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Introduction and Method

Research to develop a better understanding of how cannabis use impacts on sleep and the extent to which cannabis use is associated with changes to sleep architecture is rarely conducted.

Recognising the proportion of cannabis users who have sleeping problems or who use cannabis to assist their sleep may be clinically helpful when assisting individuals interested in abstaining from cannabis use.

English language studies on human participants including specific measure of cannabis and sleep were located through online search of eight electronic databases. Review papers, qualitative articles, opinion pieces, letters or editorials, case reports (n<6), and published abstracts were not included. This review included all papers current to the end of 2012 and did not exclude studies on the basis of methodological flaws.

In addition, a quality rating was calculated as a ratio of 14 areas that could introduce a risk of bias or not (higher percentages showing less risk of bias). The chosen areas were based on the Cochrane Collaboration's Risk of Bias Assessment Tool (2011), and Effective Practice and Organisation of Care Review Group Data Collection Checklist (2009).

Results

Initial searching resulted in 2215 manuscripts, and after duplicates were removed (n=730), and application of exclusion criteria (n=1358), 127 relevant articles remained and these articles fell into six different categories:

- 1) Studies involving the administration of cannabis to determine its effect on sleep, typically utilising sleep laboratories and recruiting individuals with no recent use
- 2) Studies investigating the prevalence of those experiencing withdrawal following cannabis use, typically recruiting experienced cannabis users
- 3) Studies describing the particular effects on sleep that occur during withdrawal, typically utilising sleep laboratories and recruiting experienced cannabis users
- 4) Studies describing medicinal cannabis use for the purpose of assisting sleep
- 5) Clinical trials involving the use of cannabis as a medicine for health conditions which included sleep outcomes
- 6) Studies describing the correlations between sleep problems and current cannabis users and previous users

Cannabis administration and sleep

15 studies – combined 'N'=556

Study quality: range: 17-72%, average: 40.7%

All articles included EEG readings following cannabis dosing. Most consistent results showed a decrease to time spent in slow wave sleep (SWS; 5/7 studies) and an increase to time spent in random eye movement sleep (REM; 3/7 studies).

Moderately consistent decrease to sleep latency (5/13 studies) and other measures of sleep such as quality and satisfaction (4/9 studies).

Stage one was not influenced (7 studies), nor was sleep awakenings (9 studies) and stage 2 was rarely affected (2/7 studies), as was overall sleep time (1/13 studies)

Prevalence of sleep problems during cannabis withdrawal

17 studies – combined 'N'=8161

Study Quality: range: 38-73%, average: 58.6%

Withdrawal prevalence ranged from 15.6% to 100% depending on the sample and criteria for withdrawal (typically more than three symptoms required for diagnosis). Average prevalence was 56.6%.

The most consistently reported symptoms were “trouble sleeping” (15 studies; range 3.4% to 87%, 46.5% on average) and “strange or intense dreams” (10 studies; range: 5.1% to 49%, 23.0% on average).

13 studies reported on the prevalence of relapse during withdrawal which ranged from 2% to 77.3% and average of 36.4%.

Sleep problems during withdrawal

27 studies – combined 'N'=769

Study quality: range: 29-80%, average: 54.3%

Disruptions to sleep during withdrawal were more pronounced for REM sleep (7/12 studies) and SWS (5/8 studies) compared to stage 1 (3/6 studies) and stage 2 (4/6 studies). SWS tended to increase and REM decreased during withdrawal but results were mixed.

Overall sleep time appeared to be effected (12/22 studies) and was most consistently decreased (10/12 studies). Similarly, sleep latency was effected (13/20 studies) and most consistently increased (9/13 studies) as were other indicators of sleep quality and satisfaction (11/19 studies) which consistently decreased. Night time awakenings and movements were largely unaffected (12/18 studies and 4/6 studies, respectively)

Prevalence of using medicinal cannabis to assist sleep

11 studies – combined 'N'=5333

Study Quality: range: 28-54%, average: 42.3%

These studies reported on the prevalence of using cannabis to assist sleep (7 studies), to assist a sleeping disorder (7 studies) and the prevalence of users who claim that cannabis use improves their sleep (6 studies).

Use to assist sleep ranged from 45% to 93.3% of the samples (64.4% on average) and use to assist a sleeping disorder ranged from 0% to 43% of the samples (13.8% on average). Of those who used to help their sleep, those claiming improvement ranged from 50% to 92% of the samples (76.3% on average)

Cannabis administration - medicinal

28 studies – combined 'N'=3620

Study quality: range: 17-70%, average: 48.2%

Conditions under investigation included pain (12 studies), Multiple Sclerosis (9 studies), and other conditions such as anorexia, cancer, and HIV aids.

Most studies showed an effect on sleep in the clinical trial (19/28 studies), although only 6 studies included a validated measure of sleep, and only two included an objective measure.

No study showed an effect on sleep time (4/4 studies), sleep quality tended to increase (12/19 studies), trouble sleeping decreased (3/3 studies) and number of night time awakenings decreased (4/7 studies)

Correlations between sleep problems and cannabis use

29 studies – combined 'N'=104230

Study Quality: range: 19-72%, average: 47.6%

The slight majority of studies showed an association between cannabis use and poor sleep (14/26 studies). Initiation to cannabis use predicted later sleep problems (2/2 studies). Likewise, poor sleep predicted later initiation to cannabis use (3/4 studies).

Three studies included an objective measure of infant sleep following use during pregnancy. Results were mixed, but each study showed a negative effect on infant sleep, including: less sleep time (2/3 studies), irregular REM sleep time (1/3 studies) and increased body movement (1/3 studies)

Conclusions

Several limitations to the research prevent any informative conclusions regarding the influence of cannabis on sleep to be made.

First, the included articles were typically of low quality (overall average was 49.5%), meaning that risk of bias was high. Specifically, very few articles included a validated measure of sleep (29/127 studies) or an objective observation (29/127 studies). Moreover, few studies included a control for confounding factors – particularly pre-existing conditions that may effect sleep and other substance use (including caffeine).

Second, over half of the studies were conducted in the US (66/127 studies) and Canada (15/127 studies). As such, the findings presented may not be representative of the Australian population or other countries with a more restrictive political climate around cannabis use.

Third, the majority of studies were short-term, looking at the influence of cannabis use on sleep over a period of weeks. As such, the longer term impact of cannabis use is not as well understood. Notably, those studies describing sleep problems among long term users showed mixed results.

Summary

The acute effects of cannabis use on sleep appear to be a disruption to the sleep cycle reflecting a reduction in time spent in slow wave sleep and an increase in time spent in random eye movement sleep. Withdrawal from cannabis shows an opposite trend. A secondary impact on sleep latency may be present where both use and withdrawal appear to increase the time taken to fall asleep. Other measures such as sleep time, body movements, night time awakenings and sleep quality were not consistently influenced.

Sleep problems during cannabis withdrawal were reported by approximately half of the samples reviewed and did not appear to be a consistent cause for relapse

Paradoxically cannabis use tended to improve sleep among populations using cannabis medicinally although this may reflect an improvement in condition related symptoms which reduce sleep.

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