

Cannabis and dementia

<https://www.alzheimers.org.uk/>

What is cannabis?

Cannabis, also known as marijuana, is a plant. The dried leaves, flowering parts or resin extracted from the plant can be taken recreationally, mostly to invoke feelings of sociability, happiness or relaxation. The main component of cannabis that causes these effects is called THC, which stands for tetrahydrocannabinol.

There are some existing medical uses for cannabis, including to relieve certain types of pain and to treat symptoms of nausea that can come as part of chemotherapy.

How does cannabis affect the brain?

Cannabis targets a system in the brain known as the endocannabinoid system. The system is comprised of receptors called CB1 and CB2. The CB1 receptor is found throughout the brain including in the hippocampus, which is the memory and learning centre. The CB2 receptor is found chiefly on specialised immune cells called microglia.

The endocannabinoid system is involved in memory, appetite regulation and response to stress. The brain naturally produces endocannabinoids, which affect these receptors. The THC component of cannabis mostly binds to the CB1 receptor and stimulates its activity, causing many of the symptoms associated with use of the drug. However, another component of cannabis, cannabidiol (CBD) can bind to both the CB1 and CB2 receptors and is thought to prevent or dampen down their activity.

Whilst use of cannabis is associated with side effects that are often considered desirable in the short-term, long-term use of some types of cannabis (especially those with a high amount of THC) have been associated with symptoms related to psychosis. The evidence behind whether cannabis is related to cognitive decline is conflicting, but heavy cannabis users are thought to be at higher risk.

Why is cannabis associated with dementia?

The hippocampus, which contains the CB1 receptor, is known to be vulnerable to the underlying causes of Alzheimer's disease and this damage contributes towards the problems with memory and learning associated with the disease. There is also building evidence that the microglia, which contain the CB2 receptor, play a crucial role in the development of Alzheimer's disease. Coupled with this, some studies have found that people with Alzheimer's disease have an increased number of CB2 receptors in their brains.

Can cannabis prevent or treat dementia?

There has been some research interest in the role of the endocannabinoid system as a potential target for treatments for Alzheimer's disease. Some studies have shown that components of cannabis, including THC, appear to remove the Alzheimer's hallmark amyloid clumps from nerve cells grown in the lab. A study that gave a combination of THC and CBD to mice that showed symptoms of Alzheimer's disease found that the mice had improved learning and had less evidence of amyloid clumps in their bodies. Other researchers believe that targeting the CB2 receptor could control the activity of

microglia, preventing the potentially harmful overactivation of the immune system in the brain.

However, as yet no studies or trials have looked into the effects of cannabis or its components on the underlying causes of Alzheimer's disease in people. Whilst the studies in the laboratory show some promise, we need to understand the wider effects that these components have before we can know whether they have any effect - positive or negative - on the development of Alzheimer's in people.

It is also worth noting that many of these studies have involved a particular component of cannabis in isolation. Even if one component is found to influence dementia risk, it doesn't necessarily mean that taking cannabis would have the same effect.

There is also a large amount of variation in the levels of THC and CBD in different strains of the plant so the effects could depend on the type of cannabis used.

Can cannabis treat some of the symptoms of dementia?

The few clinical trials that have taken place on the effects of cannabis for people affected by dementia have looked at whether the drug can help to manage some symptoms of the condition. Symptoms such as agitation and aggression could in theory be counteracted by the effects of cannabis or its components.

A few small clinical trials have assessed the effects of cannabinoids, including THC and synthetic cannabinoids such as nabilone, on behavioural symptoms of dementia. However, scientific reviews have found that the trials and studies so far have generally been small or of low quality (see here and here for references), making it difficult to come to an informed conclusion.

Has Alzheimer's Society ever funded research into cannabis and dementia?

Alzheimer's Society has never funded research into cannabis and dementia risk, or into cannabis as a potential treatment for dementia symptoms. However, this is because we have not received any high-quality applications from researchers intending to investigate this.

If we received a high-quality application into cannabis and dementia from a researcher based at a UK university, research institute or NHS trust, then we would certainly consider this for funding.

Conclusion

There is some interesting evidence at laboratory level that certain components of cannabis may be able to target the underlying processes behind dementia, particularly Alzheimer's disease. However, at present there is a lack of good quality evidence and understanding as to how cannabis use affects a person's risk of dementia, or whether the drug can help to manage some of the symptoms of the condition. As cannabis use could negatively affect memory and thinking, particularly in heavy users, much more research needs to be done to tease apart any potential benefits and drawbacks.