How Does Cannabis Affect the Stages of Your Sleep?

There isn't a simple answer to that question, in large part because there are several factors that come into play.

January 21, 2020 By Michael Breus, PhD

Always consult your doctor before you begin taking a supplement or medication, or make any changes to your existing medication and supplement routine. This is not medical advice; it is information you can use as a conversation-starter with your physician at your next appointment.

Interest in cannabis as a medicinal and therapeutic tool is at an all-time high. (Pun definitely intended.) There's a multi-billion-dollar cannabis market that is growing fast, filled with tinctures, vaping options, edibles, creams, oils and other cannabis products.

It all can be pretty confusing and more than a little overwhelming.

I've had a lot of interest from patients and readers about cannabis' potential to help improve sleep. And I've done some writing about the science around the benefits of cannabis for sleep. But I'd like to do more to respond to all this interest. With that in mind, I'm launching what I hope will be a thoughtful, easy to understand, evidence-based conversation about cannabis and sleep: what we know today about how cannabis affects sleep, where the research is headed, what the uses, benefits, and risks look like.

It's a BIG topic, too big for a single article. Look for a series of regular installments on different elements of the cannabis-sleep relationship, from its promise as a treatment for sleep disorders including insomnia and sleep apnea, to issues and concerns around heavy use and withdrawal, to the question of whether cannabis offers a more natural alternative pharmaceutical sleep aids.

Together, over time, we'll ask questions and examine the science, staying close to this topic as research continues to emerge and further inform our current understanding of how cannabis affects sleep and sleep disorders.

We're starting with a pretty common question: how does cannabis affect sleep architecture, the cycles and stages of sleep we experience every single night? There isn't a simple answer to that question, in large part because there are several factors that come into play, including:

- Dosing

- How cannabis is consumed or used
- The strain of cannabis being used

That said, there is scientific research that broadly addresses how cannabis affects sleep stages and sleep cycles, and how the major chemical compounds found in cannabis influence sleep architecture. That's what we'll look at today.

First, let's do a quick refresher on some of the most significant active components of cannabis, and how to begin thinking about different strains of cannabis in relation to sleep.

The major components of cannabis and their influence on sleep

When we talk about cannabis and its role in sleep, cannabinoids come right to the top of the list of important chemical compounds. There more than 400 chemical compounds in cannabis, and dozens of cannabinoids.

Cannabinoids for sleep

Cannabinoids have attracted a lot of interest for their potential benefits for sleep and other health conditions, including depression and anxiety, Alzheimer's and Parkinson's, seizure disorders, different forms of cancer, and chronic pain.

Three of the best-known and most-studied cannabinoids all have effects on sleep.

CBD

Cannabidiol, or CBD, is a non-mind-altering cannabinoid that promotes relaxation.

I've written about the benefits of CBD, including for sleep, also here, and here. CBD has no psychoactive effects—that means there's no "high" associated with this compound. Scientists think instead that CBD works to balance or counteract the high that's delivered from the cannabinoid, THC.

There's a compelling body of research showing CBD's ability to reduce anxiety, relieve pain, promote mental focus and clarity. CBD also may to reduce daytime sleepiness and promote alertness.

THC

Tetrahydrocannabinol, or THC, is the main psychoactive cannabinoid in cannabis. THC is what gives the high that's associated with cannabis use. THC has been shown to have a range of therapeutic benefits, including pain relief. THC has sedative effects. Really interesting emerging evidence indicates that THC may improve breathing during sleep, which makes THC a potential therapy in the treatment of obstructive sleep apnea.

CBN

Cannabinol, or CBN, is a less well-known cannabinoid than CBD. It appears to have powerful sedative effects, which may be enhanced when its combined with THC. CBN also has pain-relieving, anti-inflammatory properties. Here's where you can read my previous discussion of the potential effects of CBN on sleep, and pain.

Terpenes for sleep

Beyond cannabinoids, there's another whole set of molecules that affect how cannabis acts in the body and specifically affects sleep. Terpenes are tiny, aromatic molecules in cannabis that create its smell and taste. Terpenes aren't only found in cannabis—they're abundant in the natural world, numbering in the thousands, and found in most natural plants, fruits and flowers.

The cannabis plant contains about 200 terpenes, including several with benefits for sleep. The terpenes found in cannabis and other plants don't all have the same effects. Individual terpenes have distinct impacts on sleep, mood, and cognition. Some are stimulating, others are sedating. I recently wrote about terpenes that have been shown in scientific study to enhance relaxation and reduce anxiety, as well as provide direct sedative effects.

Different cannabis strains have different effects on sleep

The most common cannabis strains are Indica and Sativa. There are also hybrid strains that combine the two. Indica is generally considered to be relaxing and sleep promoting. Sativa is generally regarded as more energizing and invigorating.

However, these broad generalizations of Indica and Sativa can be just that: too broad. A more specific way to target strains of cannabis to meet specific sleep and health goals is to go beyond the indica-sativa distinction, and focus on different strains specific compositions of cannabinoids and terpenes. When considering using cannabis for sleep (or other health conditions), we appear to be best served by using an understanding of the effects of cannabinoids and terpenes to choose the particular strain that's most suited to our individual needs.

When it comes to sleep, generally that means identifying a strain that contains relaxing terpenes, and a balance of CBD and a not-too-high concentration of THC.

How does cannabis affect sleep architecture?

Sleep architecture refers to the nightly structure of sleep, as it moves through repeated cycles and individual stages. Every full cycle of sleep (a typical,7-to-8-hour night's sleep includes 4-5 complete cycles) contains two main types of sleep: non-REM (or NREM) and REM sleep. Within NREM, there are four different sleep stages, moving from light sleep to deep sleep. REM sleep is a distinct stage from the 4 stages of Non-REM. All the stages of sleep appear to be affected by cannabis, to a degree.

Light sleep: Stages 1 and 2

These light non-REM sleep stages tend to be increased by use of cannabis. Within the body, activation of the endocannabinoid system has been shown to lengthen non-REM sleep phases. The

sedative properties of cannabis, most closely associated with the cannabinoid THC as well as with several different terpenes found in cannabis, help shorten sleep latency—meaning, it helps you fall asleep more quickly, and perhaps lengthens the early phases of these lighter stages of non-REM sleep.

Light sleep might sound like a throwaway sleep—inconsequential, or lacking in substance. It's not. Throughout a night of sleep, light sleep paves the way for the cyclical stages of deep sleep and REM sleep, with changes to brain waves, nervous system activity, and hormones. Dreaming can occur during light sleep, and important elements of cognitive processing—including the emergence of sleep spindles in Stage 2, which help the brain transfer memories and newly acquired information, and also elevate the soundness (aka quality) of sleep—take place during these sleep stages. Sleep architecture is a finely-calibrated balance of stages, each serving important purposes. That's true for light sleep as it is for slow-wave sleep and REM.

Deep Sleep: Stages 3 and 4

While the full spectrum of research to date is somewhat mixed, with some individual studies showing no changes to slow wave sleep or decreases to slow wave sleep via cannabis, a persuasive body of research has demonstrated that cannabis is likely to increases deep, non-REM, slow-wave sleep. This sleep phase, composed of Stages 3 and 4, is when the body engages in its most powerfully restorative work to the body, repairing cells and tissue, strengthening immune function, and makes important contributions to memory processing. One open question about the effects of cannabis on slow wave sleep is, for how long might these deep-sleep boosting effects last? Some research indicates that the increase of slow wave sleep from using cannabis may not be a long-term, durable phenomenon. We don't know enough yet to have a clear answer to that question.

REM sleep

There's been a fair amount of attention paid to the effects of cannabis on REM sleep. Cannabis, especially THC-rich strains, are likely to reduce levels of REM sleep. This is the stage of sleep when we do our most active dreaming, and when the brain does a lot of memory processing and consolidation of acquired information, as well as the processing of emotional experiences. REM sleep can be thought of as a kind of wiping the slate clean in the brain each night, helping prepare the brain for all the activity, including cognitive and emotional activity, that it powers during every moment of waking life.

Too much suppression of REM sleep is not healthy—that's true for all sleep stages. But it's also possible to experience too much REM sleep. Cannabis is now increasingly recognized as a promising therapeutic tool for sleep disorders associated with abnormal REM sleep and disruptive dreaming, including REM Sleep Behavior Disorder and PTSD.

What happens to sleep architecture when you stop using cannabis?

Studies have observed alterations to sleep architecture from stopping the use of cannabis, particularly after long-term and/or heavy use. Research of long-term, heavy cannabis users has

found that stopping was linked to reductions in slow wave sleep, changes to REM sleep, increased sleep disruption, and a lengthening of the time it takes to fall asleep. These changes align with the anecdotal reports of heavy cannabis users who often describe increased difficulty sleeping after stopping. But there's a lot we don't yet understand about the changes to sleep that are associated with stopping regular cannabis use, including:

- How long do these sleep changes last?
- Are these changes to sleep directly attributable to cannabis cessation—or are they revealing of sleep issues that were present before cannabis use began?

I'll talk more in an upcoming article about the issues and scientific evidence related to heavy cannabis use, withdrawal, and sleep.

How do the compounds in cannabis affect sleep architecture?

As I've said, the impact of cannabis on sleep architecture is likely to be influenced by a number of factors, including the composition of any given cannabis strain. Different strains are made up of different amounts of the cannabinoids THC, CBD, CBN and others, as well as other biochemical compounds such as terpenes. Let's take a brief look at what we know about how the two best-known, most used cannabinoids may affect sleep cycles and stages.

THC appears to be the cannabinoid that plays the most active role in altering sleep architecture, and time spent in specific stages of sleep. Over the decades of research on cannabis and sleep, many studies have focused on THC and THC-rich strains of cannabis, and it's this cannabinoid that is most closely linked to reductions in REM sleep and increases to deep, slow-wave sleep and the lighter stages of non-REM sleep. THC has clear sedative effects. Strains of cannabis that are higher in THC will generally be more sleep-inducing. But take note: a too-heavy concentration of THC can lead to next-day grogginess.

It's less clear what specific effects CBD has specifically on the cycles and stages of sleep—in part because so much of the research that focuses on cannabis and sleep includes strains with plenty of THC, making it difficult to isolate the effects of CBD apart from this other cannabinoid. Some research has demonstrated that CBD delivers little to no effect on sleep architecture, but it's important we see more research before drawing any firm conclusion. CBD has been shown as a promising therapy for REM behavior disorder. At different doses, CBD can be either stimulating or sedating. Low doses of CBD tend to provide stimulation, while higher doses deliver sedative, or sleep-inducing effects. Right now, it appears that CBD's most potent role in facilitating sleep comes through relief from its ability to relieve anxiety and pain.

Next, I'll discuss the scientific evidence for cannabis as a treatment for insomnia.

Let me know what questions you have about cannabis and sleep, and I'll do my best to answer them here!

Sweet Dreams,

Michael J. Breus, PhD, DABSM

The Sleep Doctor

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