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Mini-Review

Rehabilitation: The Critical Role of Sleep Hygiene

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ABSTRACT

Sleep is vital to life, and poor sleep hygiene is associated with an array of health deficits. Through its physiological impact, inadequate sleep undermines the rehabilitation process, preventing optimal recovery. Without proper sleep, patients experience fatigue, are at increased risk for psychiatric illness, and tend to have a lower threshold for pain. Each of these consequences of insufficient sleep is associated with poorer rehabilitation outcomes. To ensure that rehabilitation is successful, physicians must evaluate, monitor, and address potential sleep disturbances as well as their sequelae in relevant patients. Referral to mental health professionals, such as psychiatrists and psychologists, may be warranted to restore healthy sleep cycles.

Keywords: Rehabilitation; Sleep; Sleep hygiene; Anxiety; Depression; Fatigue

INTRODUCTION

Sleep is critical for human life, facilitating key biological functions [1-3]. As such, inadequate sleep leads to adverse effects, which may impact cognition, emotion, immunity, metabolism, and other bodily systems [4]. Despite its importance, sleep is often deprioritized or overlooked as integral to health, and a large proportion of the population does not get enough of it [5]. According to the U.S. Centers of Disease Control and Prevention (CDC), 1 out of every 3 adults suffers from insufficient sleep [6]. Between 50 million and 70 million adults face sleep disorders in the U.S. alone [7,8].

While sleep habits are linked to a variety of diseases, including cardiovascular disease, stroke, neurodegenerative disease, migraine, and type 2 diabetes, they also play a critical role in rehabilitation processes and are therefore vital for recovery [9-23]. Sleep dysfunction has been shown to be associated with reduced health-related quality of life with respect to both physical and mental health during rehabilitation as well as negative rehabilitation outcomes [22-24].

Critically, good sleep hygiene involves not only getting enough hours of sleep but ensuring that sleep is restful. Such restful sleep requires a balance of the sleep stages; particularly Slow-Wave Sleep (SWS) and Rapid Eye Movement (REM) sleep [25]. When sleep is disturbed, the progression through the sleep stages is interrupted. It is essential that those undergoing rehabilitation get the guidance they need to restore their sleep cycles to ensure the volume and quality of sleep required for successful rehabilitation [24].

LITERATURE REVIEW

Poor sleep leads to fatigue, which undermines the rehabilitation process

Physical and mental fatigue has been identified as barriers to rehabilitation and patient recovery and must therefore be addressed as a prerequisite for optimal rehabilitation outcomes [26]. Though disease and long-term stress have often been pointed to as the culprits of fatigue, there is increasing evidence that disturbed sleep may be a more important contributor [27]. Most experts agree that without proper sleep, physiological resources are not adequately restored, which leads to fatigue.

Not only does fatigue frequently occur in those with disordered sleep, but it is the most common complaint associated with insomnia [28,29]. Research into the link between sleep and fatigue

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has revealed that fatigue is driven more by poor sleep quality than by other sleep factors and that it contributes to mental fatigue more than other potential contributors such as workload or lack of exercise [27,30].

While the detriment of physical fatigue in rehabilitation is clear, the mental fatigue resulting from lack of sleep may also be quite pernicious with respect to recovery because of its profound impact on patients' attention and task performance [31,32]. The influence of sleep on task performance has indeed been widely demonstrated. Even young healthy subjects who learn new motor skills are more likely to display performance improvements following sleep compared to an equivalent duration of wakefulness [33-35]. These effects of sleep on motor performance are likely mediated by the memory consolidation process that occurs only during sleep [36].

Luckily, fatigue can be overcome with improvements to sleep hygiene [30,37]. Research has shown that fatigue can be reversed even in those who change their sleep habits by taking only a 20-minute nap each day [38]. Given the importance of avoiding fatigue during the rehabilitation process, strategies aimed at reducing fatigue by enhancing the duration or quality of sleep should be considered in the relevant patient population.

Successful rehabilitation relies on mental health, which is disrupted by poor sleep habits

Psychiatric disorders are associated with limitations in physical functioning, and those with such disorders are less likely to achieve successful medical rehabilitation results [39,40]. In the context of rehabilitation, psychiatric disorders are not only detrimental due to their effects on physical functioning but also due to their behavioral consequences, such as their tendency to reduce therapy adherence [40]. To ensure optimal rehabilitation results, it is therefore critical to prevent or treat psychiatric illness in rehabilitation patients.

Addressing sleep cycle disturbances offers one key strategy for boosting mental health in rehabilitation patients. Poor sleep is known to contribute to psychiatric illnesses, including anxiety, anxiety-related disorders, depression, and other mood disorders [4,41-45] While disturbed sleep is often considered a symptom of psychiatric disorders, data suggest that poor sleep is also a causal factor contributing to these disorders [5,46-48]. A classic example is the increased risk of developing depression amongst those with chronic fatigue [49,50].

In addition to increasing the risk for mental health disturbances, poor sleep hygiene also exacerbates preexisting psychiatric conditions [51]. Given that those undergoing rehabilitation often face psychological challenges that may induce psychiatric symptoms, it is important these patients achieve good sleep hygiene to avoid developing or exacerbating such symptoms. Without proper management of sleep and mental health, the rehabilitation process is likely to be significantly jeopardized. In many cases, referring patients to psychiatrists and psychologists may offer the dual benefit of helping to restore healthy sleep cycles while also addressing co-morbid mental health issues.

Poor sleep hygiene promotes pain, which hinders the rehabilitation process

While it is intuitive that pain interferes with rehabilitation, appreciating the critical role of sleep in minimizing that pain is less intuitive. However, sleep disruption prevents optimal rehabilitation by reducing pain tolerance, which enhances the risk for new pain as well as for exacerbation of exiting pain [52-60].

Preclinical research has also shown that injuries preceded by acute sleep loss, result in greater pain than injuries preceded by adequate sleep [7]. Interestingly, sleep deprivation for just one night has been shown to impair descending pain pathways, leading to sensitization in peripheral pain pathways and enhanced spinal excitability [61]. Similarly, heightened pain sensitivity has been observed in certain patients following just one night of sleep problems [25,62].

Several chemicals and brain systems are implicated in the effects of sleep deficiency on pain, including dopamine, serotonin, melatonin, adenosine, nitric oxide, and the opioid and orexinergic systems [25,63,64]. For instance, sleep deprivation leads to the downregulation of certain dopamine receptors, which may alter the experience of pain, such that those with poor sleep hygiene suffer from hyperalgesia [55,65].

In those undergoing rehabilitation, sleep disturbances may also contribute to pain by adversely affecting the immune system, leading to inflammation, and potentially exacerbating the conditions for which rehabilitation is intended [25,66]. Importantly, pain in these patients can be reduced when disordered sleep is effectively managed [53]. Accordingly, effective pain management improves functional recovery during rehabilitation across several contexts [67-69].

Restore sleep cycle to support successful rehabilitation

Physicians who are managing rehabilitation need to address interrupted sleep cycles to prevent or overcome fatigue, psychiatric symptoms, and pain that can disrupt the rehabilitation process and lead to suboptimal outcomes. There are a variety of ways to promote healthy sleep. The most frequently used non-prescription sleep aid is melatonin, which has been shown to promote total sleep time, reduce the time required to fall asleep, and enhance sleep efficiency [70,71].

In addition to melatonin, prescription sleep drugs like Ambien-a sedative that works by modulating GABA receptor as well as other drugs such as antidepressants, benzodiazepines, and antihistamines may improve sleep cycle [72-75]. For example, low dose sedative antidepressants such as amitriptyline or nortriptyline are often prescribed in those with comorbid mental health disturbances and difficulty with sleep [76].

Nonpharmacological interventions can also support healthy sleep. These approaches include Cognitive Behavioral Therapy (CBT) and relaxation techniques, such as yoga and meditation [77,78]. There is some evidence that acupuncture can also improve sleep hygiene [79].

CONCLUSION

Regardless of the specific approach to restore healthy sleep cycles, referral to mental health professionals like psychiatrists or psychologists may be warranted. While the best approach to ensuring proper sleep is likely to be patient-dependent, it is vital to address and monitor sleep and the symptoms of inadequate sleep in those undergoing rehabilitation.

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