REVIEW ARTICLE

The Topical Application of Cannabidiol for Pain Relief

by Healthcare International Research Limited

INTRODUCTION

As part of HIR's ongoing efforts to evaluate the effects and benefits of Cannabidiol (CBD), HIR present their second white paper that explores how the topical application of CBD significantly contributes to pain relief. The paper commences by revealing the economical and societal costs of pain and confirms that chronic pain is an extant global problem. The paper then discusses how the endocannabinoid system is affected by injury, sickness or trauma and how supplementation of exogenous plant-based cannabinoids can help stabilise the system. The paper then assembles the prevailing literature relevant to Cannabidiol for pain relief and for inflammation reduction and discusses the findings. A short section then identifies urgent gaps in the current literature that emphasise the need for further studies to address emergent questions. A concluding section then summarises the salient points of this paper.

THE ECONOMICAL & SOCIETAL COSTS OF PAIN

Ten years ago, empirical research revealed that over 100 million people within the United States suffered from chronic pain[1]. The economic value of lost productivity due to pain ranged from $299 to $335 billion. Alarmingly, the annual cost of pain was greater than the annual costs of heart disease ($309 billion), cancer ($243 billion), and diabetes ($188 billion). Persistent pain also destabilises societies. A seminal study examining the societal cost of pain in Austria determined that chronic pain causes anxiety and depression and contributes to sleep disturbances, fatigue, functional disability and a degradation to quality of life[2]. Consequently, pain relief remains an extant global problem. This viewpoint is shared across scholars and healthcare professionals with the majority agreeing that chronic pain is one of the most burdensome diseases in industrialised countries[3]. With an overwhelming body of evidence concluding that chronic pain is an urgent problem it is alarming that not enough is being done to tackle the problem[4]. Further evidence concludes that patients are receiving inadequate care, due in part to deficits in knowledge and skills of healthcare professionals and there are calls for new treatments to be explored that may show new ways of contributing to pain management and relief[5].

THE ENDOCANNABINOID SYSTEM AND PAIN RELIEF

The endocannabinoid system (ECS) is the master regulatory system within the human body and plays a key function in maintaining homeostasis and balance[6]. The ECS regulates a wide range of physiological processes including mood, memory, appetite, muscle control, immune function, inflammation, and pain levels[7]. If the human body becomes sick as a result of trauma, injury, stress or toxins then the ECS can be affected and destabilised, leading to endocannabinoid deficiency. Empirical research has determined that clinical endocannabinoid deficiency can be inextricably linked to various conditions including pain, inflammatory and neurological conditions[8]. Thus, if the human body fails to produce enough endocannabinoids, then supplementation of exogenous plant-based cannabinoids may be needed[9]. Clinical studies have shown altered endocannabinoid signalling in patients with chronic pain[10] and additional pioneering research has demonstrated that either Delta-9-tetrahydrocannabinol (THC) or Cannabidiol (CBD) can be an effective therapeutic option for patients with neuropathic pain and other types of chronic pain[11]. THC has proven to contribute to pain relief and reduce inflammation but scientists caution that THC can cause psychosis and induce anxiety[12]. Studies into the effects of CBD demonstrate its ability to enhance sleep, decease inflammation and effectively reduce symptoms of chronic pain. Moreover, there are minimal

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6 Sallaberry C. & Astern L. (2019) 'The endocannabinoid system, our universal regulator', Journal of Young Investigators, June 2019; 34 (6): 48-55.

7 Aizpurua-Olaizola O., Elezgarai I., Rico-Barrio I., Zarandona I., Etxebarria N. & Usobiaga A. (January 2017) 'Targeting the endo cannabinoid system: future therapeutic strategies', Drug Discovery Today, 22 (1): 105-110.

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10 Mlost, J., Wąsik, A. & Starowicz, K. (2019) 'Role of endocannabinoid system in dopamine signalling within the reward circuits affected by chronic pain', Pharmacological research, 143, pp.40-47.

11 Lynch, M.E. & Campbell, F. (2011) Cannabinoids for treatment of chronic non-cancer pain; a systematic review of randomized trials', British journal of clinical pharmacology, 72(5), pp.735-744.

12 Sharpe, L., Sinclair, J., Kramer, A., de Manincor, M. & Sarris, J. (2020) Cannabis, a cause for anxiety? A critical appraisal of the anxiogenic and anxiolytic properties', Journal of translational medicine, 18(1), pp.1-21.

risks or side effects when using CBD[13]. Studies into the side effects are extensive and most evidence now concludes that administering CBD by different routes have shown it to be safe, in regards to the effects on physiological parameters. In human studies, CBD administration does not generally induce side effects across a wide range of dosages, including acute and chronic dose regimens, and tolerance to CBD did not develop[14].

CANNABIDIOL FOR PAIN RELIEF AND FOR INFLAMMATION REDUCTION

Unfortunately, the majority of scientific research into the effects of CBD on pain relief and inflammation reduction have been on animals in laboratory conditions. Consequently, scientific research on humans in both laboratory and real-life settings is urgently needed to extend knowledge and substantiate earlier evidence. However, some research into the effects of CBD and pain relief for humans continue to show promising results. In 2017, the National Academies of Science, Engineering and Medicine published a seminal book titled The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research. Conclusions reveal there is substantial evidence that CBD is an effective treatment for pain in adults[15]. In 2020, a paper published by Sports Medicine suggested there is preliminary supportive evidence for anti-inflammatory, neuroprotective, analgesic (pain relieving), and anxiolytic actions of CBD and the possibility it may protect against GI damage associated with inflammation and promote the healing of traumatic skeletal injuries[16].

A recent study into the effectiveness of topical cannabidiol oil in symptomatic relief of peripheral neuropathy of the lower extremities found that the transdermal application of CBD oil can achieve significant improvement in pain and other disturbing sensations in patients with peripheral neuropathy[17]. Additional studies conclude that the topical application of CBD is linked to pain relief and inflammation reduction. One study indicates that CBD oil can have a significant effect on delayed onset muscle soreness from exercise induced muscle damage[18]. A second study on professional rugby players found that the efficacy of CBD does help alleviate pain, enhance recovery, and promote sleep[19]. A third study found that CBD has potent anti-inflammatory effects on the body and can stop inflammatory responses by interacting with cannabinoid receptors located in the immune cells[20].

FUTURE RESEARCH

The majority of scientific research on the topical application of CBD to treat pain and reduce inflammation has been carried out on animals in laboratory conditions with the mainstream of the literature suggesting that preclinical trials for humans show promising results. An extensive search of the current literature for CBD research on humans yields only a few studies. Consequently, further research is urgently needed to evaluate how the topical application of CBD can provide effective treatment for pain management and inflammation reduction. Important research questions emerge about frequency of application, duration of treatment and whether to apply hot or ice preparations. These are key issues to determine how CBD can be used in a wide range of social settings.

CONCLUSION

This paper aimed to discuss the topical application of CBD for pain relief. The opening section identifies the economical and societal costs of pain that highlights the importance of researching for new ways to reduce pain and inflammation. Scientists agree that the ECS plays a critical role for keeping the body in optimum condition and evidence concludes that the ECS can be drastically affected as a result of trauma, sickness or injury. Moreover, a depleted ECS requires supplementary exogenous plant-based cannabinoids. THC and CBD both contribute to replenishing and balancing the ECS but experts favour CBD over THC as there are minimal risks or side effects when using CBD. The paper then assembles the existing research papers and concludes that, whilst limited in studies, CBD does bring tangible benefits in pain management and does contribute to inflammation reduction. Further research is urgently needed across a wide range of social settings to address extant questions about the frequency, duration and type of topical CBD application.

This white paper was completed for HIR by Harry Rule. Harry is a leading independent researcher specialising in qualitative research across a wide range of sectors. He holds a Masters of Research and has recently completed a Doctor of Business Administration and leads HIR's research team.

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