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Constituents of Cannabinoid Products

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INTRODUCTION

As the cannabis industry rapidly expands, a growing variety of cannabinoid-containing products are available, including plant material, oils, topicals, and edibles. The therapeutic potential of these products is attributed to their rich array of cannabinoids. Among these cannabinoids, cannabidiol (CBD) and tetrahydrocannabinol (THC) are the most extensively studied. Analysis of cannabinoids in different matrices is crucial to ensure product quality, consumer safety, and legal compliance.

AIMS

To identify and compare existing sample preparation techniques and analytical method parameters used to determine and quantify cannabinoids in various cannabis-based formulations.

METHOD

Systematic literature review (Figure 1) was conducted following the PRISMA guidelines[2]. The review focused on identifying peer-reviewed, open-access articles in English that described the analysis of cannabinoids in cannabis-containing products using High-Performance Liquid Chromatography with Ultraviolet detection (HPLC-UV). The search included studies published between 2010 and April 2024, using databases such as Google Scholar and PubMed.

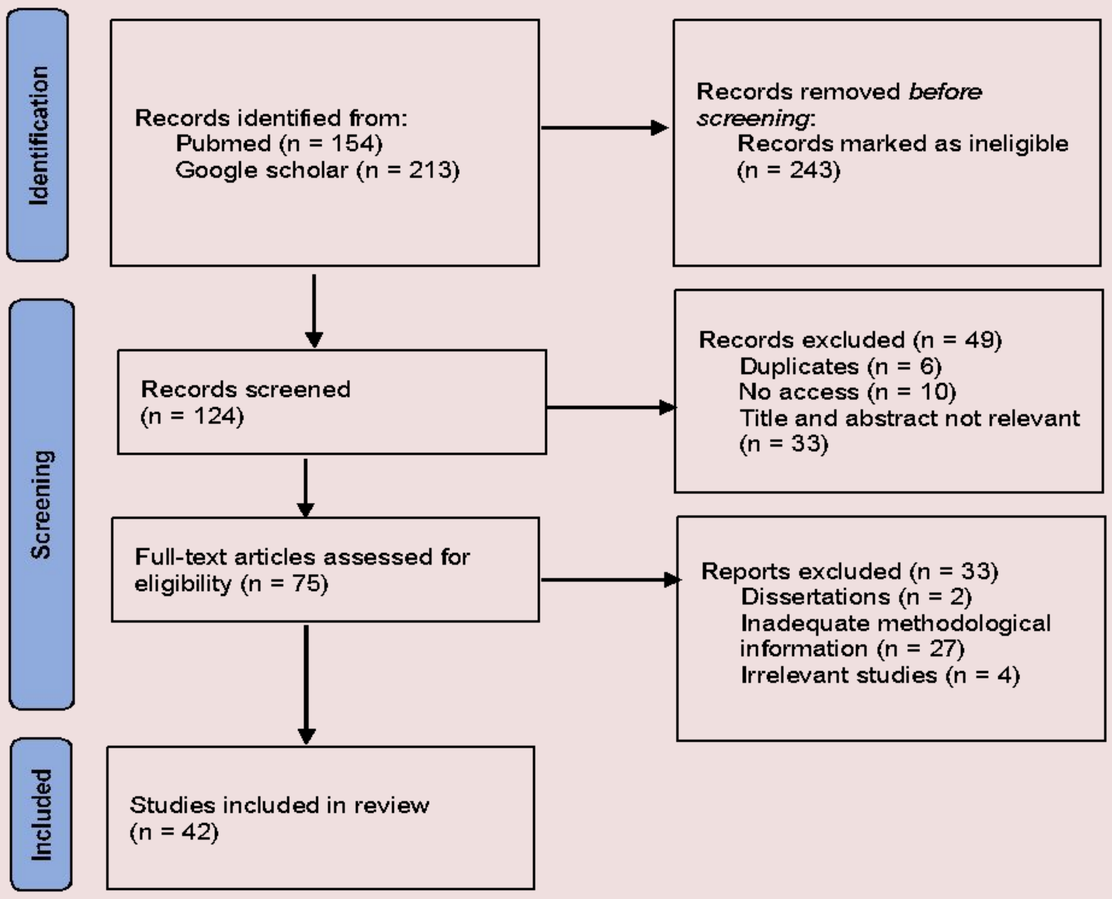

Figure 1: PRISMA flowchart

RESULTS

From the 42 articles identified, the most commonly analysed matrices were: the plant material of *Cannabis sativa* (n=25), oil extracts (n=15), and edibles (n=4). Only 3 studies focused on a broad spectrum of cannabis formulations. The most commonly analysed cannabinoids were CBD and THC (n=39), while some studies also tested for semisynthetic cannabinoids, such as delta-8-THC (n=8).

A common sample preparation method was extraction (n=42). For plant material, methanol was the most frequently used extraction solvent (n=12), followed by a mixture of methanol with chloroform (9:1) (n=6). In the case of hemp oil, studies primarily focused on extraction using acetonitrile (n=3) or methanol (n=3). Studies investigating a broad spectrum of matrices employed ethyl acetate (n=1), a mixture of ethyl acetate with isopropanol (1:1) (n=1), and a mixture of isopropanol with methanol (n=1). Heating on a hot plate was recommended for matrices that did not dissolve with primary extraction (n=2).

The literature review predominantly focused on methods utilizing High-Performance Liquid Chromatography with Ultraviolet detection (HPLC-UV) (n=42). Some studies incorporated a UV detector combined with a Diode Array Detector (DAD) (n=21) or a mass spectrometry detector (n=3). The most utilized stationary phase was the C18 column (n=29), with the Poroshell 120 EC-C18 being the most common (n=14). The column was often heated to 30°C (n=6).

The LOQ values ranged from as low as 0.008 µg/mL to 15.13 µg/mL for various cannabinoids, while the LOD values varied from 0.06 µg/mL to 4.54 µg/mL, depending on the study and analytical method.

CONCLUSION

Various methods exist for both qualitative and quantitative determination of cannabinoids which, are not harmonised, and many are not suitable for all matrices. Future research should prioritize the development and validation of more standardised methods to ensure accurate and reliable cannabinoid analysis, which is essential to meet the demands of the evolving cannabis market.

REFERENCES

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