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# Cannabis Effectiveness on the Motor Symptoms of Parkinson's Disease

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## Abstract

Fueled by news media reports, cannabis use has been ever growing in popularity for the treatment of both motor and non-motor symptoms of Parkinson's disease (PD). The purpose of this literature review is to evaluate the safety and efficacy of using cannabis to treat the motor symptoms and levodopa-induced dyskinesia of PD. In this literature review electronic databases were searched and included PubMed, CINAHL, Embase, DynaMed Plus, Cochrane Library, Academic Search Premier, and Clinical Key. A variety of keywords and mesh terms, as listed below, were used to define a set of literature. There were 16 studies chosen for review that were completed within the last 20 years, included only human subjects, and were excluded if it was a case study with only one subject. Much of the research displayed discrepancies on the evidence for cannabis use to treat the motor symptoms and dyskinesia of PD; however, a large amount of the research deems cannabis safe for use in most PD patients. The current research available does not conclusively provide enough quality evidence to suggest using cannabis is an effective treatment for motor symptoms and dyskinesia in PD. Furthermore, there is a significant need for more quality research on the effects of cannabinoids for PD, to better comprehend the pharmacology, therapeutic benefits, and adverse effects of various cannabis formulations.

## Statement of the Problem

- Recent social and news media has been showing videos displaying how cannabis seems to be effectively treating the movement-related symptoms of PD
- Medical cannabis (MC) has now been legalized in 33 states with 13 considering PD as a medically qualified condition
- Basis for using MC as a PD treatment is due to PD patient's having less cannabinoid type 1 (CB<sub>1</sub>) receptors than those without PD
  - MC acts as an agonist on the CB<sub>1</sub> receptors so it may hold the potential to improve PD motor symptoms, or levodopa-induced dyskinesias
- Although promising, questions arise to the validity of studies showing cannabis success in PD treatment, and if this success is just a placebo effect for patients suffering from a debilitating condition.

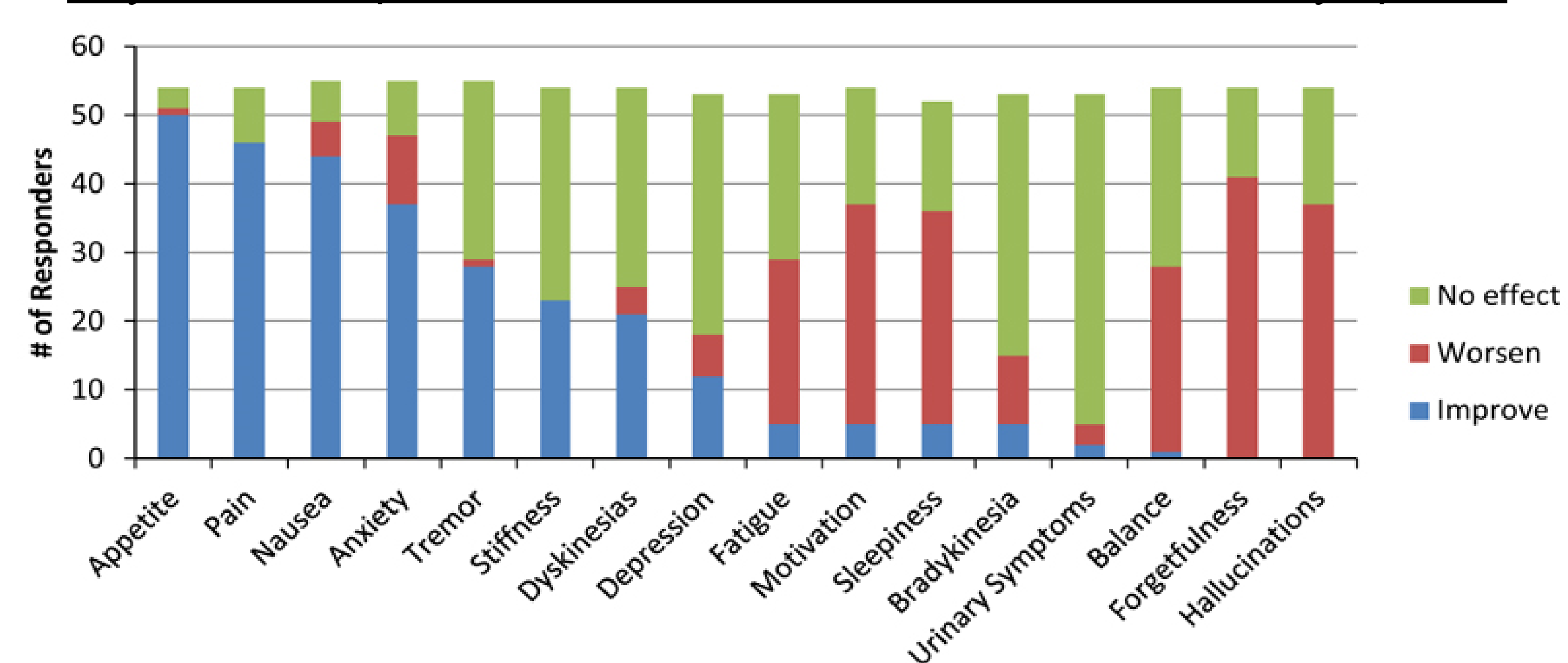
## Research Question

- In patients diagnosed with Parkinson's disease, is there sufficient evidence to suggest cannabis is an effective therapy in treating the motor symptoms and levodopa-induced dyskinesia associated with Parkinson's disease?

## Literature Review

- Safety of Cannabis Use**
  - Bega et al. (2017) surveyed PD experts and found that many providers had concerns for adverse effects related to memory, executive functioning, drowsiness, and hallucinations.
  - Cannabinoids appear to be well tolerated overall by PD patients, but a CBD dominant chemovar should be chosen due to less AEs observed and THC chemovars worsening symptoms in patients with dementia, psychiatric, substance abuse, or respiratory disorders (Buhmann et al., 2019; MacCullum & Russo, 2018).
  - MacCullum and Russo (2018) found smoking to be the most common form of cannabis administration but that it was associated with the most toxic byproducts and inconsistencies in dosing.

Physicians' Expectations of How Cannabis will Effect PD Symptoms



Source: Medical Marijuana. (2019). Retrieved from <https://www.parkinson.org/Understanding-Parkinsons/Treatment/Medical-Marijuana>.

## Efficacy of Cannabis Use to Treat Motor Symptoms of Parkinson's Disease

- Three separate studies at Rabin Medical Center in Israel all found that patients UPDRS motor scores had statistically significant improvement after cannabis administration (Balash et al., 2017; Lotan et al., 2014; Shohet et al., 2017).
- Chagas et al. (2014a) did not find any significant statistical differences in PD patients using placebo versus CBD to alleviate their motor symptoms from PD.
- Two separate patient surveys found that cannabis use in PD patients improved their overall PD symptoms, but did not show any significant improvement in motor symptoms (Kindred et al., 2017; Venderova et al., 2014).

## Efficacy of Cannabis Use to Treat Levodopa-Induced Dyskinesia

- Sieradzan et al. (2001) found that nabilone significantly reduced levodopa-induced dyskinesia (LID) compared to the to the placebo (P < 0.05).
- Mesnage et al. (2004) did not find that dopaminergic antagonist CB1 led to significant improvement in PD patient motor symptoms or decrease the severity of their LID compared to the placebo group.
- Carroll et al. (2004) reported that using cannabis to treat LID worsened patient's dyskinesia compared to the placebo group, but without statistical significance (P = 0.09).

## Discussion

- Further research is needed to suggest that cannabis or CBD can be used to effectively treat the motor symptoms or LID of PD
  - New research must emphasize greater control over cannabis route of administration, dosing, and strain
  - New research must account for positive outcomes that are caused by the anti-PD medication itself
- If prescribing cannabis for a patient a CBD predominant chemovar should be used over a THC predominant chemovar
  - The cannabis should also be prescribed in an oral form if possible to have better control over dosing and AE management
- Five of the eight studies reporting that cannabis may relieve PD motor symptoms were in survey design suggesting that positive outcomes from cannabis administration may be due to a placebo effect
- Results from the four RCTs of this literature review suggest that cannabis does not improve motor symptoms or LID of PD, and possibly may even worsen symptoms.

- Secondary outcomes observed in the review suggest that CBD could lead to relief in non-motor symptoms of PD, especially for pain and in REM sleep behavior disorder.



## Applicability to Practice

Medical cannabis is becoming more frequently requested by patients in a multitude of clinical settings and for a variety of reasons. PD is one of the reasons in question, and many providers could benefit from further education on cannabis efficacy, chemovar preference, drug interactions, and side effects when they are considering therapies for their patients with PD. The research conducted in this literature review can act as a guiding factor to medical providers when deciding whether they want to prescribe medical cannabis in their practice.

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## Introduction

- Parkinson's disease (PD) is a neurodegenerative condition characterized by a loss of dopaminergic neurons and an accumulation of Lewy bodies within the substantia nigra of the brain.
- These neurological changes lead to debilitating motor symptoms such as bradykinesia, tremors, limb rigidity, and gait or balance problems.
- To date, there is no cure for PD and the goal of treatment has been to treat the symptoms, with dopaminergic agents being the mainstay of treatment.
- The purpose of this literature review is to further understand the effects and safety of using cannabis as adjunctive therapy in a PD treatment regimen.

