

Introduction:

Posttraumatic stress disorder (PTSD) is a trauma and stress-related disorder that is characterized by re-experiencing, avoidance, hyperarousal, and negative alterations in cognition or mood (1). Events that involve threat to integrity of self or others such as rape, physical assault, natural disasters, and combat exposure are commonly associated with the development of PTSD (1). The lifetime prevalence of PTSD among adults in the United States ranges from 6 to 10% (2,3), with women being more than twice as likely to have PTSD at some point. Significantly higher estimates have been reported in combat veterans (15-30%) (4). Rates of PTSD in veterans are higher if they were stationed in combat zones, had tours of longer than 1 year, experienced combat, or were injured. Specifically, among veterans with deployments to Iraq and Afghanistan, 31-86% report multiple traumatic combat exposures and 11-20% endorse significant PTSD symptoms (5,6).

Sleep Disturbances Associated with PTSD:

Following traumatic experiences, sleep complaints are common. Subjective and objective sleep disturbances are associated with an increased risk of meeting PTSD diagnostic criteria (7) and insomnia and nightmares are core diagnostic features of PTSD (1). Sleep terrors, sleep avoidance, nocturnal anxiety, acting out dreams, and increased motor behaviors and vocalizations are also frequently reported by PTSD patients (8,9). These sleep disturbances are known to exacerbate daytime symptoms and contribute to worsened clinical outcomes (10,11). This stresses the importance of monitoring for the development of sleep disturbances in patients with trauma history and the role they may have as mediators for clinical outcomes in PTSD. Sleep disturbances in this population are often resistant to first-line PTSD treatment (12). Sleep-specific interventions are commonly employed to alleviate insomnia and nightmares. Effective treatment has been associated with improved daytime PTSD symptoms, depression, quality of life, and subjective physical health (13,14,15).

Nightmares

Nightmares are characterized by disturbing, well-remembered dreams that cause distress or daytime impairment (ICSD). Nightmares in the general population are not uncommon with up to 85% of adults reporting at least 1 nightmare per year (16). In patients with PTSD and psychiatric disorders, occurrence of nightmares is much more common (17). Additionally, nightmares are associated with an increased risk of suicidal ideation (18,19). Despite this, nightmares are frequently under-reported by patients and thus under-recognized by clinicians (17). The high prevalence of PTSD and psychiatric disorders in military personnel leads to an even higher rate of nightmares. In military personnel referred for a sleep evaluation, nightmares at least weekly were reported in 31%, which is significantly higher than the general population of 0.9-6.8% (17). Treatment options for nightmares include a combination of behavioral techniques and medical therapy. Imagery rehearsal therapy (IRT), is a technique where patients are taught to 'rescript' their nightmares and thus unlearn the behavior (20). This therapy has been successful in combat veterans as well civilian trauma victims (13, 21). A variation of IRT, called exposure, rescripting, and relaxation therapy (ERRT) incorporate aspects of traditional cognitive behavioral therapy (CBT) with IRT (22). A combination of CBT for insomnia and IRT shows promising short term effects in veterans with PTSD (23). Finally, pharmacologic therapy with prazosin or positive airway pressure (PAP) therapy in patients with obstructive sleep apnea (OSA) can also be successful in nightmare patients (24,25).

Trauma associated sleep disorder

In a subset of PTSD patients, trauma-related nightmares (TRN) are accompanied by parasomnias (26). Trauma-associated sleep disorder (TSD), is a recently proposed unique parasomnia that describes the clinical features of TRNs in association with disruptive nocturnal behaviors (DNBs) (27,28). DNBs consist of abnormal vocalizations (screaming, groaning) and movements (thrashing, turning, sleepwalking) as well as combative behaviors (striking or kicking bed partner). It is not uncommon for the DNBs to mimic nightmare content. Autonomic hyperarousal signs (increased heart rate, quickened breathing, night sweats) are often linked with these behaviors. Polysomnogram (PSG) evaluation commonly shows dream reenactment behavior and increased muscle activity during REM (REM without atonia). Nightmares are almost universally reported in these patients (28). TSD may also present along with insomnia and OSA. Therefore, in patients who present with symptoms of TSD, a polysomnogram (PSG) is recommended to look for sleep disordered breathing (SDB) in addition to evaluating whether the patient has abnormal REM behavior and/or movements. Currently no evidenced-based guidelines for treatment of this newly proposed sleep disorder are available. Obtaining an adequate quantity of sleep, avoiding triggers, and promoting a safe sleep environment are critical. In some cases, medical therapy to suppress these events may be necessary. Some patients respond well to a combined treatment with prazosin for nightmares and DNB, behavioral therapy for insomnia, and PAP therapy for OSA (29).

Insomnia

Insomnia is the most common sleep complaint in civilian as well as military populations (MSMR 2013). It is also the most reported symptom among service members returning from deployment and in combat veterans with PTSD (30). Up to 74% of combat veterans with PTSD meet clinical criteria for insomnia (31). In addition, veterans who have experienced sexual trauma have higher rates of insomnia symptoms (61%) than veterans who did not experience trauma (53%) (32). Insomnia is associated with higher PTSD severity and does not tend to resolve spontaneously over time (31). Treatment options for insomnia in patients with PTSD are similar to those for the general population. However, insomnia in PTSD patients can be complicated by their symptoms of PTSD as well as comorbid sleep disorders and unhealthy sleep practices. CBT improves sleep quality as well as daytime PTSD symptoms in this population (33). In addition, combined therapy of CBT and IRT can be beneficial in those patients with comorbid nightmares (23). There are currently no evidence-based guidelines on pharmacologic treatment of insomnia in the PTSD population due to lack of quality studies (33). While PSG is not routinely recommended by the American Academy of Sleep Medicine (AASM) in chronic insomnia patients, patients with PTSD have high rates of comorbid sleep disorders, such as OSA and periodic limb movement disorders (13,34). PSG should be considered in PTSD patients with insomnia, especially if standard insomnia treatment fails (26).

Sleep disordered breathing

While insomnia and nightmares have been the most frequently reported sleep symptoms in PTSD literature, recently more attention has been given to the prevalence and significance of SDB in PTSD patients. SDB, most commonly in the form of OSA affects 9-38% of the adult population (35,36), with higher estimates among men, the elderly and obese populations. In addition, OSA rates of up to 60-85% has been reported in military samples. (37,38). Further, recent literature indicates that individuals with PTSD have a disproportionately higher rate of SDB than the general population (39,40), with rates of co-

morbid PTSD and OSA (15-90%) being reported, depending on diagnostic methodology used. Krakow et, al. proposed a novel hypothesis involving a bidirectional pathway to explain why high rates of sleep breathing disorders among PTSD patients have been observed (40). In this pathway the sleep fragmentation (nightmares, insomnia) seen in PTSD affects the airway, causing upper airway collapsibility and SDB events. These events further fragment sleep, leading to exacerbation of insomnia and nightmares, which in turn worsens overall PTSD symptoms. This may have clinical implications for a subgroup of PTSD patients who also suffer from SDB and more research is needed in order to clarify best diagnostic and treatment practices. Studies evaluating treatment in patients with comorbid PTSD and SDB suggest that positive airway pressure therapy may improve sleep by decreasing sleep fragmentation and nightmares (41, 24). Unfortunately, patients with PTSD typically have suboptimal PAP adherence (42,43). Due to the potential adverse outcomes of comorbid mental illness and sleep disorders, including suicide, interventions should begin early (44).

Conclusion:

Sleep disturbances are prevalent in patients with PTSD and are often resistant to standard first-line treatments. This can lead to worsening of PTSD symptoms and poorer clinical outcomes. Insomnia and nightmares are the most commonly reported sleep problems in patients with PTSD and treatment consists of a combination of behavioral methods and pharmacologic therapy. TSD is a newly described parasomnia that can occur in some patients with PTSD. OSA prevalence is higher in PTSD patients than the general population. Thus, PSG should be considered in PTSD patients with sleep disturbances, especially if resistant to initial treatment. PAP therapy can improve daytime functioning as well as PTSD symptoms, but compliance is generally low. Evaluation and treatment of sleep disorders should be an integral part of PTSD treatment in order to limit their adverse effect on daytime symptoms and overall functioning.

The views expressed are those of the author(s) and do not reflect the official views or policy of the Department of Defense or its Components.

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