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The Interplay Between Sleep Disorders and Depression: Examining the Influence of Insomnia and Daytime Sleepiness on Mental Health

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Abstract

Introduction: Depression is one of the most common mental disorders, characterized by a wide range of symptoms, including sleep disturbances. Sleep, as a key component of mental health, plays a significant role in the development and treatment of depression. This study examines the impact of sleep, particularly insomnia and excessive sleepiness, on depressive disorders.

Objective: The aim of this study is to analyze the relationship between sleep quality and the occurrence and progression of depression, with particular attention to the influence of antidepressant treatment on sleep quality.

Materials and Methods: A literature review covering studies on the relationship between sleep disorders and depression, as well as the effectiveness of various therapeutic methods for treating these disorders, found on the PubMed and Google Scholar platforms.

Conclusions: Sleep quality has a significant impact on the onset and severity of depressive symptoms. Appropriate treatment of sleep disorders can significantly improve the effectiveness of depression treatment and, in some cases, even prevent it. Early diagnosis and treatment of sleep disorders may be a key component in the prevention and treatment of depression.

Keywords: depression, sleep, insomnia, excessive sleepiness, sleep disorder treatment, antidepressant treatment.

Introduction:

Depression is a complex condition that significantly impacts an individual's health. Due to the wide range of clinical symptoms experienced by those struggling with this disorder, the precise neuronal mechanisms responsible for the development of depression remain challenging to understand [1]. Depression is one of the most common mental disorders in society. According to the WHO, up to 5% of the population may experience depression, with women being more frequently affected than men. Symptoms of depression include a low mood, loss of pleasure or interest in previously enjoyed activities, impaired concentration, heightened feelings of guilt, suicidal thoughts, sleep disturbances, changes in appetite and body weight, increased feelings of fatigue, and lack of energy. Depression is a condition that affects all aspects of life - work, social relationships, and physical health. Each year, over 700,000 people die by suicide. Suicide is the fourth leading cause of death among people aged 15-29. Contributing factors to the onset of depression include difficult life experiences (such as traumatic events, unemployment, the loss of a loved one, and grief). Depression is linked to physical health and is influenced by it. Many factors that contribute to depression (lack of physical activity, harmful alcohol consumption) are also known risk factors for diseases such as cardiovascular disease, cancer, diabetes, and respiratory diseases. Individuals with these conditions may also experience depression due to the challenges of coping with their illness.

Standard methods of treating depression include psychotherapy and pharmacological treatment [2]. Among patients who achieve remission following antidepressant treatment, relapses may occur: the likelihood of experiencing another depressive episode is >60% after the first, >70% after the second, and >90% after the third [3].

The primary function of sleep is to ensure proper functioning during wakefulness. Adequate sleep quality can also refer to the ability to remain fully awake and function effectively during the day. It is recognized that sleep quality may affect not only daytime functioning but also cognitive abilities and mood, making it a key factor in ensuring mental health [4].

Insomnia ranks second among mental disorders, yet understanding of its neurobiological mechanisms remains limited [5]. It is often undiagnosed or treated inadequately. Insomnia can be categorized into chronic and short-term types. Chronic insomnia is diagnosed when symptoms occur at least three times a week for a minimum of three months. Short-term insomnia is characterized by symptoms lasting less than three months. It is often correlated with acute stressors and may resolve with the cessation of the stressor, but if perpetuating factors are present, it can develop into chronic insomnia. It manifests as subjective difficulties in falling asleep or maintaining sleep, which must occur at least three days a week for three months to meet the ICSD-3 diagnostic criteria. A key feature is the presence of insomnia despite adequate opportunity for sleep and noticeable daytime symptoms.

Daytime consequences of insomnia include problems with concentration, fatigue, reduced motivation, impaired memory, and irritability [6]. The occurrence of insomnia involves a correlation between psychological cognitive arousal and changes in circadian and homeostatic mechanisms. Disruptions in the functioning of the sleep-wake center may also contribute to this. During sleep, there is a gradual transition from non-rapid eye movement (non-REM) sleep stages to cycles of rapid eye movement (REM) sleep.

The AASM classifies sleep into 5 stages:

1. Stage W (wakefulness)
2. Stage N1 (relaxed wakefulness)
3. Stage N2 (light sleep)
4. Stage N3 (deep or slow-wave sleep)
5. Stage R (REM sleep or dreaming) Stages N1-N3 are non-REM sleep phases, during which cortical activity is low, while during REM sleep, brain activity is high [7]. Non-REM sleep constitutes about 75–80% of sleep time, while REM sleep makes up the remaining 20–25%. The average duration of the first NREM-REM sleep cycle is 70–100 minutes, but in healthy individuals, this cycle may lengthen throughout the night [8].

Sleep Deprivation and Depression Symptoms

Connections have been discovered between rapid eye movement (REM) sleep cycles and endogenous depression, suggesting that prolonged periods of REM sleep are associated with various mental disorders, including endogenous depression [9]. Depression is characterized by disruptions in sleep continuity, such as prolonged sleep onset, increased number and duration of nighttime awakenings, and early morning awakening. Additionally, a reduction in deep (slow-wave) sleep and disinhibition of REM sleep is observed, with shortened REM latency and prolonged first REM period [10]. Research confirms that sleep is related to experiencing mental health issues, making sleep an area that should be targeted for therapy and treatment. Improving sleep quality has led to better mental health regardless of the severity of mental health difficulties [11].

In healthy individuals, short sleep duration leads to emotional instability and mood deterioration [4], impaired cognitive functioning, and mental health issues [12]. Individuals who do not have depression but experience insomnia have double the risk of developing depression compared to those without sleep problems [13]. The isolated occurrence of insomnia for more than 2 weeks within a given time frame predisposes individuals to an increased risk of depression over the following three years [14].

Additionally, sustained arousal and chronic excessive activation of the hypothalamic-pituitary-adrenal (HPA) axis play a significant role in the development of depression in individuals suffering from insomnia with objectively short sleep duration [15]. Studies conducted at a sleep clinic for youth found that these patients are at a higher risk of developing depression. The risk among insomnia patients was independent of gender, age, and obesity, showing a clear link between insomnia and affective suffering, as observed in adults. Greater attention should be given to assessing sleep in young patients, considering the observed correlations [16].

In cases of psychophysiological insomnia, poor sleep hygiene, disturbed sleep perception, and periodic limb movement disorder/restless legs syndrome, more than half of the patients were diagnosed with some form of depression. Depression of moderate to severe intensity was found in 3.5% of patients [17].

A study also investigated the mediation of sleep quality in the relationship between depression and cognitive disorders. The study involved 6,828 participants aged 50 and older. The conclusion of this study was that there is indeed a relationship between depression and cognitive decline dependent on sleep quality [18]. Similarly, a study on the mediation of sleep in the relationship between depression and chronic pain found that sleep disorders partially influence the relationship between depression and pain experience [19].

Early detection and treatment of insomnia may reduce the risk of developing depression in the general population and serve as a preventive strategy against mental disorders as well as somatic diseases [13].

Excessive Daytime Sleepiness and Depression

It is hypothesized that excessive daytime sleepiness (EDS) may result from sleep disorders or insufficient sleep. Various symptoms associated with EDS have been described, indicating a multifactorial mechanism. EDS is linked with many sleep disorders, such as insomnia, obstructive sleep apnea syndrome, circadian rhythm sleep disorders, and restless legs syndrome. However, it is most commonly associated with mental health disorders, particularly depression [20].

A study was conducted to investigate the correlation between excessive daytime sleepiness and the likelihood of developing depression. The study involved 944 women aged 20-97, with 125 (13.2%) diagnosed with excessive daytime sleepiness. EDS was associated with an increased likelihood of experiencing disorders both at the time of the study and throughout life, regardless of age and alcohol consumption.

The clinical approach emphasizes the need to consider a possible bidirectional relationship between depressive disorders and excessive daytime sleepiness when assessing mental health issues in patients with EDS. The need to account for this potential bidirectional relationship in clinical assessments of mental health problems in patients with EDS is highlighted [21]. Another study assessed excessive daytime sleepiness in patients with depressive disorders and determined its relationship with the severity of depression and suicidal thoughts. Interviews were conducted with seventy patients, and they were assessed using the Epworth Sleepiness Scale (ESS), Beck Depression Inventory (BDI), and Beck Scale for Suicidal Ideation (SSI). Most patients had high ESS scores. There was a positive and strongly significant correlation between ESS scores and BDI scores, as well as between ESS scores and SSI scores. The conclusion of this study is that excessive daytime sleepiness was common among patients and was significantly associated with higher levels of depression, particularly with suicidal thoughts. Given these results, daytime sleepiness should be examined in the clinical assessment of patients with depression [22].

Participants whose sleep duration fell within normal ranges (7-8.9 hours/night) had a hereditary component of depressive symptoms of about 27%.

However, among those with reduced sleep duration (<7 hours/night) or extended sleep duration (≥ 9 hours/night), an increased genetic influence on depressive symptoms was observed, especially at extreme sleep durations (5 hours/night: 53%; 10 hours/night: 49%) [23].

The Impact of Antidepressant Treatment on Sleep

Most antidepressants inhibit REM sleep in both healthy individuals and patients with depression [24]. A key finding in sleep research related to depression is that nearly all antidepressants affect sleep by strongly suppressing REM sleep. The degree of REM suppression has been correlated with clinical ratings of the therapeutic efficacy of antidepressant medications. REM suppression was an early predictor of later response to treatment.

Identifying this predictor could help in locating a biomarker of significant clinical value, as the response to medication in many depressed patients is often delayed or nonexistent. Most antidepressants inhibit REM sleep, with a few exceptions, such as trimipramine, trazodone, and mirtazapine.

Certain classes of medications, particularly SSRIs (selective serotonin reuptake inhibitors), may worsen sleep continuity, which is clinically expressed as increased insomnia complaints [25]. Different types of antidepressants impact the strength of REM sleep suppression in various ways. Complete REM suppression has been observed with the use of clomipramine and the irreversible monoamine oxidase inhibitors phenelzine and tranylcypromine. After discontinuing antidepressant medication following two weeks of treatment, a return of REM sleep was observed, which persisted for at least one week [26].

Treatment Approaches for Sleep Disorders

Short sleep duration, long sleep duration, and symptoms of insomnia are risk factors for depression [27]. Improving sleep quality positively affects mental health, regardless of the severity of issues or the presence of other coexisting conditions [11]. It is crucial to address sleep disorders before, during, and after depression, as this is likely to improve outcomes and prevent relapse [28].

Treatment for insomnia can be divided into non-pharmacological and pharmacological interventions. The first-line non-pharmacological treatment is Cognitive Behavioral Therapy (CBT), a psychotherapeutic technique. CBT for insomnia (CBT-I) is specifically tailored to treat insomnia and combines behavioral and educational interventions with cognitive techniques. Education focuses on sleep hygiene, which includes maintaining a regular sleep schedule, avoiding screen time 30 minutes before bed, keeping the sleep environment cool and dark, avoiding caffeine after lunch, and minimizing daytime naps. The behavioral component focuses on stimulus control, sleep restriction, and relaxation techniques. Cognitively, efforts are made with the patient to, for example, halt distressing thoughts and engage in constructive worry exercises [29].

Given that available evidence indicates a promising potential for CBT-I and dCBT-I in secondary prevention of depression, it is recommended that future research in this area aim to provide this standard treatment (i.e., CBT-I) to all participants involved in studies assessing insomnia, whether in the context of mental health disorders or otherwise [30].

Several pharmacological medications are FDA-approved for the treatment of insomnia. These medications may exert their effects through GABA receptors (benzodiazepines and non-benzodiazepine Z-drugs), orexin receptors (DORA), or melatonin receptors (ramelteon). Many drugs have a sedative effect, including antidepressants (e.g., trazodone, mirtazapine), anticonvulsants (e.g., gabapentin, pregabalin), mood stabilizers, and antipsychotics (e.g., olanzapine, quetiapine). Over-the-counter medications with potential sedative effects include antihistamines and various supplements, including melatonin [6].

Melatonin may be effective in treating insomnia and circadian rhythm disorders. Increasing the natural physiological signal that induces sleep seems to be the most natural way to improve these sleep problems, especially in older age when melatonin production is diminished [31].

Data collected in studies have shown that pharmacological treatment of insomnia, as well as psychological treatment in the form of cognitive-behavioral therapy for insomnia, improves both insomnia and depressive symptoms [32].

Summary

This article focuses on the critical role of sleep in the context of depressive disorders, analyzing the relationships between sleep quality and depression symptoms. Research shows that both insomnia and excessive daytime sleepiness can affect the severity of depression, and appropriate treatment of these sleep disorders can significantly enhance the effectiveness of depression therapy. The article also emphasizes that antidepressant treatment often affects sleep structure, which can have clinical significance. Early diagnosis and a personalized approach to the treatment of sleep disorders can be a key element in the prevention and therapy of depression.

Author's contribution

Conceptualization, EJJ; methodology, OB, AA, KR; software, EJJ, KR, JNL, MN; check AP, MR; formal analysis EJJ, AA, KR; investigation, JNL, MN; resources, AA, EJJ, MR; data curation, AP, KR; writing—rough preparation MN, MR, OB; writing-review and editing, EJJ, AA; visualization, JNL, KR; supervision, AP, OB ; project administration, MR

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