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**The Effects of Yoga on Symptoms of PTSD**

 Posttraumatic stress disorder (PTSD) is typically characterized by physical, mental, and emotional symptoms including exhaustion, emotional numbing and volatility, insomnia, nightmares, difficulty concentrating, and avoidance of particular places, people, feelings, and events which trigger trauma memories.1,2 Combat-related PTSD occurred in 13.8% of Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF).3 Veterans from all branches of military service from 2007-8.4 Of returning troops in 2008, only 53% sought out medical assistance largely due to fear of adverse consequences and stigma.3 Lifetime prevalence of PTSD has been shown to increase to 30.9% of males and 26.9% of females in veterans of Vietnam.4 Consequences in the short and long-term of not seeking treatment can include: substance abuse, domestic violence, divorce, job loss, financial difficulties, homelessness, and suicide, causing difficulty not only for the military member, but the entire family, and society as well.2,3,5

 In 2010, 39% of patients with PTSD reported using some kind of alternative treatment, including mind-body interventions, which incorporate breath and movement, including yoga, tai chi, qigong, and meditation.5 Because yoga helps teach patients about controlling their physiological states through breath work and movement, it has been suggested this may help reduce freezing associated with PTSD.3 Additionally, a recent study revealed an increase in allostatic load, an imbalance in the autonomic nervous system (ANS), specifically over-activity of the sympathetic nervous system (SNS), and under-activity of the parasympathetic nervous system (PNS), marked by reduced heart-rate variability (HRV), and reduced activity of the neurotransmitter gaba amino-butyric acid (GABA), may be what induces PTSD and other disorders exacerbated by stress.6 Yoga has been shown to stimulate the PNS and increase production of GABA, thereby affecting threat perception, emotion regulation, and stress reactivity.6 As talk therapies, and pharmaceutical interventions have been shown to be limited in treating PTSD, potentially due to deactivation of Broca’s area in reaction to trauma reminders, more physical practices, such as yoga have been identified and researched as an alternative treatment option.1,3 Further research into non-pharmacologic psychobiological mechanisms. through which mind-body intervention work would be helpful to justify using yoga in clinical practice, especially in terms of receiving financial reimbursement.6,7 For example, utilizing outcome measures that rely on more objective, quantitative data such as sleep data or heart rate variability would be helpful to further establish yoga as an intervention for the military population and others as well.

 Recent studies utilize a variety of types of yoga for a variety of populations who experience PTSD. In a meta-analysis studying the efficacy of yoga as treatment for psychiatric disorders, including PTSD, it was determined that generally yoga may help relieve PTSD symptoms which remain after more traditional treatment.8 The most common yoga interventions used were hatha, iyengar, sudarsha kriya, and mixed versions.8 Unfortunately, there are few well-designed RCTs on this topic.8 Kim et al. used reviewed sixteen articles in a recent systematic review (SR) and looked at studies regarding different mind-body practices for PTSD— there isn’t currently an SR specifically about yoga and PTSD. The effects of yoga on PTSD require further research as pointed to by the SR by Kim et al., which found only 3/6 RCTs had significant improvement in PTSD symptoms, and 2/6 found no change in HRV or PTSD symptoms. There is a lack of studies on individual mind-body approaches, and among them high variability in quality, intervention, duration, design, use of control group, age, and gender, making any results challenging to generalize.5 Future systematic reviews focused on one particular intervention for defined populations would help determine which interventions are the most significant and valuable in practice for which patients.

 While other studies reviewed generally have a similar degree of variability, results in general appear to be promising for reducing PTSD using various yoga interventions for military populations. Sensory-enhanced hatha yoga, which included centering, or focusing in on the present moment, asana, or physical postures/positions, pranayama, which is controlled breath work, meditation, and savasana, or corpse pose, used for complete relaxation, used on military personnel deployed to Iraq, produced statistically significant reductions in state and trait anxiety, and qualitatively improved sleep quality.3 In a small non-controlled study of veterans with PTSD, Krishnamacharya yoga, focusing on self-awareness, postures with breath awareness, and full body relaxation with guided visualization, helped reduce hyper-arousal symptoms and improved sleep quality.4 It was also reported qualitatively that yoga was “very” or “extremely” helpful in improving quality of life for these veterans.4 Additionally, in a non-controlled pilot study on Vietnam veterans with PTSD, Iyengar yoga significantly decreased depression, improved sleep, anger management, and quality of life.2 In a small RCT of women, both veteran and civilian, Kripalu yoga with an emphasis on trauma sensitivity has been shown to reduce expressive suppression, a component of emotional regulation, and increase psychological flexibility in patients with PTSD.9 In a larger RCT also studying the effect of Kripalu yoga on both civilian and veteran women, significant decreases in symptoms of PTSD including re-experiencing and hyper-arousal were shown, but only in the short-term.10 A qualitative feasibility study on integrative restoration yoga nidra on PTSD symptoms in male combat veterans, subjective reports include subjective control over their experience, decreased rage, anxiety, and emotional reactivity, and increased relaxation, peace, self-awareness, and self-efficacy.1 In a survey of VA PTSD treatment programs, there has been shown to be large variation in terms of what practices are offered with cited challenges including: lack of staff and funding.11 Further research to understand the benefits of yoga to help establish yoga as a treatment option for this setting would be beneficial.

 Yoga has also been determined to be potentially useful for PTSD symptoms in non-military populations. In women with histories of interpersonal violence who were unresponsive to traditional medical treatment for PTSD, trauma-informed yoga classes including breathing, postures, and meditation, significant reductions in PTSD symptoms were noted.12 In a short-term, small RCT studying the effects of yoga on PTSD symptoms and HRV in male Bihar flood survivors in north India, there were no significant changes in HRV or RR, but there was a significant decrease in self-rated sadness.13

 In summary, in terms of session and intervention duration, and frequency, 75-minute classes at a minimum of twice a week for seven weeks of sensory-enhanced hatha yoga have been found to be useful for reducing state and trait anxiety.3 Elements utilized in this program included: centering, asana, pranayama, meditation, and savasana.3 Participants, who were active duty members of the military and currently deployed, additionally participated in the regular military physical exercise regimen.3 Another study found that a one hour session of a trauma-informed yoga class once per week for ten weeks which included breathing, postures, and meditation significantly reduced PTSD symptoms.12 Both studies required additional training in the specific yoga interventions’ specific elements, which were not included in the articles directly.3,12 Additionally, these two studies were found to be the strongest according to the Downs & Black scale during critical appraisal of this topic.3,12,14

 Of the studies available currently, generally the sample sizes are small, interventions are varied, attrition is moderate, investigators are generally not blinded to the experiment, a control group is not always included, data is not always quantitative, and the discussion always includes the need for more research over a longer period of time. Additionally, there are no studies available which look at the effects of yoga on symptoms on PTSD in military personnel who have sustained a mTBI. Further exploration and establishment of self-identification and self-treatment techniques to modulate affect and arousal changes related to PTSD could help reduce cost of service, positively affect dependence of patients with PTSD on mental health services, and help reduce re-victimization of PTSD.12

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