

Study shows widespread mislabeling of CBD content occurs for over-the-counter products

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In a new study, Johns Hopkins Medicine researchers tested more than 100 topical cannabidiol (CBD) products available online and at retail

stores, and found significant evidence of inaccurate and misleading labeling of CBD content. The study also revealed that some of these nonprescription products contained amounts of delta-9-tetrahydrocannabinol (THC), the main active ingredient in cannabis that can cause a "high," including some products that claimed to be free of THC.

The study, published July 20 in *JAMA Network Open*, further found that some of the CBD products made therapeutic claims not approved by the U.S. Food and Drug Administration (FDA). To date, the FDA has only approved one prescription CBD product to treat seizures associated with rare epilepsy disorders, and two prescription THC products for nausea and vomiting associated with chemotherapy and for loss of appetite and weight loss associated with HIV/AIDS.

"Misleading labels can result in people using poorly regulated and expensive CBD products instead of FDA approved products that are established as safe and effective for a given health condition," says study lead author Tory Spindle, Ph.D., assistant professor of psychiatry and behavioral sciences at the Johns Hopkins University School of Medicine.

According to the National Institutes of Health's National Center for Complementary and Integrative Health, CBD and THC are the most commonly known compounds in the plant *Cannabis sativa*. A key difference between the two is that THC can produce a psychoactive "high" effect at high doses, whereas CBD doesn't.

Under the Agriculture Improvement Act of 2018 (the Farm Bill), CBD products that contain less than 0.3% of THC are not considered federally illegal substances. This has made CBD products particularly popular and widely available to consumers virtually anywhere, but it also makes it difficult for the FDA to address unapproved claims and mislabeling.

However, Spindle notes, "Recent research has shown that people who use CBD products containing even small amounts of THC could potentially test positive for cannabis using a conventional drug test." This has not been determined for topical CBD products, but the authors are currently studying it.

For the study, the research team purchased 105 CBD topical products—including lotions, creams and patches—online and at brick-and-mortar retail locations in Baltimore, Maryland, in July and August 2020. Products were tested using a technology called gas chromatography-mass spectrometry to identify the actual amount of CBD and THC they contained.

Only 89 (85%) of the 105 tested products listed the total amount of CBD in milligrams on the label. Of the 89 products, 16 (18%) contained less CBD than advertised, 52 (58%) contained more CBD than advertised and 21 (24%) were accurately labeled. On average, the in-store products contained 21% more CBD than advertised and the online products contained 10% more CBD than advertised, though CBD label accuracy varied widely across products.

THC was detected in 37 (35%) of the 105 products, though all were within the legal limit of 0.3%. Four (11%) of those 37 were labeled as "THC free," 14 (38%) stated they contained less than 0.3% THC and 19 (51%) did not reference THC on the label.

Of the 105 products, 29 (28%) made a therapeutic claim, mostly about pain/inflammation, 15 (14%) made a cosmetic/beauty claim (e.g., that they alleviate wrinkles or nourish/improve skin) and 49 (47%) noted they were not FDA approved. The other 56 (53%) products made no reference to the FDA. "It's important to note that the FDA has not approved CBD products to treat any of the conditions advertised on the products we tested," says Spindle, who also is a faculty member at the

Johns Hopkins Cannabis Science Laboratory.

"The variability in the chemical content and labeling found in our study highlights the need for better regulatory oversight of CBD products to ensure consumer safety," says Ryan Vandrey, Ph.D., professor of psychiatry and [behavioral sciences](#) at the Johns Hopkins University School of Medicine and the study's senior author. Such regulation, the authors believe, would ensure CBD products meet established standards for [quality assurance](#) so consumers can make informed decisions about product selection and are not misled by unproven therapeutic or cosmetic claims. The study authors also caution that people should check with their health care practitioner before starting any CBD regimen.

More information: Tory R. Spindle et al, Cannabinoid Content and Label Accuracy of Hemp-Derived Topical Products Available Online and at National Retail Stores, *JAMA Network Open*, (2022). [DOI: 10.1001/jamanetworkopen.2022.23019](#)

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