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CLINICAL VIGNETTE

Sleep Deprivation and Mental Health

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Introduction

Sleeping is essential for human survival just like eating, drinking, and breathing. Therefore, states of sleep deprivation and deficiency can result in short and long-lasting physical and mental health problems. In addition to recognizable lethargy from sleep loss, sleep deprivation can have effects on cognitive processes including attention, memory, decision-making, and emotional or behavioral adjustment. We discuss a patient who presented to the ER with behavioral changes due to lack of sleep.

Patient Presentation

A 26-year-old male presenting to the ER with one week of altered sensorium, confusion, visual and auditory hallucinations, hypersexual behavior, and aggression. This was in the setting of significant sleep disturbance and insomnia after the birth of his first child.

The patient was brought to the ER by his father after he was found fighting imaginary home invasion burglars outside their house. He would also hear people talking; whom the father confirmed were not in the house.

The week prior to the visit, the patient accompanied his pregnant partner to the hospital, who gave birth without incident. Since the discharge of his partner and newborn child, the patient reported an average only 10-15 minutes of sleep a night. The patient reported using caffeine, but no other stimulants. He has taken a whey protein supplement for mixed martial arts training. He denies drugs, alcohol, tobacco use or other performance enhancing drugs (PEDs).

Upon arrival in the ER, he was afebrile with normal vitals. He was able to state his name and location, but unable to state the date. Unremarkable labs included basic chemistries, serum ammonia, and complete blood count. Computed tomography head scan was within normal limits, unremarkable for any acute pathology. The urine drug screen was negative. The patient was given IV Haloperidol for aggression and confusion in the ER, which decreased aggression without improving confusion.

He was admitted for continued evaluation and management due to the risk of self-harm and harm to others given his visual and auditory hallucinations. His hypersexual behavior was evidenced by sexualized contact with his father who he had confused for his partner.

Neurology was consulted. A lumbar puncture (LP) showed no evidence of viral or bacterial meningoencephalitis. CSF 14-3-3 protein from his LP was also negative, as well as unremarkable cell count, CSF cultures remained negative, as well as negative HSV and WNV titers. Serum RPR was negative, HIV negative, blood cultures remained negative, and the viral blood PCR was also unremarkable. EEG noted evidence of “toxic-metabolic encephalopathy with no focalized irregularities”. Follow-up MRI ruled out thromboembolic and ischemic causes of altered mental status. Carotid ultrasound was also unremarkable.

The patient was started on quetiapine 25 mg PO QHS with IV haloperidol as needed for breakthrough aggression. The quetiapine was scheduled for both insomnia and his psychotic symptoms. The patient was placed in soft restraints during the majority of his hospitalization. He was started on scheduled zolpidem 5 mg PO QHS for his insomnia on the second night of admission as he only slept one hour during the first night. Quetiapine was increased to 50 mg PO QHS on night three, and after 3 days of zolpidem at night, the patient’s auditory/visual hallucinations resolved. He became alert and oriented to person, place, time and purpose. His aggression and hypersexual behavior resolved and he was in his usual state of health. The patient had a spotty recollection of the prior week’s symptoms and hallucinations, and he was discharged home with a diagnosis of sleep deprivation psychosis. He was strongly encouraged to get sufficient sleep to prevent recurrence of symptoms that brought him to the hospital.

Discussion

Getting sufficient high-quality sleep is important for maintaining good health. The American Academy of Sleep Medicine suggests at least 7 hours per night of sleep for adults.¹ According to a 2020 national study on US adults conducted by the Center for Disease Control (CDC), 33.2% self-reported averaging less than 7 hours per day.²

Multiple variables can be direct causes of sleep deprivation or diminish the sleep quality. These include sleep apnea, insomnia, mood disturbances, adjustment disorders, lifestyle choices, work demands, psychiatric or medical conditions and life events such as the birth of a child.

Long-term sleep deprivation has well established effects including hormonal imbalance, with increased cortisol levels, and

associated weight gain, insulin resistance, obesity, diabetes, and hypertension. However, in the more acute setting, lack of sleep can also lead to difficulties with concentration, and decision-making, and more complex processes such as altered perception, memory and executive function.³ There can be increased muscle tone, tremulousness, monotonous and incoherent speech, and increased sensitivity to pain.⁴ Similar to alcohol intoxication, after 20-25 hours of sleep deprivation, impairment to performance is akin to a blood alcohol concentration of 0.10%.⁴

Lack of sleep has been well known to trigger manic events in both patients with and without underlying psychiatric disorders. Although cognitive and behavioral changes can be seen after just 1 day of sleep deprivation, our patient presented with a psychotic break due to sleep deprivation over a period of a week, likely related to birth of his first child. Even after the patient was hospitalized and had no direct parenting responsibilities, his psychotic features persisted for multiple days. This is similar to a 1990s study by Gessa et al, showed when a rat is returned to its home cage after a period of sleep deprivation, the rat does not fall asleep.⁵ Instead, they reported approximately 30 minutes of mania-like features such as insomnia, hyperactivity, irritability, aggressiveness, hypersexuality, and stereotypy.⁵ Many of these features occurred in our patient.

In acute sleep deprivation, there is low likelihood for prolonged morbidity associated with lack of sleep. Data regarding the acute effects of sleep deprivation generally show that behavioral/cognitive deficit, generally resolve after two full nights of sleep. Our patient required use of pharmacotherapy to alleviate his agitation and delirium. Fortunately, after two nights of sleep, he showed dramatic improvement and after the third night of sleep returned to cognitive baseline.

Although the long-term effects of chronic sleep deficiency were not discussed, some chronic sleep deprivation studies in mice show a possible correlation with neurocognitive disorders such as Alzheimer's disease and dementia.⁶ Chronically sleep deprived rodents show evidence of biochemical changes such as blood-brain barrier disruption and brain gene expression.^{7,8}

It is critical that sleep is recognized as a pillar of individual physical, mental, and cognitive health. As medical providers, we must consider the management and treatment of underlying sleep disorders and disturbances to promote and enhance overall health for our patients.

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