

Research on the Relationship Between Depression and Insomnia and Possible Treatments

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Abstract: Depression, which affects millions of people worldwide, frequently presents with comorbid conditions such as insomnia. The bidirectional relationship between depression and insomnia indicates that each condition can exacerbate the other, thereby creating a cycle of worsening symptoms. This study explores the complex interrelationship between these disorders, with a particular emphasis on their cause-and-effect relationship. The present study draws upon existing research findings to provide a comprehensive account of the relationship between depression and insomnia. The methodology also encompasses an extensive review of research studies and clinical trials, with a particular focus on cognitive behavioral therapy for insomnia (CBTi) and its efficacy in comparison to antidepressant medication. The study concludes that depression and insomnia are intricately connected and that treating one can often alleviate the other. Research indicates that non-pharmacological interventions, are more effective than antidepressants in addressing insomnia. These findings highlight the necessity for an integrated approach that combines pharmacological and non-pharmacological strategies to improve mental health outcomes and improve patients' quality of life.

Keywords: Depression, Insomnia, Sleep cycle, Cognitive behavioral therapy, Mental health.

1. Introduction

Depression is a severe mental health disorder that affects over 100 million people globally, with approximately 19 million residing in the United States [1]. The impact of depression varies greatly from person to person: some individuals manage to maintain their daily routines, while others face significant challenges, including lack of motivation, persistent sadness, and often, insomnia. Insomnia is not just a symptom of depression but can also exacerbate it, forming a complex, bidirectional relationship. In other words, depression can trigger insomnia, and insomnia can worsen depression, creating a vicious cycle that is difficult to break. Despite the extensive research on both conditions independently, there remains a gap in fully understanding how they interact and how to treat them together effectively. The primary focus of this research is to explore the intricate, bidirectional relationship between depression and insomnia. While previous studies, like the HUNT study, have established a clear link between these two conditions, there is still much to be uncovered about their specific cause-and-effect relationship and the best treatments for individuals who suffer from both simultaneously [2]. To investigate these issues, this study will review existing research, focusing on both pharmaceutical and non-pharmaceutical treatments that aim to address both conditions. Methods will include a detailed literature review of clinical trials, meta-analyses, and observational studies that

examine the treatment outcomes of antidepressants, cognitive-behavioral therapy (CBT), sleep hygiene practices, and other approaches like mindfulness meditation. This research is significant because a deeper understanding of how depression and insomnia interact could lead to more targeted and effective treatments for individuals suffering from both. Additionally, this study could help inform patients about accessible non-pharmaceutical treatments, offering alternative options that complement traditional medical approaches. In the future, research in this field may lead to more personalized treatment plans, better prevention strategies, and eventually, improved mental health outcomes for those affected by these debilitating conditions.

2. Overview of depression and insomnia

2.1. Depression

Depression is a pervasive yet serious mental health condition that affects over 100 million individuals on a global scale. In the United States, approximately 19 million individuals, representing 9.5% of the population, are affected by depression, according to the data from the National Institute of Mental Health (NIMH)[1]. Given the significant prevalence of depression, it is vital to prioritize public awareness campaigns, educational initiatives, and efforts to develop effective treatments. It is imperative that individuals encourage prompt diagnosis and foster supportive environments for those affected.

Depression has always been a feature of human history for millennia, yet the precise aetiology of this condition remains obscure. In the past, it was believed that an imbalance in bodily fluids was the cause of depression or melancholia. Contemporary psychological theory posits that depression is precipitated by a complex interplay of situational and biological factors. While most experts recognize depression as a serious mental illness, there is a concern that typical, acceptable emotions such as sadness or grief may sometimes be erroneously classified as a "disease", but depression is distinct from grief or loneliness [1].

The symptoms of depression can be diverse. While some individuals are able to maintain their daily routines, including their academic, occupational, and leisure activities, the majority of patients experience depression as a significant barrier to their ability to engage in these activities. The performance of simple tasks, such as getting out of bed or attending to personal care, is significantly impaired for patients, with the capacity to care for their families also being severely affected [1][3]. Such individuals frequently evince an overwhelming sense of hopelessness, accompanied by a diminution of hope, ambition, and, in some cases, even the will to live.

2.2. Insomnia

Insomnia disorder is characterized by a lack of satisfaction with the sleep quality or duration, difficulty falling or staying asleep, and a notable impact on daytime functioning. It occurs at least three nights a week for more than three months and isn't due to a lack of sleep opportunities. The disorder frequently co-occurs with medical issues like chronic pain, psychiatric conditions such as depression, and other sleep disorders like sleep apnoea [4]. While the exact causes remain unclear, psychological and physiological hyperarousal are recognized as core factors. Furthermore, chronic insomnia may also be influenced by alcohol or drug misuse and an obsessive focus on sleep difficulties [4,5].

Insomnia can be either temporary or episodic, but it always ends up with being a long-term issue in over 50% of cases. The initial episode is typically precipitated by a constellation of factors, including stressful life events, health concerns, irregular work schedules, and jet lag [5]. While many people return to normal sleep patterns after adjusting, some develop chronic insomnia, especially if they're more vulnerable to the condition. Psychological, behavioral, and medical factors often

contribute to difficulties in duration of sleep [5]. For example, sleeping in late or napping during the day might seem helpful at first but can develop into insomnia over time. In perimenopausal women, symptoms like hot flashes can both induce and sustain insomnia [5]. Furthermore, chronic insomnia is associated with an increased risk of other serious medical conditions, including major depression, high blood pressure, Alzheimer's, and work-related disability.

3. Bidirectional association between depression and insomnia

3.1. Overview of the association

The link between depression and insomnia has been recognized for a long time. A substantial body of research indicates that up to 90% of people with mood disorders have trouble falling or staying asleep, and about 20–50% of those with insomnia disorder also experience depressive symptoms. This overlap is evident in the diagnostic criteria for both conditions. Major depressive disorder includes insomnia or excessive sleep as primary symptoms, while insomnia disorder can involve mood disturbances as part of the required daytime impacts. The co-occurrence of depression and insomnia has been demonstrated to markedly diminish quality of life, precipitate an increased prevalence of overall health issues, and engender a greater demand for healthcare resources when compared to the presence of a single condition alone [4][6].

Nevertheless, the idea that insomnia is just a secondary phenomenon associated with other health problems or psychiatric disorders, particularly depression, is a matter of contention. Numerous studies have shown that insomnia itself is a major risk factor for developing depression. For instance, a recent meta-analysis by Baglioni et al. found that people with insomnia who are not currently depressed are twice as likely to develop depression later compared to those without insomnia [7]. This link between insomnia and depression has been observed across various age groups, with stronger connections found in older adults compared to the general population and younger individuals [2]. These findings suggest that insomnia might not just be an early sign of depression but could also be a separate risk factor for it.

3.2. The HUNT Study

To investigate the relationship between depression and insomnia, the HUNT study was conducted. This research used data from the Nord-Trøndelag Health Study (HUNT), specifically from the HUNT2 phase (1995–1997) and the HUNT3 phase (2006–2008). A total of 24,715 participants provided valid responses to the relevant questionnaires across both surveys [2].

The Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria for insomnia involve difficulties in initiating or maintaining sleep, accompanied by a lack of adequate sleep quality for a minimum of one month, and the presence of significant disturbances in an individual's daily functioning. In the HUNT2 study, insomnia was assessed based on responses about difficulties with falling asleep or staying asleep (i.e., “often” or “almost every night”) and issues with work performance over the past year. HUNT3 further developed this by including questions on maintenance insomnia and shifted to measuring daytime impairment through daytime sleepiness instead of work performance. Both studies aimed to match the DSM-IV criteria for insomnia and to additionally develop a continuous measure of insomnia severity [2][8].

In order to assess depression, both HUNT2 and HUNT3 employed the Hospital Anxiety and Depression Scale (HADS), which includes 14 items, 7 of which are specifically for measuring depression (HADS-D). The HADS is regarded as an accurate instrument for identifying depression in various clinical settings. In this study, both categorical and continuous measures of depression were used [2]. Additionally, anxiety was measured with the HADS anxiety subscale and factored in as a confounding variable in logistic regression analyses.

In summary, the HUNT study found that insomnia and depression are highly predictive of one another. Participants who were not depressed in HUNT2 but had insomnia in both HUNT2 and HUNT3 had an odds ratio (OR) of 6.2 for developing depression by HUNT3. Conversely, those who didn't have insomnia in HUNT2 but were depressed in both studies had an OR of 6.7 for developing insomnia by HUNT3 [2]. These findings suggest a bidirectional relationship between insomnia and depression.

4. Possible treatments

When depression and insomnia occur together, depression is often seen as the primary issue, with insomnia regarded as a secondary symptom. This perspective is also reflected in clinical practice, where managing depression is prioritized over treating insomnia, with the expectation that insomnia will improve once depression is addressed. For instance, a 2020 Productivity Commission inquiry report on mental health did not consider the impact of insomnia and focused on referral models in primary care that emphasize managing depression, anxiety, stress, and psychosis rather than insomnia [9]. Under this circumstance, insomnia induced by depression is expected to resolve only after effective treatment of depression and achieving remission [3].

4.1. Pharmacological treatments

A breakthrough in sleep research related to depression was made through the observation that the majority of antidepressant medications have a marked impact on sleep patterns, particularly by significantly suppressing rapid eye movement (REM) sleep. The degree of REM sleep suppression was found to correlate with clinical ratings of antidepressant effectiveness, making REM suppression a promising early indicator of how well a treatment might work. The identification of such early predictors as biomarkers would be of significant value, particularly in light of the extended period of time required for antidepressants to demonstrate efficacy and the fact that only approximately 60% of patients with depression respond to treatment. In this context, REM sleep suppression has been identified as a key indicator of antidepressant efficacy[10].

Most antidepressants have been observed to suppress REM sleep, although a few exceptions include trimipramine, trazodone, and mirtazapine. While many antidepressants increase slow-wave sleep (SWS) and improve sleep continuity, certain classes, particularly SSRIs (Selective Serotonin Reuptake Inhibitors), can worsen sleep continuity, leading to more insomnia complaints [3]. This variability made it difficult to use polysomnography (PSG) to predict treatment response, and this approach has largely been abandoned. Challenges included the inability to consistently replicate the predictive value of REM sleep suppression and the high costs and practical difficulties of using PSG as a monitoring tool. However, advancements in miniaturized EEG monitors and semi-automatic sleep analysis algorithms offer new opportunities for integrating sleep EEG into clinical practice. A significant finding of this research is the necessity for drug washout periods of at least 7–14 days (or longer for drugs such as fluoxetine) to obtain accurate sleep data [10]. This presents complications for further research in depression, as the majority of severely depressed patients in research settings are already on medication, making drug withdrawal both challenging and ethically problematic.

4.2. Nonpharmacological treatments

The most effective non-pharmacological treatment for insomnia is cognitive behavioral therapy for insomnia (CBTi). The Royal Australian College of General Practitioners recommends CBTi as the first-line treatment for insomnia, rather than relying on medications like benzodiazepines[10]. CBTi typically involves 6–8 weekly sessions with trained professionals such as psychologists, but it can also be self-administered through reading materials or interactive online programs. General

practitioners might offer CBTi in four to five weekly or biweekly sessions. CBTi uses a combination of educational, cognitive, and behavioral strategies to address the psychological, behavioral, and physiological factors that contribute to insomnia. This approach frequently yields substantial and enduring enhancements in sleep quality. Recent research has highlighted the value of online CBTi programs, which can be particularly advantageous in the context of the ongoing pandemic and for individuals residing in rural or remote regions[3].

5. Conclusion

In conclusion, depression and insomnia are deeply intertwined, with each condition exerting a substantial influence on the onset, persistence, and severity of the other. This bidirectional relationship is well-supported by research, particularly by large-scale studies such as the HUNT study, which highlights the predictive connection between these two mental health disorders. Depression is frequently addressed as the primary condition, whereas insomnia is often regarded as a secondary symptom. However, recent studies reveal that this approach may overlook the crucial role that insomnia plays in both the exacerbation and perpetuation of depression. Research consistently shows that treating insomnia can improve overall mental health outcomes. This evidence suggests that insomnia should be addressed as a core component of treatment, rather than being regarded as a secondary issue. However, while the current body of research provides valuable insights into the relationship between depression and insomnia, there are still some limitations. A notable limitation is the lack of large-scale, long-term studies that explore the sustained effects of integrated treatment approaches, particularly those combining pharmacological and non-pharmacological interventions. Therefore, future research should explore the effects of integrated treatment plans that combine therapies for both insomnia and depression. The potential of other non-pharmacological treatments, such as mindfulness-based therapies, sleep hygiene education, and emerging technologies like sleep tracking devices, represents a promising avenue for further investigation. Moreover, an investigation into the impact of socio-economic factors, lifestyle, and cultural differences on the relationship between depression and insomnia would facilitate a more comprehensive understanding of these conditions and potentially lead to the development of more effective treatments.

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