Analysis of Novel Cannabis Products Labeled as Containing THC-JD

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ABSTRACT

Objective: THC-JD (tetrahydrocannabioctyl) is a semi-synthetic cannabinoid with an eight-carbon C3 side chain, present in only trace amounts in hemp, requiring synthesis for commercial use. It has been promoted as potentially 19 times more potent than Δ^9-THC, consistent with enhanced CB1 receptor affinities for cannabinoids with 7-8 carbon C3 side chains. While one peer-reviewed report identified THC-JD (tetrahydrocannabioctyl) in Japanese online products, an anecdotal report from the U.S. suggests mislabeling. **Method:** To inform regulatory efforts and consumer awareness and to address these discrepancies, this study chemically analyzed five U.S. commercial cannabis vape products marketed as containing THC-JD. **Results:** Utilizing GC-MS analysis with a Δ^8-THC-JD reference standard, no THC-JD was detected in any of the five commercial samples. Instead, the most prevalent compound in four of the five samples was Δ^8-THC. **Conclusions:** The absence of THC-JD in these products raises critical concerns for consumer safety, regulatory compliance, and industry integrity, as consumers risk unknowingly ingesting uncharacterized or mislabeled substances. The lack of standardization in THC-JD products raises critical concerns for regulatory compliance and industry integrity. Further studies are needed to characterize THC-JD products and evaluate their potential health risk to consumers.

Key words: = THC-JD; tetrahydrocannabioctyl; synthetic cannabinoids; hemp-derived products; Δ^8-THC; Farm Bill

The 2018 U.S. Farm Bill legalized hemp by removing it from the Controlled Substances Act, with the provision that the concentration of Δ^9-tetrahydrocannabinol (Δ^9-THC) does not exceed 0.3% on a dry weight basis (H.R.2 - 115th Congress, 2017-2018). However, the bill's expansive definition of hemp includes "all derivatives, extracts, cannabinoids, isomers, acids, salts, and salts of isomers" but does not address the chemical conversion of cannabidiol (CBD) to semi-synthetic cannabinoids (Mead, 2017; Zhang et al., 2025). As a result, semi-synthetic cannabinoids are currently marketed and sold legally as hemp-derived products (Zhang et al., 2025).

Semi-synthetic cannabinoids, such as Δ^8-THC, hexahydrocannabinol (HHC), THC-O-acetate, and others, exert psychoactive and intoxicating effects that are comparable to or greater than those of Δ^9-THC (Kruger & Kruger, 2022). Case

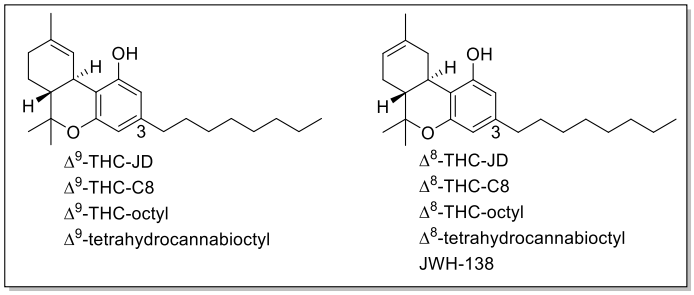
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reports link Δ^8-THC to adverse psychiatric outcomes, including psychosis (Miller et al., 2023). Animal studies have shown that when Δ8-THC was administered, dose-dependent reductions in body weight and relative organ weights were observed, showing that elevated doses of Δ8-THC may interfere with metabolic processes and/or organ functions (Sjödén, P. O. 1973). HHC, a hydrogenated derivative of THC, is psychoactive and shares Δ^9-THC–like effects (Nasrallah & Garg, 2023). Acetylated analogs such as THC-O-acetate, which are more bioavailable than THC, were reported by a majority of cohorts to be more potent than Δ^8- or Δ^9-THC (Kruger et al., 2023).

The widespread availability of products containing semi-synthetic cannabinoids has raised public health and regulatory concerns. Key issues include the absence of safety testing (Frinculescu et al., 2017), quality control (e.g., mislabeling and inconsistent batch reproducibility; Gidal et al., 2024), and gaps and ambiguities in regulatory oversight (U.S. Food and Drug Administration, 2023). While some jurisdictions have begun to restrict or ban specific semi-synthetic cannabinoids (National Conference of State Legislatures, 2022), the pace of product innovation and commercialization continues to outstrip both scientific research and regulatory responses.

THC-JD, also known as tetrahydrocannabioctyl as well as other names (Figure 1), is a semi-synthetic cannabinoid with an eight carbon C3 side chain. It is present in just trace amounts in hemp and thus needs to be synthesized for use in commercial products. THC-JD refers to both Δ^8- THC-JD and Δ^9-THC-JD (Tanaka & Kikura-Hanajiri, 2024). THC-JD has generated concern amongst both researchers and prosumers (Bone et al., 2022). This is due to promoting unique psychedelic effects and its being potentially 19 times more potent than Δ^9-THC, according to the Cannabis Commerce Industry Association (CCIA; Lange, 2022). The enhanced effects of THC-JD are consistent with the fact that cannabinoids with C3 side chains of 7-8 carbons can exhibit improved CB_1 receptor affinities and potencies relative to Δ^9-THC (Martin et al., 1999). There are no substantive toxicological studies of THC-JD published to date.

Figure 1. *Structures of the Two THC-JD Isomers Including Examples of Their Alternative Names*



Note. Note the distinctive eight carbon alkyl group bonded at carbon-3, rather than the five carbon moiety characteristic of Δ^8- and Δ^9-THC

Recently, Tanaka and Kikura-Hanajiri reported the identification of various THC analogs, including both THC-JD isomers, in online products sold in Japan between 2022 and 2023 (Tanaka & Kikura-Hanajiri, 2024). This is the only prior peer-reviewed report, to the best of our knowledge, of any positive identification of THC-JD in commercial cannabis oil products. In contrast, an anecdotal report describes five products, four edibles, and one vape cartridge, four of which originated from the same company, marketed as containing THC-JD, yet accompanied by laboratory reports indicating either that THC-JD was not tested for or that it was not detected (Lange, 2022). To inform both regulatory efforts and consumer awareness, and to address discrepancies between products available in Japan and anecdotal reports of mislabeled commercial formulations, we herein describe the chemical analysis of five cannabis vape products from U.S. manufacturers, each marketed as containing THC-JD.

METHODS

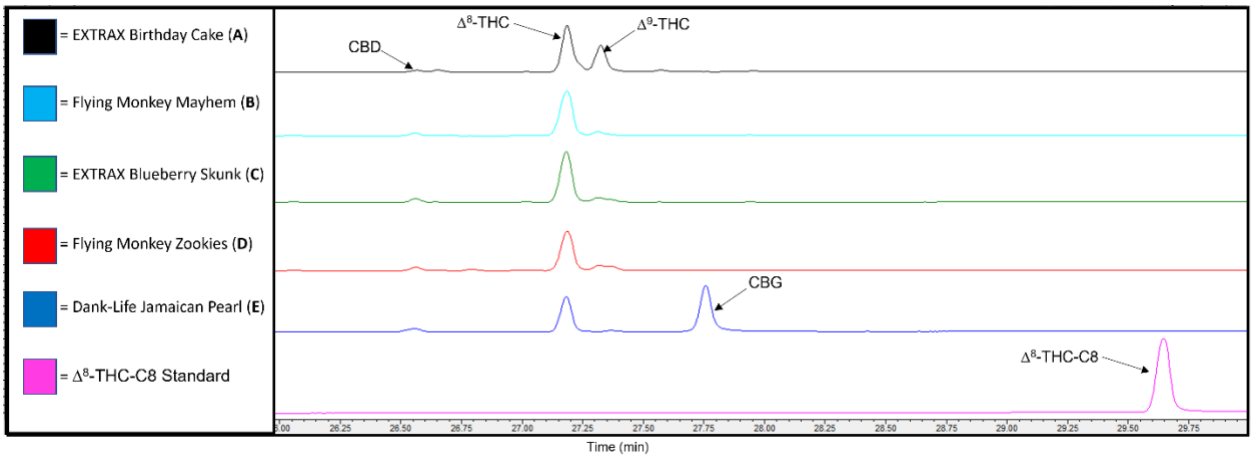
Five products labeled as containing THC-JD were purchased online (Figure 2). The procured samples included four disposable vapes and one "wax dab." The disposable vapes were disassembled, and 0.5 ml e-liquid was extracted and diluted with HPLC grade MeOH to 1 mg/ml. The samples were transferred to 2 ml autosampler vials and vortexed. Analysis was performed using a capillary GC column mounted in an Agilent (Santa Clara, CA) 7890A GC interfaced with an Agilent 5975C MS and operated in electron impact ionization mode. Fragmentation patterns were analyzed and compared to the National Institute of Standards and Technology (NIST) for positive confirmation of prominent compounds in the samples. A reference standard of D^8-THC-JD was purchased from Cayman Chemicals.

RESULTS

GC-MS analysis of the commercial reference standard of D^8-THC-JD shows that it elutes at 29.8 min and displays a corresponding molecular ion of m/z = 356 (Figure 2). Chromatograms corresponding to samples A-E are also shown in Figure 2. None contains a peak corresponding to THC-JD. Sample B did produce a peak showing a molecular ion of m/z = 356, but it eluted at 26.8 min (Figure S2). Moreover, the 26.8 min was unambiguously identified as corresponding to THC-O-acetate via comparison to an authentic standard.

The peak with the largest area in the chromatograms of four of the five samples corresponds to D^8-THC. Note that D^8-THC has a molecular ion m/z = 314, enabling unambiguous distinction from THC-JD (m/z = 356), along with a 2 min GC elution time difference (Figure 2). In addition to not detecting THC-JD in any of the samples, the relative prevalence of D^8-THC is also consistent with the aforementioned anecdotal report.[13] Additionally, precursors used for THC synthesis such as resorcinol and olivetol were identified in the commercial e-liquids, indicating that THC analogs in the samples were potentially synthesized and not obtained and purified from plant material. A more detailed analysis of the compounds identified is included in the Supporting Information.

Figure 2. *GC-MS Chromatograms of the THC-JD Reference Standard (Bottom) Along with Those of the Five Tested Samples, A-E, Claiming to Contain THC-JD*



Note. The peak appearing at 29.6 min is from the reference standard of D^8-THC-JD (D^8-THC-C8) and does not appear in any of the commercial samples.

DISCUSSION

The absence of THC-JD in several commercial cannabis products that explicitly claim to contain this compound raises important concerns relevant to consumer safety, regulatory compliance and industry integrity. It also highlights vulnerabilities in cannabinoid product oversight. It puts consumers at risk for unknowingly ingesting uncharacterized or mislabeled substances. Without accurate labeling, consumers cannot make informed decisions regarding dosing, psychoactivity, or potential adverse effects. This unpredictability increases the likelihood of acute

intoxication, drug interactions, or delayed care in vulnerable populations.

Incorrect product claims can undermine trust in cannabis testing labs, brands, and the broader hemp-derived product industry. Such claims may accelerate regulatory scrutiny of the industry, such as greater mandatory testing, batch-level QR code product traceability, or rigorous pre-market approval systems. Misrepresented compositions can make it difficult for toxicologists and pharmacologists to interpret exposure effects, undermining evidence-based health assessments.

Conclusion

This study conclusively determined that THC-JD was not present in any of five U.S. commercial cannabis vape products explicitly marketed as containing this compound. This finding is consistent with anecdotal reports of mislabeled formulations within the industry and highlights a contrast with a prior peer-reviewed report that identified THC-JD in online products sold in Japan. Instead of the advertised THC-JD, most of the tested products primarily contained Δ^8-THC.

The absence of accurate labeling and the widespread marketing of mislabeled products raise concerns regarding consumer safety. Consumers are put at risk of unknowingly ingesting uncharacterized or mislabeled substances. This unpredictability increases the likelihood of adverse effects. Incorrect product claims undermine trust in the cannabis industry, with such practices taking advantage of substantial vulnerabilities in cannabinoid product oversight. Ultimately, these findings underscore the urgent need for enhanced regulatory frameworks, robust quality control, and transparent labeling practices to safeguard public health and maintain the integrity of the rapidly evolving hemp-derived cannabinoid market.

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