

# Sleep Disorders in Substance Abusers: How Common Are They?

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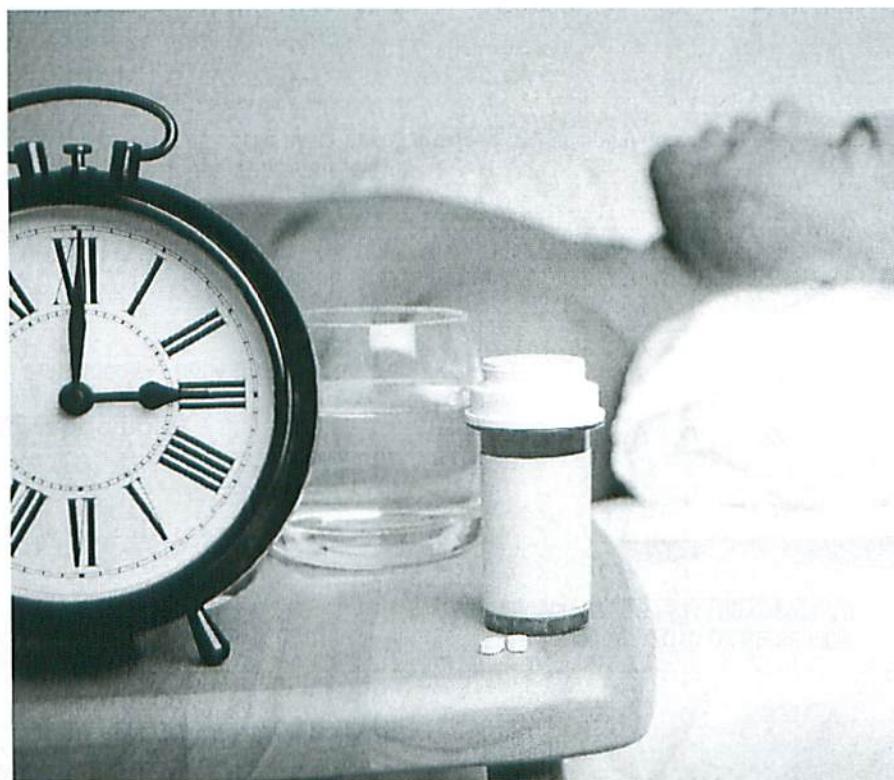
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## ABSTRACT

Substance abuse is a major public health problem with high morbidity and mortality. Comorbid disorders are suspected to cause a high relapse rate. Subjects with sleep disorders tend to self-medicate with alcohol and tranquilizers to promote sleep or abuse stimulants to stay awake during the day. Substance abuse can, in turn, cause sleep disturbances, which can result in relapse. No studies have systematically studied the prevalence of various sleep disorders in these subjects.

**Methods:** This is a cross-sectional study conducted at the Alcohol and Drug Recovery Center (ADRC) at Cleveland Clinic, Cleveland, Ohio. Subjects with active substance abuse and the ability to consent were recruited to complete a comprehensive sleep disorder questionnaire, including a general medical, psychiatric, and substance abuse history as well as validated scales (e.g., Insomnia Severity Index, Pittsburgh Sleep Quality Index (PSQI), Berlin Questionnaire for sleep apnea and restless legs).

**Results:** Thirty patients completed the survey so far. The most commonly abused substance was alcohol (80%) followed by



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narcotics (40%); about 66 percent were polysubstance users. Forty-six percent of the patients reported using substance to self-medicate sleep problems. The prevalence of various sleep disorders in this

population along with the prevalence in general population in parenthesis are as follows: Sleep impairment (PSQI>5) was noted in 96 percent (15%) of the subjects, and 56 percent (10-15%) had

insomnia of moderate-to-severe degree. Symptoms suggestive of sleep apnea were reported in 53 percent (4–6%) of the subjects and restless leg syndrome symptoms in 33 percent (10%).

**Conclusion:** Substance abuse is on the rise and affects every aspect of society. Our study has, for the first time, systematically evaluated various sleep disorders in these subjects who seem 5 to 10 times more likely to have sleep disorders. Diagnosing and treating sleep disorders will have a huge impact in inducing remission. However, this study has significant limitations, including a small number of subjects, subjective data collected via questionnaires, and no long-term follow up, which makes it difficult to draw conclusions.

## INTRODUCTION

The relationship between substance abuse and sleep is emerging as an area of great interest for researchers. According to the 2007 National Survey on Drug Use and Health, 7.6 percent of Americans older than 12 years met the criteria for alcohol abuse or dependence, and the prevalence of illicit drug use in the same year was as high as 14.5 percent.<sup>1</sup> Similarly, sleep disorders are also very common. The National Sleep Foundation's Sleep in America Poll, 2008, showed that about two-thirds (65%) of working adults reported experiencing sleep problems at least a few nights a week within the past month, and 44 percent reported this occurring every night or almost every night.<sup>2</sup>

Several studies have reported sleep problems associated with the use of several illicit drugs, and the vast majority of alcoholic patients entering treatment reported insomnia-related symptoms, such as difficulty falling and maintaining sleep.<sup>3,4</sup> For example, the prevalence of insomnia ranged from 36 to 72 percent in patients admitted for alcoholism treatment, depending on sample

characteristics and instruments used to measure insomnia.<sup>4–6</sup> The polysomnographic features after drinking alcohol, during withdrawal, and during abstinence are well defined. Alcohol intake increases slow wave sleep and suppresses rapid eye movement (REM) sleep. During periods of acute withdrawal, sleep latency (time taken to fall asleep) is increased, total sleep time is decreased, slow wave sleep returns to baseline while REM sleep either rebounds or returns to baseline. Sleep fragmentation and REM sleep disruptions can sometimes persist for 1 to 3 years after achieving sobriety.<sup>7</sup> Similarly, opiates, despite their sedating effect, interrupt sleep by increasing wakefulness and decreasing total sleep time, slow wave sleep, and REM sleep.<sup>8</sup> Some researchers debate the cause and effect relationship between sleep and substance abuse disorders. Sleep problems might predispose an individual to alcoholism.<sup>9</sup> Sleep problems can sometimes be severe enough to reverse alcohol or drug treatment success and precipitate a relapse to addiction or dependence.<sup>10</sup> Disturbed sleep is a significant predictor of relapse even after controlling other factors, like depression, and the severity of alcohol dependence and relapse was greater in individuals with alcoholism who had insomnia versus those with alcoholism without insomnia at baseline.<sup>11</sup> However, paucity of information is noted regarding the prevalence of sleep disorders in subjects who abuse other drugs, and very little information is available on the prevalence of other sleep disorders even in subjects who abuse alcohol. It is in this context that a cross-sectional study was conducted to determine the prevalence of various sleep disorders in subjects who were admitted to the ADRC at Cleveland Clinic, a tertiary referral center.

## METHODS

A total of 30 subjects were enrolled in this study over a period

of six months after obtaining informed consent. These subjects were invited to complete a comprehensive sleep disorder questionnaire 2 to 3 days after completing the appropriate detoxification process. Information on various demographic and functional variables, including drug of choice, other illicit drug use, comorbid psychiatric and medical conditions, medications, and family history of substance abuse, psychiatric, and medical conditions was collected. All subjects were also invited to complete the following validated, self-administered instruments:

- **Pittsburgh Sleep Quality Index (PSQI).** This is a validated, self-administered questionnaire used to measure sleep quality. It is a seven-item questionnaire with each item rated from 0 to 3 (sleep duration, sleep efficiency, sleep latency, sleep disturbance, daytime dysfunction, frequency of sleep medications, and subjective sleep quality). A score of  $\leq 5$  distinguishes healthy controls without sleep complaints from poor sleepers with sleep complaints ( $>5$ ).<sup>12</sup>
- **Insomnia Severity Index (ISI).** This is a validated, self-administered questionnaire used to measure a subject's perception of symptom severity, distress, and daytime impairment. It is a seven-item questionnaire with a total score range from 0 to 28. A score of  $\leq 14$  distinguishes good sleepers from those with insomnia ( $>14$ ).<sup>13</sup>
- **Berlin Questionnaire.** This is used to estimate the pre-test probability for sleep apnea. It is an eight-item questionnaire in three categories. The subject is considered high risk for sleep apnea if the score is positive in two or more categories.<sup>14</sup>
- **Epworth Sleepiness Scales (ESS).** It is an eight-item questionnaire that measures a

**TABLE 1. Baseline characteristic features of participants**

Mean age	44 years
Sex	77% male
Ethnicity	97% Caucasian
Marital status	47% married
Employment status	47% employed
Alcohol abuse/dependence	80%
Opiate abuse/dependence	40%
Benzodiazepine abuse/dependence	30%
Marijuana abuse/dependence	23%
Cocaine abuse/dependence	17%
Stimulant abuse/dependence	3%
Ecstasy/LSD abuse/dependence	3%
Other substances abused	3%
History of mood disorder	63%
History of anxiety disorder	7%

person's tendency to doze off in day-to-day situations. The total score ranges from 0 to 24 and a score of >10 is considered abnormal.<sup>15</sup>

- **Beck Depression Inventory (BDI)-II.** This is a validated, self-administered questionnaire used to screen for depression. It is a 21-item questionnaire with a total score range of 0 to 63. A total score of 0 to 13 is considered normal, while scores in the range of 14 to 19, 20 to 28, and 29 to 63 are considered to be consistent with mild, moderate, and severe degrees of depression, respectively.<sup>16</sup>

The subjects also answered questions to help diagnose other sleep disorders, such as restless legs syndrome and narcolepsy, based on the criteria established by the *International Classification of Sleep Disorders, Second Edition (ICSD)*.<sup>17</sup>

## RESULTS

Out of the 30 subjects, 23 were male and all were Caucasian except for one, who was Hispanic. About half (47%) were married and more than half (53%) were unemployed. The mean age was 44 years.

All the participants met criteria for at least one substance abuse or dependence according to the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition (DSM-IV)* criteria. About two-thirds (66.6%) of the subjects were polysubstance abusers, using either alcohol and at least one illicit drug or any combination of two or more illicit drugs. Alcohol was the most commonly abused substance (80%), followed by opiates (40%), benzodiazepines (30%), marijuana, (23.3%) and cocaine (16.6%). About 10 percent of the subjects abused other illicit drugs. More than half of the subjects had a history of mood disorder, while

seven percent had a history of anxiety disorder (Table 1).

The mean total sleep time in these subjects was 5.5 hours, which is less than the widely accepted norm of 7 to 8 hours of sleep per night. About half of these subjects (46.6%) admitted to using substance to promote sleep, more than three-fourths of the subjects (76.6%) thought that the substance abuse affected their sleep, and 44 percent of the subjects felt that they had a sleep disorder that required further assessment.

Almost all of the subjects (96.6%) had a total PSQI score of 6 or higher, suggestive of poor quality of sleep. Analysis of ISI scores found that, overall, 16.6 percent of participants had severe insomnia, 40 percent had moderate insomnia, and 26.6 percent had subthreshold insomnia. Only 16.6 percent of the subjects did not have insomnia. More than half of the subjects (53.3%) had a high pre-test probability for sleep apnea, based on the Berlin Questionnaire, while one-third (33.3%) scored positive for restless legs syndrome. ESS scores showed that 16.6 percent of the subjects had excessive daytime sleepiness. On screening for possible narcolepsy, 6.6 percent of the subjects had symptoms suggestive of narcolepsy. The narcolepsy questionnaire was based on the clinical features of narcolepsy (tetrad of hypersomnia, cataplexy, sleep hallucinations, and sleep paralysis) as per diagnostic guidelines in the *ICSD*. Based on the BDI-II scores, 30 percent fell in the severe depression category, 33.3 percent in the moderate depression category, and 13.3 percent in the mild depression category (Table 2).

## DISCUSSION

The results from our study show a very high prevalence of sleep disturbances among subjects with substance abuse or dependence, with almost all of the subjects reporting impaired sleep quality. Also, more than half of the subjects

had moderate-to-severe insomnia. This is much higher than what is found in the general population (17–30%) or in a general medical sample (16%, severe insomnia; 34%, mild insomnia over the prior 4 weeks).<sup>18,19</sup> More than half of the subjects had a high pre-test probability for sleep apnea, which is again higher than in the general population (4–6%).<sup>20</sup> Of note, the prevalence of symptoms suggestive of restless legs syndrome was also very high (33%) compared to the general population (10%).<sup>21</sup> Almost half of the subjects admitted to abusing a substance to promote sleep, and this is consistent with the findings in the previous studies wherein subjects reported consuming alcohol to help them with insomnia.

This study has several limitations, including a small sample size, collection of data from self-administered questionnaires, and lack of objective sleep metrics, which reduce the ability to apply the findings in clinical practice. A follow-up study with a larger sample size and with objective sleep metrics, such as Actigraphy, Polysomnography and Multiple Sleep Latency Test (MSLT), is warranted to further elucidate the findings of this study.

## SUMMARY

In summary, this study not only confirms the high prevalence of sleep disturbances in patients with substance abuse or dependence, but also sheds some light on the prevalence of different sleep disorders. We recommend routine screening for sleep problems in subjects with substance abuse. Frequent relapse is a common problem in substance abuse disorders, and achieving a sustained remission is always a challenge. Early diagnosis and treatment of sleep disorders might help in decreasing the rates of relapse. The study is ongoing, and in phase II, the same subjects will be screened in six months for relapse of substance abuse and

**TABLE 2.** Prevalence of various sleep disorders in subjects with substance abuse

SLEEP PROBLEMS	%
Pittsburgh Sleep Quality Index (PSQI) score >5	96.6
Insomnia Severity Index (ISI)	severe: 16.6 moderate: 40 Subthreshold: 26.6
Berlin Questionnaire: high pre-test probability for sleep apnea	53.3
Restless legs syndrome	33
Epworth Sleepiness Scale (ESS) score >10	16.6
Narcolepsy (suggestive)	6.6
Beck Depression Inventory	severe: 30 moderate: 33.3 mild: 13.3

sleep problems and to assess if sleep disturbances contributed to the relapse of substance abuse.

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