or a waitlist control group. Thirty-minute massages were provided weekly for a 4-week period by a massage therapist. Moderate pressure massages were done with the participant in a side-lying position on a massage table. The massage included circular rocking, stroking and kneading the head, neck, shoulders and back. Immediately following the massages on the first and last days of the study the massaged versus the waitlist control veterans were more accurate on math computations, had lower stress levels and lower heart rate. At the end of the study, the massage group had lower PTSD scores, fewer sleep disturbances and expressed less intent of self-harm. In a follow-up one month later, the massage group was no longer showing the improvement noted at the end of the study, although they continued to express less intent of self-harm. These data highlight immediate positive effects of massage on memory, stress and heart rate and long-term effects on PTSD symptoms, sleep, and self-harm ideation. The absence of follow-up effects highlights the importance of continuing massage therapy (stimulation of pressure receptors) for these positive effects to persist.

**Keywords:** Veterans; Massage therapy, Post traumatic stress disorder

number of somatic disorders and scores on psychological health.

Sleep disturbances are among the most common symptoms reported by veterans with PTSD [3]. These, in turn, have been associated with a range of psychological problems. In this study on veterans, 28% reported poor sleep quality, and the prevalence of sleep problems was significantly higher among veterans who screened positive for PTSD compared to those who did not (84% versus 25%). In addition, path analysis suggested significant associations between greater severity of PTSD and measures of both cognitive and mental health functioning. In another sample on veterans, 68% endorsed sleep disturbances and 88% experienced trauma-related nightmares [4].

Sleep disturbances may relate to the nightmares noted in veterans with PTSD [5]. In this study, based on mattress actigraphy, sleep apnea and lower respiratory sinus arrhythmia were associated with nightmares and disturbing dreams, suggesting

that arousal dysregulation was contributing to sleep disturbances in this sample. In another sample on veterans with PTSD, in-home EEG recordings suggested that those who were experiencing sleep difficulties were spending less time in REM and Lo Deep sleep and more time in Hi Deep sleep [6]. Decreased REM sleep was correlated with self-reported depression, highlighting depression as a comorbidity of sleep disturbance. In addition, selective serotonin reuptake inhibitors were associated with less sleep efficiency and more sleep fragmentation in this study. Sleep disturbance, in turn, may relate to compromised immune function [7]. In this study, veterans with PTSD had higher inflammatory cytokine levels (IL-6 and TNF-alpha) at sleep onset.

Depression is comorbid with both PTSD and sleep disturbances in veterans. In a recent systematic review on 24 studies on PTSD in veterans, depression was the most prevalent psychiatric morbidity, with estimates ranging from 33 to 52% [8]. Depression and PTSD are not only based on self-report measures, but have also been noted for laboratory-based measures including heart rate variability [9]. In this study on combat-exposed veterans, those with elevated PTSD symptoms had lower heart rate variability. Lower heart rate variability, in turn, may explain the findings of more monotonous speech and less change in tonality in the speech samples of war zone exposed veterans given that lower heart rate variability is associated with monotonous speech [10]. And, monotonous speech was also associated with depression.

The risk for suicide associated with PTSD was similar to that associated with depression in a large sample of veterans with PTSD who were compared to veterans who were not diagnosed with PTSD [11]. The risk of suicide associated with PTSD had a Hazard Ratio (HR) of 7.1 and a similar hazard ratio with depression of 7.2. Veterans with both PTSD and depression compared to veterans of neither diagnosis had the highest risk of suicide (HR=15.22).

The continuing need for therapy for veterans with PTSD is highlighted by these sleep problems, depression and risk of suicide. The most commonly used therapies for veterans have been prolonged exposure and cognitive processing therapy [12]. In this sample of veterans, improvements were noted in PTSD and depression. But these evidence-based therapies did not result in any greater reductions in PTSD and depression symptoms than other programs that did not use these evidence-based therapies. In a study that compared prolonged exposure with relaxation training, PTSD symptoms were decreased following both therapies, but depression symptoms were not decreased [13]. According to a very recent study, one in three veterans have dropped out of these trauma-focused treatments for PTSD [14]. These authors speculated that attrition was related to the therapies requiring long-term, time-intensive and costly commitments from patients who have seen these therapies having variable degrees of success.

Some physical stimulation therapies have also been tried with PTSD veterans with some success including jujitsu training which reputedly led to decreased PTSD symptoms as well as decreased depression, anxiety and drug use [15]. Another example is the decrease in PTSD symptoms associated with equine-facilitated cognitive processing therapy [16]. Still other examples are the use of real acupuncture as compared with a sham needling procedure that resulted in improved sleep in veterans with PTSD [17]. And, a combination of acupuncture and cognitive and exposure therapy has also resulted in improved sleep [18].

Complementary/integrative therapies are being increasingly used by veterans, but mostly to decrease pain and opioid use and to increase mobility [19]. More recently, veterans' interest in and frequency of the reasons for use of complementary/integrative therapies were assessed by a national survey [20]. In the last year, 52% of veterans had used these therapies including 44% who had used massage therapy for pain and stress reduction. The literature search for this paper revealed only two studies on the effects of massage with veterans. However, both of these were focused on the reduction of pain and did not sample veterans with PTSD. In one study, decreased pain, increased mobility and decreased opioid use were reported [19]. Another study focused on veterans with knee osteoarthritis [21]. In this study, 25 veterans with knee osteoarthritis received eight weekly one-hour sessions of full body massage. The results showed significant reduction in pain, stiffness and function as well as improvements on the PROMIS scale. Unfortunately, to date, no studies could be found on the use of massage therapy with veterans experiencing PTSD.

The purpose of this randomized controlled study was to assess the effects of massage therapy on posttraumatic stress disorder (PTSD) and comorbid conditions including sleep disturbances, depression and suicide ideation in veterans. Massage therapy was expected to be effective for PTSD and these comorbid conditions in veterans given that massage therapy has reduced PTSD symptoms, sleep disturbances, depression and suicide ideation in non-veterans [22].

## Methods

### Sample

Veterans from a Veterans' Administration Medical Center were recruited. Those with severe brain damage and limited mobility (wheelchair bound) were excluded. Flyers with a description of the study and contact information were left at the sleep lab and the PTSD lab at a Veterans Administration Medical Center. Whenever a potential participant called, a phone survey was conducted. The caller was asked about: 1) being a veteran; 2) being stressed; and 3) being sufficiently mobile to participate in the study. The potential participants were then told that they would be

randomly assigned to a massage or a waitlist control group and that the massage group members would receive a 30 minute massage each week for 4 weeks. The potential participants were also informed that on the first and last days of the study and one month later they would be given questionnaires on stress, depression and sleep and a math computation followed by a recording of heart rate and blood pressure. A power analysis suggested that a sample of 24 participants would be required. To accommodate potential attrition, 40 veterans were recruited and following informed consent at their first session, they were randomly assigned to a massage therapy or a waitlist control group. The participants had the following demographic characteristics: 1) mean age=51; 2) 71% males; 3) 35% Hispanic, 30% Black, 35% non-Hispanic white; 4) 21% married, 42% single, 37% separated or divorced; 5) 63% bachelors or graduate degree; 6) 66% employed, 29% retired; 7) 63% Army, 21% Navy, 8% Air Force, 8% Marines; 8) mean number deployments=5, average deployment time=6 months; 9) 25% combat physical injury, 33% combat emotional trauma; and 10) 75% have seen counselors and 35% want to see counselors. The two groups did not differ on these variables.

### Massages

Thirty-minute massages were provided weekly for a 4-week period by a licensed massage therapist. Moderate pressure massages were done with the participant in a side-lying position on a massage table. The massage included circular rocking, stroking and kneading the head, neck, shoulders and back.

### Assessments

The assessments were made pre and post massage therapy and control sessions on the first and last day of the treatment period

and at a follow-up visit one month later. The measures taken before the massages on the first day included: 1)a background demographic questionnaire; 2) the PTSD Checklist-Military Version [23]; and 3)the PROMIS-57 Profile [24] that includes sub-scales on physical function, anxiety, depression, fatigue, sleep disturbance, ability to participate in social roles and activities, pain interference and pain intensity. All of these measures except the background/demographic questionnaire were given again on the last day of the study and at the one month follow-up visit. The pre-post massage session measures included: 1) a stress test consisting of a math computation (adding 7 numbers in head) and a visual analogue stress scale; and 2) blood pressure and heart rate taken from a standard cuff.

### Data Analyses

Data were collected and entered by a research associate. Data analyses were conducted including group by repeated measures ANOVAs on the pre-post session measures and on the long-term measures (first and last days of the treatment period). ANOVAS were also conducted on the last day and follow-up day (one month following the end of the treatment period) measures of the massage group to determine the persistence of the massage effects following the end of the treatment period.

### Results

As can be seen in Table 1, analyses of the massage group pre-post session measures suggested that the participants: 1) showed an increase in accuracy on math computations; 2) reported less stress; and 3) showed decreased heart rate following the first and last day massage sessions.

Measure	First Day		Last Day		F	p	eta <sup>2</sup>
	Pre	Post	Pre	Post			
Math accuracy	28.09	34.61	30.57	33.42	6.14	0.05	0.02
Stress	4.74	2.33	4.00	1.57	51.24	0.000	0.23
Heartrate	76.90	68.42	74.71	68.61	20.99	0.004	0.07
Systolic Blood Pressure	123.00	124.57	122.64	125.49		NS	
Diastolic Blood Pressure	81.00	82.50	77.06	79.78		NS	

**Table 1:** Means for pre and post massage sessions on the first and last days.

Table 2 illustrates group by day interaction effects suggesting that by the end of the treatment period, the massage versus the waitlist control group: 1) reported fewer PTSD symptoms; 2) had a decrease in self-reported sleep problems on the PROMIS; 3) had improved PROMIS summary scores; and 4) reported less self-hurt ideation.

Measure	Massage		Waitlist		F	p	eta <sup>2</sup>
	First	Last	First	Last			
PTSD <sup>1</sup>	51.29	38.14	50.71	43.14	12.21	0.001 <sup>3</sup>	0.05
Sleep <sup>2</sup>	19.00	24.57	22.29	24.71	4.16	0.05 <sup>3</sup>	0.02
Depression <sup>2</sup>	8.71	8.86	9.42	8.87		NS	
PROMIS <sup>2</sup>	115.14	127.36	128.07	122.04	4.47	0.05 <sup>3</sup>	0.03
Self-hurt <sup>2</sup>	0.33	0.61	0.29	0.43	4.12	0.05 <sup>3</sup>	0.02

<sup>1</sup>Lower score is optimal

<sup>2</sup>Higher score is optimal

<sup>3</sup>Group by day interaction effect

**Table 2:** Means for the first and last days of the treatment period for the massage and waitlist groups.

As can be seen in Table 3, repeated measures ANOVAs on the last day and the follow-up day measures for the massage group suggested that: 1) although fewer PTSD symptoms were reported by the last treatment day, the symptoms increased by the follow-up day; 2) although decreased sleep problems were noted at the end of the treatment period, sleep symptoms increased at the follow-up assessment; 3) although PROMIS scores had increased by the last day of the treatment, those scores decreased by the follow-up assessment; and 4) the decrease in reported self-hurt intent by the last day of treatment continued to decrease at the follow-up period.

Measure	Last	Follow-up	F	p	eta <sup>2</sup>
PTSD <sup>1</sup>	34.66	39.71	6.46	0.004	0.03
Sleep <sup>2</sup>	27.29	16.74	4.31	0.02	0.02
Depression <sup>2</sup>	6.79	6.42		NS	
PROMIS <sup>2</sup>	128.69	90.76	4.82	0.01	0.02
Self-hurt <sup>2</sup>	0.50	0.83	10.88	0.005	0.04

<sup>1</sup>Lower score optimal

<sup>2</sup>Higher score optimal

**Table 3:** Means for last day and follow-up day for massage group.

## Discussion

These data on massage therapy are consistent with the data from evidence-based therapies by reducing PTSD symptoms but not depression including the study showing that both prolonged exposure and relaxation therapy reduced PTSD symptoms but not depression [13]. In the current study, the baseline depression scores were notably low, suggesting a floor effect or no room for a decrease in depression scores resulting in an underestimation of an intervention effect. Other alternatives are that they may be “faking good” scores that have been noted in other studies where depression scores were notably low [25] or the low depression scores may accurately reflect the mood state of these veterans with PTSD given that their self-harm ideation scores continued to improve.

The improved PROMIS scores are consistent with another massage-with-veterans study, but in that case, massage was used to reduce pain [21]. The decrease in sleep problems following massage is consistent with other physical stimulation studies including the study on Jiu Jitsu with veterans with PTSD [15] and the studies showing acupuncture reduced sleep problems in veterans with PTSD [18]. These physical stimulation therapies like that of massage therapy may be reducing sleep problems via the stimulation of pressure receptors under the skin, leading to increased vagal activity (a more relaxed autonomic nervous system) that leads to better sleep [22]. Although vagal activity was not measured in this study, the decrease in heart rate following the massage sessions may be suggestive of increased vagal activity [22].

Massage therapy could be compared with other physical stimulation therapies like Jiu Jitsu and acupuncture as well as with the more evidence-based, commonly used prolonged exposure and cognitive processing therapies [13,15]. The use of massage therapy by 52% veterans in the last year in the very recent survey on veterans' interest in therapies highlights the need for continuing research on massage therapy effects on PTSD and comorbid problems in veterans [20]. The absence of follow-up effects highlights the importance of continuing massage therapy (stimulation of pressure receptors) for these positive effects to persist.

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