Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/0vr5j213

THE COMPLEX RELATIONSHIP BETWEEN INSOMNIA AND POST-TRAUMATIC STRESS DISORDER (PTSD): A SYSTEMATIC REVIEW

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Abstract

Background: Post-Traumatic Stress Disorder (PTSD) and insomnia frequently co-occur, complicating both diagnosis and treatment. Insomnia, a common complaint in individuals with PTSD, exacerbates daytime dysfunction, impairs recovery, and reduces the overall quality of life.

Objectives: This systematic review aims to:

- Assess the prevalence of insomnia in individuals with PTSD across different populations.
- Identify key factors associated with the co-occurrence of insomnia and PTSD.

Methods: A comprehensive literature search was conducted using databases including PubMed, PsycINFO, and Web of Science. Studies were selected based on their exploration of the relationship between PTSD and insomnia. Inclusion criteria encompassed peer-reviewed studies in adults that examined both conditions, using either cross-sectional or longitudinal designs

Results: The prevalence of insomnia in PTSD patients was consistently high, ranging from 50% to 90%, with variations across trauma types and comorbidities. Factors such as symptom severity, trauma exposure, and the presence of anxiety or depression were found to significantly influence insomnia. Key mechanisms proposed to explain the relationship include heightened hyperarousal, circadian rhythm abnormalities, and trauma-related fear conditioning.

Conclusion: Insomnia plays a critical role in perpetuating PTSD symptoms, and its treatment may improve both sleep and PTSD outcomes. Further research should explore targeted interventions, such as cognitive-behavioral therapy for insomnia (CBT-I), in the management of comorbid insomnia and PTSD.

Keywords: Post-Traumatic Stress Disorder(PTSD), Insomnia, quality of life

Introduction

Post traumatic stress disorder(PTSD) is a psychiatric disorder under the category of "Trauma and stress related disorders" that has developed in reaction to trauma such as "actual or threatened death, serious injury, or sexual violence".(1) It consists of a heterogenous set of cognitive, behavioral and emotional responses to traumatic events.(3)

The lifetime prevalence of PTSD in a general population is 8%.(4) As per the DSM V criteria, the definition of post traumatic stress disorder are inclusive of sleep disturbances. These include re-experiencing symptoms(distressing dreams, criteria B) as well as a state of hypervigilance(difficulty initiating and maintaining sleep, criteria E). (2)The prevalence of the sleep disturbances are as high as 90%, and therefore sleep disturbance is considered a hallmark feature of PTSD.(5) Night mare however is a unique feature of this disorder and has a prevalence rate of 19% -96%. (5)

Insomnia is a behavioural sleep disorder that may either occur as a primary disorder or secondary to medical, psychiatric or circadian disorder. (6) It presents with inability to fall asleep, maintain it, experience refreshing sleep or waking up earlier than desired. (6) It is noted that an approximate of 30%-60% of individuals with PTSD has existing comorbid insomnia, in addition to the sleep disturbance and nightmares included in the PTSD symptom criteria.(7)

	DSM-5	ICD-10	ICD-11
Trauma	Exposure to death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence, in one of four specified ways	Exposure to a stressful event or situation (either short or long lasting) of exceptionally threatening or catastrophic nature, which is likely to cause pervasive distress in almost anyone	Exposure to an extremely threatening or horrific event or series of events
Re-experiencing	The traumatic event is persistently re-experienced in one or more of five specified ways	Persistent remembering or 'reliving' the stressor in one or more of three ways	Re-experiencing the traumatic event or events in one or more of three ways
Avoidance	Avoidance of trauma-related stimuli after the trauma, in one or two ways	Actual or preferred avoidance of circumstances resembling or associated with the stressor (not present before exposure to the stressor)	Avoidance of thoughts and memories of the event or events, or avoidance of activities, situations, or people reminiscent of the event(s)
Negative alterations in cognition and mood	Negative thoughts or feelings that began or worsened after the trauma, in two or more of seven ways	(a) Inability to recall, either partially or completely, some important aspects of the period of exposure to the stressor[a]	Not a criterion
Altered arousal	Trauma-related arousal and reactivity that began or worsened after the trauma, in two or more of six specified ways	(b) Persistent symptoms of increased psychological sensitivity and arousal (not present before exposure to the stressor) shown by any two of five ways[a]	Persistent perceptions of heightened current threat, e.g. as indicated by hypervigilance or an enhanced startle reaction to stimuli such as unexpected noises
Duration	Symptoms last for more than 1 month	Onset follows the trauma with a latency period that may range from a few weeks to months	The symptoms persist for at least several weeks
Complex PTSD?	Not specified	Not specified	Severe and persistent: (a) problems in affect regulation; (b) beliefs about oneself as diminished, defeated or worthless, accompanied by feelings of shame, guilt or failure related to the traumatic event; and (c) difficulties in sustaining relationships and in feeling close to others

Several studies suggest that insomnia is not simply a symptom of PTSD but a distinct comorbidity that complicates the clinical course of PTSD. For instance, individuals with PTSD and co-occurring insomnia are more likely to experience severe functional impairment, and evidence suggests that untreated insomnia may hinder the effectiveness of PTSD-specific therapies. Given the complex bidirectional relationship between sleep and trauma-related symptoms, understanding the factors that contribute to insomnia in PTSD and the underlying mechanisms that sustain this relationship is crucial for improving treatment outcomes.

Table 1. DSM-V Criteria for Insomnia Disorder

- Complaint of dissatisfaction with quantity or quality of sleep occurs at least 3 nights a week for at least 3 months, associated with one or more of the following:
  - Difficulty falling asleep
  - Difficulty staying asleep, with frequent awakenings or difficulty falling back asleep
  - Early morning awakening
- The sleep disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- The sleep disturbance occurs even when there is enough time for sleep
- The sleep disturbance does not occur exclusively during the course of narcolepsy, breathing-related sleep disorder, circadian rhythm sleep disorder, or a parasomnia (an unusual behavior or event that occurs during sleep that may lead to intermittent awakenings).
- The sleep disturbance does not occur exclusively during the course of another mental disorder.
- The sleep disturbance is not due to the direct physiologic effects of a substance such as a drug of abuse or a medication, or from a general medical condition.

DSM-V, Diagnostic and Statistical Manual of Mental Disorders, 5th Ed.
Based on reference 4.

Methods

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Extensive search of electronic databases: We conducted an extensive search of electronic databases (PubMed, PsycINFO, and Web of Science) using a combination of keywords including “insomnia,” “sleep disturbances,” “Post-Traumatic Stress Disorder,” “PTSD,” and “trauma survivors

Inclusion criteria included:

· Peer-reviewed studies published in English.
· Studies involving adults (aged 18 and older) diagnosed with PTSD.
· Studies examining the relationship between PTSD and insomnia.
· Cross-sectional, longitudinal, or interventional studies assessing prevalence, associated factors, or mechanisms.

Exclusion criteria included: studies focusing on pediatric populations, those examining sleep disorders other than insomnia, or articles without peer review (e.g., dissertations). Two independent reviewers screened titles, abstracts, and full-text articles to ensure eligibility.

Data Collection: Data were extracted from the included studies using a structured form, capturing study characteristics, population demographics, measures of PTSD and insomnia, and key findings. Any disagreements between the reviewers were resolved by consensus. Study quality was assessed using the Newcastle-Ottawa Scale (NOS).

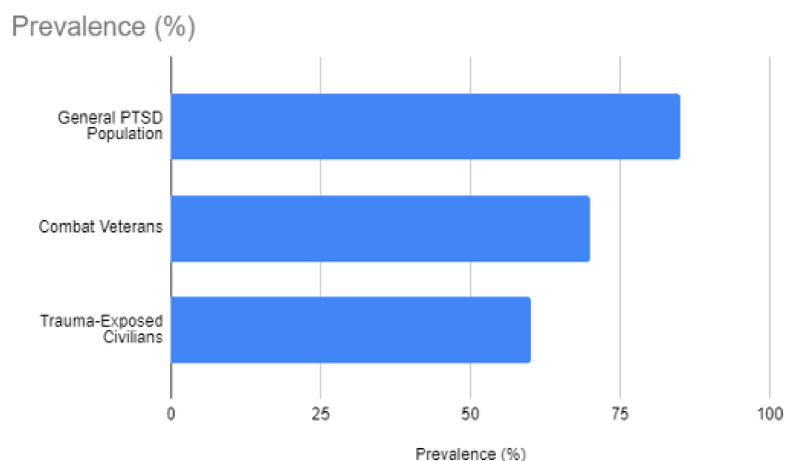
Results

A total of 62 studies met the inclusion criteria. These studies represented a diverse range of populations, including military veterans, trauma-exposed civilians, and survivors of interpersonal violence.

Prevalence of Insomnia in PTSD:

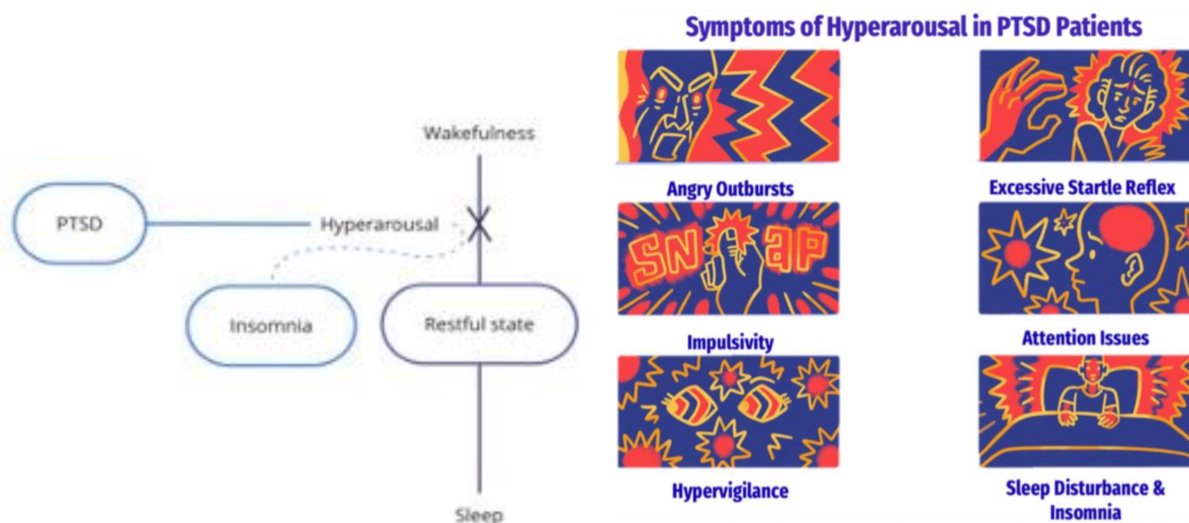
The prevalence of insomnia among individuals with PTSD was notably high across all studies, with estimates ranging from 50% to 90%. Among combat veterans, up to 70% reported moderate to severe

insomnia, while trauma-exposed civilians had an insomnia prevalence of around 60%. Insomnia was frequently cited as one of the most debilitating symptoms of PTSD, leading to a significant detriment in overall quality of life.



Discussion

The findings of this systematic review highlight the substantial prevalence of insomnia in individuals with PTSD. The bidirectional relationship between these two conditions is evident, with insomnia both contributing to and exacerbating PTSD symptoms. Hyperarousal, a core feature of PTSD, plays a critical role in the maintenance of insomnia by preventing the body from transitioning into a restful state.

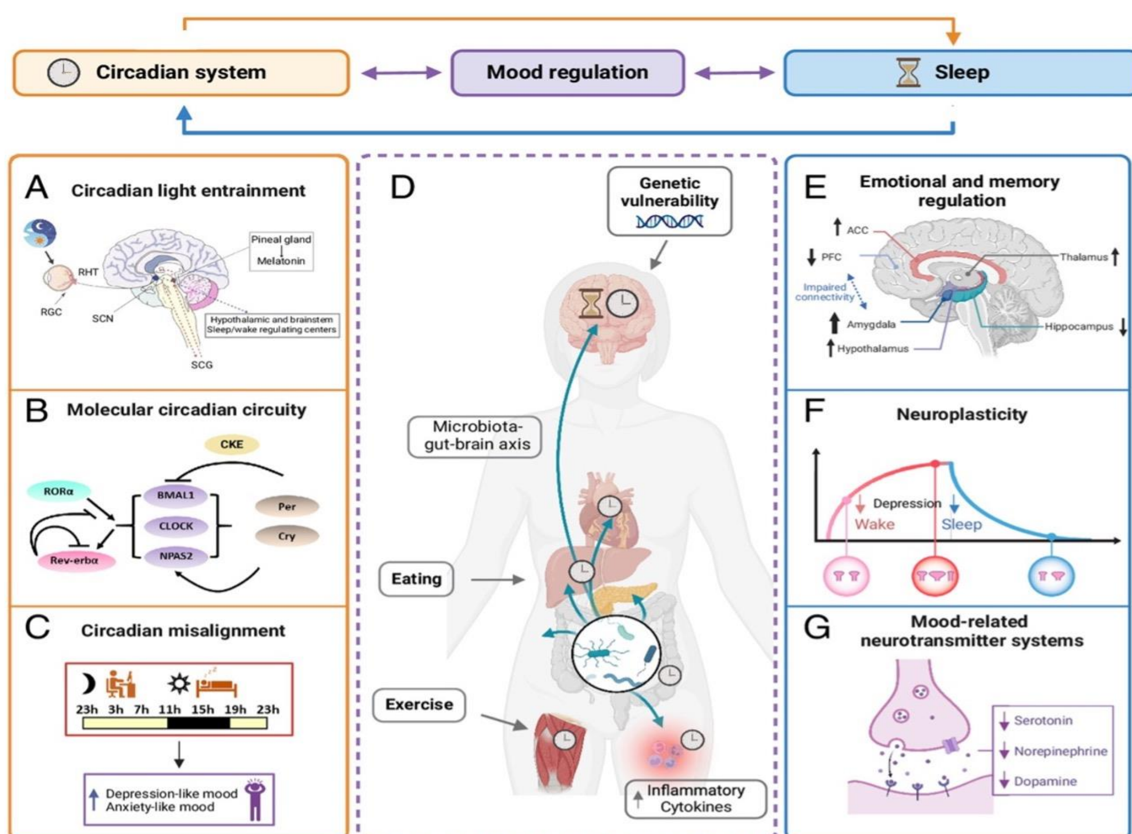


Additionally, circadian disruptions and fear-based conditioning further complicate the ability of individuals with PTSD to achieve restorative sleep. From a clinical perspective, the high prevalence of insomnia among PTSD patients underscores the importance of screening for sleep disturbances during PTSD assessments. Interventions that specifically target insomnia, such as Cognitive Behavioral Therapy for Insomnia (CBT-I), have shown promise in improving both sleep quality and PTSD symptoms. Evidence from the reviewed studies suggests that combining CBT-I with trauma-focused therapies may provide a more comprehensive approach to treating both conditions.

Therapy component	Description
Stimulus control	Set of instructions aimed at breaking conditioned arousal and strengthening the bed and bedroom as stimuli for sleep
Sleep restriction	Limiting the time allowed in bed to the patient's average reported actual sleep time and subsequently slowly increasing the time allowed in bed as sleep improves
Cognitive therapy	Targets beliefs and thoughts that directly interfere with sleep by increasing arousal in bed or indirectly by interfering with adherence to stimulus control and sleep restriction
Relaxation techniques	Diaphragmatic breathing, progressive muscle relaxation, and visual imagery to reduce psychic and somatic anxiety related to sleep
Sleep hygiene education	Limiting caffeine intake, avoiding alcohol before bed, incorporating daily exercise, and keeping the bedroom quiet, dark, and at a comfortable temperature

Conclusion

This systematic review emphasizes the complex and interwoven relationship between insomnia and PTSD. Insomnia is highly prevalent in individuals with PTSD and significantly contributes to the severity of PTSD symptoms. Mechanisms such as hyperarousal, circadian rhythm abnormalities, and fear conditioning provide insight into the persistence of insomnia in this population. Future research should focus on integrating sleep-targeted interventions into PTSD treatment protocols to improve outcomes. Prevalence of insomnia should be taken into consideration while examining PTSD patients which is critical for achieving a comprehensive version thus improving the quality of life.



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