K45 A Determination of Δ-9-Tetrahydrocannabinol (THC) and Cannabidiol (CBD) in Edibles Using Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)

Mingjing Sun, Emporia State University, Emporia, KS 66801; Courtney Sellens, BS, Emporia State University, Emporia, KS*

Learning Overview: The goal of this presentation is accurately determining the amount of CBD and THC from edibles.

Impact on the Forensic Science Community: This presentation will impact the forensic science community for accurately analyzing the abuse drug by quantitatively determining the amount of CBD and THC in edibles from local stores. This presentation will also help to establish a reliable method to determine CBD and THC to promote the research and development of industrial hemp.

Cannabis products are by far the most abused drugs on the illicit drug market. The most popular used cannabis products are Δ-9-THC and CBD. Tetrahydrocannabinol Acid (THCA-A) is a non-intoxication cannabinoid and as the plant dries, this gets transformed into THC by decarboxylation as heat expedites. Cannabinol (CBN) is a lesser-known cannabinoid that is less than 1% in most strains, but it could be generated when THC is oxidized.

Several states had legalized the use of medical cannabinoids as well as the recreational use. The most common way of administering cannabinoids is the oral route, in the form of edibles, such as baked goods, candies, gummies, chocolates, and beverages. Because it takes longer for the initial psychoactive effect of edibles to be felt, the edible could be easily overconsumed. Overdosing on cannabinoids might cause severe health and mental problems. On the other hand, there is a possibility that the labeled amounts of CBD and THC do not reflect their real values, and the residues of THCA-A and CBN in the edibles could be another concern. However, determination of cannabinoids in edibles is a problematic task due to the complexity of the involved matrices. Therefore, a reliable and accurate method to determine CBD, THC, THCA-A, and CBN is needed. In this study, a sensitive LC/MS/MS was developed to determine active cannabis compounds from edibles.

Edible samples were purchased from two CBD shops in Emporia, KS, including gummy bears, chocolate sandwich cookies, chocolate bars, honey sticks, and CBD water. For sample process, gummy bears, cookies, and chocolate bars were cut into small pieces, frozen overnight, and ground to powder. One gram of sample was soaked with 10mL water for 30 minutes, 10ml of acetonitrile was added, extracted with Quick, Easy, Cheap, Effective, Rugged, and Safe (QuEChERS) salt, purified by Clean Screen® THC extraction Solid-Phase Extraction (SPE) column, then analyzed with LC/MS/MS. For the honey stick and water sample, 1mL sample was diluted with CAN and directly analyzed with LC/MS/MS.

The recovery study was conducted with similar blank samples (gummy bears, Oreo® sandwich cookies purchased from a local Walmart® store). THC, THCAA, CBN, and CBD standards were spiked into the sample, then extracted and analyzed with LC/MS/MS. THC, THCA-A, CBN, and CBD were separated on a Agilent® Poroshell 120 EC-C_{18} column, and detected by triple-stage quadrupole mass spectrometer with linear ion trap capability (SCIEX™ 3200 Qtrap®). THC-d3 and CBD- d3 were used as internal standards. THC, CBN, and CBN were analyzed in positive mode and THCA-A was analyzed in negative mode.

Linearity, sensitivity, matrix effects, and recovery were studied to validate the method. The results show the method is satisfied for quantitatively analyzing THC, THCCA, CBN, and CBD from edibles. The amount of those four cannabinoids in the edible will be determined by the method and provide the accurate information of its content.

THC, CBD, Edibles

*Presenting Author