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Using the NADA Protocol to Treat Combat Stress-Induced Insomnia: A Pilot Study

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Keywords: NADA protocol, acupuncture, combat stress, insomnia, PTSD, Combat Exposure Scale (CES), Post-Traumatic Stress Disorder Check List - Military Version (PCL-M), Pittsburgh Sleep Quality Index (PSQI), re-experiencing, avoidance, hypervigilance, sleep quality.

Abstract

PURPOSE: Minimal research has been conducted on the use of acupuncture for the treatment of illnesses related to post-traumatic stress. The purpose of this pilot study was to investigate whether auricular acupuncture treatment using the National Acupuncture Detoxification Association (NADA) protocol was effective in treating individual aspects of post-traumatic stress (specifically insomnia) in combat veterans. **METHOD:** Using a randomised pre-test – post-test design with a delayed-treatment wait-list control, this study evaluated the effect of the NADA protocol on insomnia symptoms in five participants who were veterans of the United States armed forces. **RESULTS:** The NADA protocol was associated with statistically significant improvements in overall scores of both the Pittsburgh Sleep Quality Index (PSQI, $p \leq 0.04$ at post-treatment and follow-up) and Post-Traumatic Stress Disorder Check List - Military Version ($p \leq 0.05$ at post-treatment and follow-up). The PSQI showed a statistically significant improvement in sleep quality post-treatment ($p \leq 0.05$). In addition, reductions in re-experiencing ($p \leq 0.04$ at follow-up) and hypervigilance ($p \leq 0.003$ post-treatment) were statistically significant on the PCL-M. **CONCLUSION:** The NADA protocol may offer military medical personnel a simple treatment option for symptoms of combat-induced stress that could be used in any military setting. The treatment could be used preventively soon after combat stress or trauma exposure to reduce the risk of development of future symptoms. For service members, the NADA protocol can provide a way to begin treatment that does not expose them to feelings of vulnerability or fear of loss of reputation.

Background

Military-related post-traumatic stress disorder (PTSD) is a serious psychiatric condition often resulting from combat duty, which is associated with severe psychosocial dysfunction.[1] Post-traumatic stress disorder is defined as an anxiety disorder resulting from exposure to a traumatic event involving personal or secondary threat to life or wellbeing that causes intense fear, helplessness or horror.[2] Patients with PTSD present with three symptom clusters: re-experiencing of the traumatic event(s), avoidance of reminders and emotional numbing, and hyperarousal.[2]

Between 2001 and 2008, 1.6 million US military personnel were deployed to Afghanistan and Iraq. Approximately 21 per cent of these service members (around 320,000 individuals) are expected to be diagnosed with PTSD as a result of combat exposure.[1] This is more than double the incidence of PTSD found in the civilian population (eight per cent).[2] Although the military is aware of the increased incidence of PTSD in combat veterans, resources to treat service members with the condition are limited.[3,4]

To complicate matters, many active-duty service members and veterans feel that there is a stigma associated with any acknowledgement of psychological illness.[3-6] Ironically, concern about this stigma has been found to be greatest in those most in need of mental health services. In a study of soldiers and Marines who had returned from Iraq, those who met the screening criteria for a mental disorder were found to be twice as likely to report concern about being stigmatised and to report other barriers to accessing and receiving treatment for mental health issues as those who did not.[1] Another study found that up to 45 per cent of active duty soldiers who met the criteria for a mental disorder believed that seeking treatment for mental disorders would harm their careers.[4] The importance of anonymity in reducing the stigma of reporting honestly and improving willingness to receive care has been recognised as crucial for the establishment of effective screening and treatment programmes for mental health problems among military personnel.[7]

Unfortunately, even if service members do seek help, treatment options are limited. SSRI (Selective Serotonin Reuptake Inhibitors) and SNRI (Serotonin - Norepinephrine Reuptake Inhibitors) are the only FDA approved medications for PTSD. However, although prescribed often to service members as part of their treatment, they have limited success. Furthermore many of the drugs used to treat PTSD symptoms have unpleasant side-effects, including anxiety, restlessness, cognitive deficits, tachycardia and cardiac arrhythmias.[8] Their use can result in altered mental states which may affect the operational

readiness of military personnel. Service members who experience these side-effects may believe the treatment ineffective, or even counter-productive, causing them to discontinue their medication and refuse further treatment. An effective treatment for PTSD that is neither associated with the stigma of receiving psychotherapeutic care nor the disabling side-effects of psychiatric medication is clearly much needed by returning veterans.

Given the drawbacks associated with traditional interventions, acupuncture is beginning to emerge as a promising alternative treatment. Since Chinese medicine has a broad range of uses for a wide variety of both physical and mental conditions, receiving treatment via this modality does not single out recipients in the same way as receiving psychotherapy or psychiatric treatment. There is therefore far less (if any) stigma associated with being treated with acupuncture. This modality may thus provide a route that would allow active-duty service members and veterans to receive treatment without feeling that their peers, superiors or family will think less of them for so doing. In addition, acupuncture treatment is unlikely to affect the operational readiness of recipients.

In our study, we chose to use an approach that did not require any personal information from participants. Any identifying information presented was offered by the participant without prompting. We chose to use the NADA protocol because it does not require the person undergoing therapy to divulge their experience; participants need only passively receive a standardised treatment. Our hypothesis was that the NADA protocol might provide a way for service members to begin treatment promptly, without exposing them to feelings of vulnerability or fear of loss of reputation.

Post-traumatic stress and insomnia

Of those diagnosed with PTSD, between 70 and 91 per cent experience insomnia. Insomnia has been found to aggravate, as well as prolong, mental health conditions.[9-14] The combination of combat exposure plus subsequent insomnia represents the main risk factors for the development of PTSD in service members. Cases of PTSD in which insomnia is a problem have been found to last longer than cases without insomnia.[15]

Once believed to be a secondary consequence of many psychological illnesses, insomnia is itself now considered a primary disorder. When a person sleeps, dreaming allows the person to 'replay' events that have occurred, and thus experience them from a safe emotional distance. Sleep is thus viewed as a way to successfully integrate the emotional content of memories. A failure or absence of this process could therefore trigger psychological symptoms such as the re-experiencing that is a symptom of PTSD.[15]

Studies of sleep deprivation have found that the longer it persists, the more likely a person will be to experience hallucinations and disassociation.[15] This suggests that treating sleep disorders in a timely manner can stop psychological issues from getting worse and might thus help prevent the development of PTSD in service members and veterans. Early treatment of sleep disorders may also reduce suicide risk, since the presence of sleep problems is a better predictor of suicidal ideation than depression, hopelessness, PTSD diagnosis, anxiety or drug/alcohol use.[9]

Insomnia has been found to be a predictor for the development of PTSD and depression in combat veterans.[15] Treating sleep-related issues has been found not only to prevent the development of PTSD, but also to shorten the amount of time people suffer from the condition.[12] It has therefore become apparent that sleep disorders should be looked upon as a precursor to the development of PTSD and depression rather than simply as a symptom of the disorder. Early treatment of insomnia may mitigate the other mental health consequences of combat stress.

Exposure to combat stress and the resultant sleep problems may mark the beginning of the trajectory leading to PTSD. Over time, the illness becomes more complex, changing according to stress and social circumstances. Further along the developmental process towards full-blown PTSD, when the condition manifests as what is called Acute Stress Disorder (ASD) and beyond, more treatment modalities may be needed in order to control all the signs and symptoms. The beginning of this arc is thus the place where efforts to treat the condition may prove most effective.

In short, the process of development of PTSD is characterised by the following broad markers**: combat stress → insomnia → ASD → PTSD.** The earlier in this process treatment begins, the more quickly and easily suffering can be minimised. Addressing insomnia caused by combat exposure in a timely manner may thus help prevent the development of PTSD in many service members.

Eastern and Western perspectives on the development of PTSD

According to Western neuroscience, the development of PTSD is viewed in terms of the physiology of the fear response. The amygdala, hippocampus and medial prefrontal cortex of the brain deal with fear. A threatening stimulus causes the release of cortisol from the adrenal cortex of the kidney, which affects these brain areas, causing the person to feel fear. Those predisposed to developing PTSD were originally thought to be particularly sensitive to the effects of cortisol on the hippocampus and prefrontal cortex – they would feel uncontrollable fear in response to a stimulus that reminded them of a previous trauma due to the effects of cortisol on the prefrontal cortex.[16] More recent studies have determined, however, that some people with PTSD actually have lower than normal cortisol levels.[17] It has been hypothesised that cortisol may mitigate the effects of shock by enabling the person to 'forget' the worst parts

of an experience. In people with reduced cortisol levels, these positive effects may be lost, leading to the experience of more intensely fearful memories and the development of PTSD.

In terms of Chinese medicine, the organ specifically related to the emotion of fear is the Kidney. Although the development of PTSD caused by combat stress may involve pathology of other organs, deficiency of the Kidney is likely to be involved in some way.[18] Kidney deficiency is thought to be associated with the development of the fear-related PTSD symptoms of re-experiencing, avoidance and hypervigilance.[19]

Five-phase theory can be used to describe the symptoms of PTSD. According to five-phase theory, one type of disharmony manifests through the control (ke) cycle, a system which normally keeps the phases in balance. Two of the most common patterns of control cycle imbalance found in PTSD patients are water (Kidney) not controlling fire (Heart), and metal (Lung) not controlling wood (Liver). The PTSD signs and symptoms associated with water not controlling fire are: recurrent disturbing dreams, recurrent disturbing memories, trouble falling or staying asleep, and being easily startled, emotionally numb and hyperalert.[18] The signs and symptoms associated with metal not controlling wood are: being prone to angry outbursts and irritability, and feeling severely distressed. Both of these symptoms are associated with the hyperarousal states associated with PTSD.[2,19]

The *Huang Di Nei Jing Ling Shu* (Yellow Emperor's Inner Classic Divine Pivot) Chapter 8 states that 'The spirits of the Heart, no longer enjoying support from the Kidney essences, go astray, and their conduct becomes unconscious'.[20] From this, it can be inferred that the Kidney, and specifically its yin substances, need to be strong in order for a person to be able to deal with fear and fright. The yin of the Kidney has the function of anchoring the yang of the shen (mind/spirit), thus assisting a person to control their fear and to respond to it in a rational manner. If the yin substances of the Kidney are deficient, a person may feel overwhelmed by a fearful experience. Kidney yin provides the internal material basis needed for a person to feel that they can support themselves, and if this foundational yin energy is deficient the individual may not feel 'anchored'. Such a person may find emotional regulation challenging, and may turn to external 'crutches' such as alcohol or drugs. The effects of these substances together ongoing emotional distress is likely to have further detrimental effects on other zang organs.

In addition to the importance of the yin aspect of the Kidney, its mental/spiritual aspect or shen also plays a crucial role in relation to PTSD. The shen of the Kidney, called the zhi, represents a person's strength of will, which is important in being able to face and then to move beyond traumatic experience.[21] Weakness of the Kidney zhi is likely to predispose individuals to becoming overwhelmed by combat stress, making them susceptible to the development of PTSD.

The association of Kidney deficiency with combat stress-associated insomnia is supported by a small study of 21 patients diagnosed with PTSD who were treated with acupuncture.[18] Eleven out of the 21 assessed individuals had insomnia as one of their symptoms and, of those, six were found to have an underlying Kidney deficiency.

The NADA protocol

The NADA protocol is a standardised five-point auricular acupuncture protocol, which has a balancing effect on the body and mind. It consists of the points Shenmen, Sympathetic, Kidney, Liver and Lung/Heart.[21] The importance of the Kidney in the development of PTSD has been described above. In Chinese medicine, the Liver is the organ in charge of ensuring the free flow of qi throughout the body. If qi does not flow freely, a person tends to feel irritable and become angry easily. The health of the Liver is therefore important in terms of resolving anger, controlling aggression and keeping the body's systems moving smoothly.[22] The Lung controls the process of respiration and is also involved in immunity and protecting the body from disease. The Lung is associated with the emotion of grief and letting go, and its proper function is therefore required for a healthy grieving process.[22]

Shenmen translates as 'Spirit Gate' and this point relates to the Heart.[21] Needling Shenmen helps alleviate anxiety and nervousness, and produces a calming, relaxing effect on the shen (mind/spirit).[22] The Sympathetic point balances the activity of the sympathetic and parasympathetic nervous systems, calming the 'fight or flight' response.[22] It has a strong analgesic effect and also a vasodilatory effect on the internal organs.[22] This improves digestion, which is related to the Spleen/Stomach, and soothes the aggressive tendencies associated with the Liver.[21] The Sympathetic point is also associated with the Kidney because the nervous system is associated with the brain, and the brain - as the 'Sea of Marrow' – has its foundations in the Kidney.[21]

One of the key benefits of the NADA protocol in the treatment of PTSD patients is that the recipient does not need to describe whatever it is that is adversely affecting them. In fact, it is meant to be a quiet procedure, and the less said by both the practitioner and the person receiving treatment, the better. The acupuncturist inserts five needles in each ear, at the points described above. The person is then instructed to sit quietly for 45 minutes, after which the needles are removed and the person continues with their day.[22] For patients who are particularly worried about stigma and the consequences of asking for assistance, it is an ideal modality because it can easily be kept anonymous. In addition, NADA works well as an adjunctive treatment alongside whatever medications or other treatment modalities the person is already using.[22]

Previous research

Until now, no studies have been published on the effectiveness of NADA protocol in the treatment of combat stress-induced insomnia; however, some reports from programmes set up to treat survivors of other traumatic events suggest that it might be helpful. For example, an acupuncture clinic included in the Integrative Stress Management Program set up as part of the World Trade Center Healing Services (WTCHS), has reported success.[23] Also, Acupuncturists Without Borders (AWB) has successfully used the NADA protocol for the treatment of trauma resulting from natural disasters.[24]

Although evidence from previously published studies of acupuncture for PTSD, insomnia and anxiety disorders (PTSD is classified as an anxiety disorder) is limited, much of it is promising. Acupuncture has been shown to have effects on the brain's default mode network (DMN) and limbic system, both of which are affected in people who develop mental health disorders including PTSD.[25] The DMN consists of cortical and subcortical brain structures (in the medial prefrontal cortex, medial parietal cortex and medial prefrontal lobe) which are active when one is alert, but which are not involved in focused cognitive tasks. Although the mechanisms are unclear, people displaying a variety of mental disorders - including PTSD - show hypofunction in these brain regions. Acupuncture has been found to reduce the effects of negative stimuli (such as stress and pain) on both the DMN and limbic system.[25]

Studies of acupuncture for insomnia have produced inconclusive results. A pilot study[26] (n=28) comparing auricular acupuncture at verum (Shenmen, Sympathetic, Kidney, Insomnia 1, Insomnia 2) and sham points found no difference between the two in improving sleep parameters in women with insomnia. Another small study[27] (n=18) found significant improvements in objective measures of sleep quality in anxious adults who received acupuncture, although no details of the acupuncture points used were given in the paper.

The evidence for the efficacy of acupuncture in the treatment of anxiety disorders is more promising. Auricular acupuncture at the Relaxation point was shown to outperform needling auricular Shenmen in terms of its capacity to reduce anxiety in a study of 55 healthy volunteers.[28] Meanwhile, in a systematic review,[29] 10 out of 12 studies which met the inclusion criteria reported positive findings for acupuncture in the treatment of generalised anxiety disorder and anxiety neurosis.

The first published study investigating the use of acupuncture to treat PTSD[30] studied 84 participants randomised to three groups: acupuncture, cognitive behavioral theory or wait-list control. Each participant received either two one-hour individualised acupuncture treatments per week over a 12-week period, or one two-hour group cognitive behavioral therapy (CBT) session. Both acupuncture and CBT produced similar effect sizes, and resulted in statistically significant symptom reductions, which were maintained for three months post-treatment. Unlike the present study, the acupuncture treatment in this trial consisted of needling a standard set of points on the body, with flexibility for the acupuncturist to add three points based on the individual's Chinese medicine pattern. This study also made use of the NADA protocol, with ear seeds inserted between treatments to maintain treatment effect. This study concluded that acupuncture could be an effective and cost-effective treatment for PTSD.

Another randomised study looked at the use of electro-acupuncture for PTSD following the 2008 earthquake in Wenchuan, China. A total of 138 participants were randomly assigned to receive either electro-acupunture at points on the head and body, or the drug paroxetine.[31] The authors concluded that acupuncture was more effective than medication.

A recent systematic review[32] covering six studies of acupuncture for PTSD analysed two studies in its meta-analysis, although only one of these was judged to be of high quality. The conclusion drawn was that the evidence, although inconclusive, was encouraging enough to warrant further studies.

The pilot study

Methods

Five individuals participated in the present study, three males and two females, between 29 and 48 years of age. All were Caucasian and all were part of the Veterans Sustainable Agriculture Training Program (VSAT).[33] One participant was a former army medic, another was a former navy corpsman assigned to a reconnaissance unit, and two of the participants were combat veterans who did not disclose their former military jobs. The fifth participant was not a combat veteran, but had experienced military sexual trauma. The participants were not asked any identifying questions and the above information was given without prompting. The study received approval from the institutional review board of the Pacific College of Oriental Medicine (San Diego) and all participants completed an approved consent form.

To determine a baseline for the severity of each participant's combat stress and insomnia the following assessments were completed at the commencement of the study before treatment: pre-study data collection sheet, Combat Exposure Scale (CES),[34] Post-Traumatic Stress Disorder Check List – Military Version (PCL-M)[35] and Pittsburgh Sleep Quality Index (PSQI).[36]

At the start of the study, all five participants met the Lichstein criteria for insomnia,[37] and their scores on the PSQI were consistent with this. The four participants who had seen combat had experienced different levels of combat stress - two had light combat exposure, one moderate and one heavy, as measured on the CES.

Of the five participants, three had a PTSD diagnosis

for five to 10 years. One participant with a more recent diagnosis of PTSD had a 10-year plus history of PTSD symptoms. The final participant, a combat veteran, had not been diagnosed with PTSD and scored 45 on PCL-M (a score of 50 and above is required on this scale to qualify as full-blown PTSD). The other participants' pre-treatment scores on the PCL-M were consistent with their existing PTSD diagnoses.

Of those who participated, one participant met one of the exclusion criteria (diagnosis of borderline personality disorder) and one participant failed to meet one of the inclusion criteria (not a combat veteran).

The acupuncture treatment followed the standard NADA protocol[22] and involved auricular points Shenmen, Sympathetic, Kidney, Liver and Lung/Heart (Figure 1). Each point was needled bilaterally using Seirin D-Type needles (40 gauge - red) and the needles were retained for 45 minutes. The course of treatment consisted of acupuncture carried out once per day, for five consecutive days.

Each participant completed the post-study data collection sheet, PCL-M and PSQI after completion of the treatment course. A follow-up assessment was completed using the same measures one week after the end of treatment. After the experimental group had completed their one-week follow-up, the control group underwent the treatment protocol. The same assessments were completed in the same order when each participant switched from the control group to the treatment group.

Pre- and post-test outcomes were compared using a one-tailed T-test to determine if the NADA protocol had been effective in reducing insomnia and PTSD symptoms.

Results

The results showed preliminary evidence that treatment with the NADA protocol could produce statistically significant improvements in the overall scores of both the PSQI ($p \leq 0.04$ post-treatment and follow-up) and PCL-M ($p \leq 0.05$ post-treatment and follow-up) – see Table 1. Looking at sub-categories of the PSQI, improvement in sleep quality was found to be statistically significant post-treatment ($p \leq 0.05$) – see Table 2. Significant improvements were also detected in the PCL-M sub-categories of re-experiencing ($p \leq 0.04$ at follow-up) and hypervigilance ($p \leq 0.003$ post-treatment) – see Table 3. Interestingly, the participant who demonstrated the greatest reductions in insomnia and combat stress symptom scores was the combat veteran who did not qualify for an official diagnosis of PTSD.

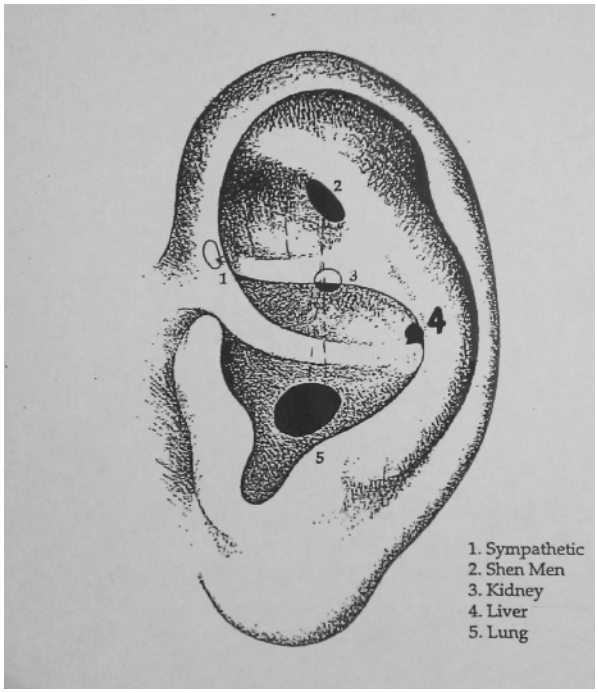

Figure 1: The NADA auricular protocol

	With treatment	Without treatment	With treatment at follow-up
PSQI	*0.04	0.09	*0.04
PCL-M	*0.05	0.18	*0.05

* represents statistically significant result ($p \leq 0.05$)
PSQI = Pittsburgh Sleep Quality Index
PCL-M = Post Traumatic Stress Disorder Checklist – Military Version
With treatment = measurement after five days of treatment
Without treatment = control group measurement
With treatment at follow up = measurement one week after treatment completed

Table 1: One-tailed T-test results for PSQI and PCL-M (overall scores)

	Sleep Duration	Sleep Disturbance	Sleep Latency	Day Disturbance	Sleep Efficiency	Sleep Quality	Meds to sleep
With treatment	0.35	0.19	0.09	0.09	0.50	*0.05	0.09
Without treatment	0	0.09	0	0.09	0.20	0	0.20
At follow-up	0.2	0.09	0.2	0.20	0.20	0.13	0.36

* represents statistically significant result ($p \leq 0.05$)

Table 2: One-tailed T-test results in each of the seven PSQI sub-categories

	Re-experiencing	Avoidance	Hypervigilance
With treatment	0.16	0.09	*0.003
Without treatment	0.32	0.25	0.50
At follow-up	*0.04	0.08	0.06

* represents statistically significant result ($p \leq 0.05$)

Table 3: One-tailed T-test results on PCL-M by sub-category

Discussion

All those who took part in the study were appreciative of receiving treatment and assistance. However the participant who noticed the greatest change (and whose post-treatment symptom scores reflected those changes) was also the only one who did not qualify for a diagnosis of full-blown PTSD. This suggests that treating the illness early in its trajectory should be the goal. In more complicated cases, where full-blown PTSD has already developed, treatment with auricular acupuncture alone may not be enough to achieve significant symptom reduction.

Conclusion

The NADA protocol can provide a way for service members and veterans affected by the trauma of combat to begin their healing process, without exposing them to feelings of vulnerability or fears of loss of reputation. It offers military medical personnel a simple and potentially effective treatment option for symptoms of combat-induced stress that could be easily employed in any military setting. NADA treatment could be used preventively, soon after combat stress or trauma exposure, reducing the risk for future development of more complex and harder to treat symptoms.

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