Letter to editor

Monitoring the treatment with medical cannabis in patients with chronic pain due to severe osteoarthritis through the analysis of THC, CBD, and metabolites in hair

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To the Editor,

Osteoarthritis is a degenerative joint disease causing chronic pain, stiffness, and functional limitations. Traditional therapeutic options, such as analgesics and nonsteroidal anti-inflammatory drugs (NSAIDs), often fail to provide adequate relief or entail significant side effects. In this context, cannabis-based pharmaceutical preparations, called medical cannabis, is emerging as a promising option for the treatment of drug-resistant chronic pain associated with osteoarthritis. This article explores the clinical implications and future developments in the therapeutic management of patients with resistant chronic pain due to severe osteoarthritis treated with medical cannabis. Numerous clinical and preclinical studies have demonstrated that cannabinoids, the main active components of cannabis, can modulate pain and inflammation through the endocannabinoid system (1). Tetrahydrocannabinol (THC) and cannabidiol (CBD) are the two most studied cannabinoids for their analgesic and anti-inflammatory properties. THC primarily acts on the CB1 and CB2 receptors of the central and peripheral nervous systems, while CBD interacts with various non-cannabinoid receptors, helping to modulate inflammatory response and pain (2). Medical cannabis has been shown to significantly reduce pain in patients with osteoarthritis, improving quality of life and joint functionality, resulting in greater participation in daily and social activities, mitigating isolation,

and enhancing psychological well-being. The use of medical cannabis may influence opinions on chronic pain management, promoting a more natural approach compared to traditional drugs like opioids, which carry a high risk of dependency. Different combinations of THC and CBD can be tailored to the specific needs of the patient, optimizing therapeutic efficacy and minimizing side effects. The use of medical cannabis is becoming increasingly common worldwide, with numerous patients finding relief for a wide range of medical conditions, including chronic pain, epilepsy, anxiety, and sleep disorders. However, the management of medical cannabis therapy requires precise and reliable monitoring of the main active components of cannabis, particularly THC and CBD, as well as their primary metabolites. Recently, an innovative analytical method has been developed to simultaneously quantify these compounds in human hair samples, providing a detailed and long-term picture of medical cannabis use (3). Traditionally, cannabis use monitoring has been conducted through the analysis of blood, urine, or saliva samples. While useful, these methods present significant limitations, including a short detection window and the need for frequent sampling, which can be invasive and uncomfortable for patients. Hair, on the other hand, offers a unique matrix for long-term monitoring, as substances can be detected for months after use, reflecting a historical overview of drug intake.

The analytical method developed for the simultaneous quantification of THC, CBD, and their

main metabolites in hair samples is based on high-performance liquid chromatography coupled with mass spectrometry (HPLC-MS/MS) (4). This approach combines efficient chemical compound separation with the sensitivity and specificity of mass spectrometry, allowing the detection of very low concentrations of cannabinoids and their metabolites. Sample preparation is a crucial step in the analytical process. Hair must be thoroughly washed to remove any external contaminants and then ground into a fine powder. This powder is then treated with specific solvents to extract the cannabinoids and their metabolites. The resulting solution is purified and concentrated before being injected into the HPLC-MS/MS system. During the liquid chromatography phase, various compounds are separated based on their physicochemical properties. Once separated, they enter the mass spectrometry phase, where they are ionized and detected based on their mass and charge. This method allows for distinguishing between THC, CBD, and their metabolites with high precision, even in the presence of other substances that may be present in hair (5). Monitoring through hair samples offers several advantages over traditional methods. Firstly, the extended detection window allows for obtaining information on cannabis use over a period of months, rather than days (6). This is particularly useful for chronically treated patients, as it enables the evaluation of patient compliance and therapy effectiveness over time. Additionally, hair collection is non-invasive and can be easily performed in a clinical setting, increasing patient acceptability of the test. The introduction of this advanced analytical method has significant potential implications for the management of medical cannabis therapy. It is now possible to monitor cannabis intake and its effects on the patient more accurately, adapting therapy based on the objective data obtained. This could improve both treatment efficacy and safety, reducing the risk of undesirable side effects due to incorrect dosages. In the future, further developments of this methodology could include the ability to distinguish between different varieties of cannabis used and detect an even wider range of metabolites, offering an even more comprehensive picture of therapeutic cannabis use. Moreover, the application of this technology could extend to other therapeutic substances, broadening the possibilities for long-term monitoring of various pharmacological therapies.

In conclusion, medical cannabis represents a promising therapeutic option for patients with chronic pain due to severe osteoarthritis, offering potential benefits in terms of pain reduction and quality of life improvement. The analytical method for the simultaneous quantification of THC, CBD, and their main metabolites in hair samples represents a significant advancement in therapy monitoring. With its precision, sensitivity, and extended detection window, this approach offers a new and powerful tool, contributing to the improved therapeutic management of patients treated with medical cannabis. An integrated and multidisciplinary approach, supported by adequate regulations and clinical guidelines, is essential to maximize benefits and minimize risks associated with medical cannabis treatment. Adequate regulation is necessary to ensure the quality, safety, and efficacy of medical cannabis products. Furthermore, post-marketing surveillance is crucial to monitor long-term effects and appropriate use. Ultimately, the use of medical cannabis for the treatment of osteoarthritis has the potential to bring significant benefits in terms of patient quality of life, economic savings, and improvements in healthcare practices. However, it is essential to address the challenges related to regulation, education, and stigma reduction to maximize these benefits.

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