

Heavy metals screening in Hemp/ CBD oil after normal consumer use of Ispire LVL 280 disposable, vaporizing cartridge: a case report

Abstract

To determine and analyze heavy metal contamination in Hemp/CBD (cannabidiol) distillate oil, after consumer use of Ispire LVL 280 disposable, vaporizing (vape) device. Heavy metals testing was performed on nine (9) vape device cartridges, containing 1g of HEMP/CBD distillate oil each. Each vape was assigned to a unique individual, who were subsequently instructed to inhale 40 ~ 50 “puffs” (respectively) ranging from 2-3 seconds, over the course of seven (7) days. Upon completion, all nine vape devices were recovered and prepared for screening, with approximately +/- .5g of distillate remaining in each sample. Heavy metals testing was performed using microwave sample digestion and an Inductively Coupled Plasma – Mass Spectrometer (ICP-MS). Results demonstrated all nine individual samples resulted in below experimental Limit of Detection (LOD) and Limit of Quantitation (LOQ) for Lead, Mercury, Cadmium and Arsenic. Laboratory screening was performed in accordance with the California Department of Cannabis Control (DCC) regulations detection limits for distillate oil. This case report is one of the first to test Hemp/CBD distillate for heavy metals, after exposure to the cartridge’s coil operation and corresponding mechanical components from normal consumer use.

Device Make/Model: Ispire LVL 280

Testing Laboratory: Excelbis Labs: Santa Ana, CA License Number: C8-0000059-LIC

Introduction

In recent years, the popularity of disposable vape devices has grown exponentially. They are easily accessible, discrete and several brands collectively offer a multitude of products to choose from. When acquired from a California licensed retailer, the cannabis distillate oil within the cartridge has undergone third-party lab testing for heavy metals, in addition to several other contaminants required by the DCC regulations. However, during the vape's operation, the coil within the device generates heat that could potentially leak contaminants into the oil, thus exposing the consumer to hazardous elements. This was seen when the CDC declared e-cigarette, or vaping product, use-associated lung injury (EVALI) a nationwide health emergency in 2019.

As EVALI was predominantly focused on vitamin E acetate exposure, other contaminants have been brought into question within vape products as well. According to the CDC web site on e-cigarettes and lung injury, "Evidence is not sufficient to rule out the contribution of other chemicals of concern, including chemicals in either THC or non-THC products, in some of the reported EVALI cases." This sparked interest to investigate heavy metal contamination in distillate oil within vaporizing cartridges. In 2021, a published study titled, "*Strategies for Nonpolar Aerosol Collection and Heavy Metals Analysis of Inhaled Cannabis Products*", demonstrated trace amounts of metals detected within the distillate oil from different vape devices/brands, after simulated use.

Due to different metals employed in manufacturing the internal coil and other mechanics of vape devices, screening distillate oils for heavy metals, after normal consumer use, was of strong interest. Moreover, specifically concentrating on disposable vapes was of significance due to the possibility of low-grade materials used to manufacture the devices in large quantities.

Participants

All products used in this case report are legally permitted for retail sale in CA. The distillate oil contents were previously lab tested for heavy metals by Excelbis Labs, pursuant to California Department of Cannabis Control Regulations. All participants are over the age of 21.

A total of nine disposable vaping devices were randomly assigned to nine participants (one device per participant), who voluntarily agreed to the trial. Each participant was instructed to perform 40 ~ 50 puffs (respectively), in which they would inhale the contents of their respected vaping device for 2-3 seconds, over the course of seven days. Whether the vapor aerosol was physically consumed by the participant or not is irrelevant and was at the discretion of the individual. The Hemp/CBD distillate oil within each vape device was previously screened for heavy metals by Excelbis Labs to safeguard participant involvement.

The distillate within each vape unit was 1g of Full-Spectrum Hemp/CBD oil (+/- .03% THC). After seven days expired, all nine vaping devices were recovered, with +/- .5g of the distillate oil remaining within each cartridge reservoir.

Materials & Methods

Nine Ispire LVL 280 vape devices were hand-delivered to Excelbis Labs in Santa Ana, CA after each participant completed 40 ~ 50 puffs, with a 2-3 second inhale duration on each device. The devices were logged and prepared to undergo heavy metal screening, under the direction of trained scientists. Each vape device was uniquely dismantled and +/- .5g of Hemp/CBD distillate oil was extracted and placed into individual digestion tubes. Homogenizing all nine samples was not employed, which guaranteed unique results for each vape device and its corresponding mechanical innerworkings.

After the digestion process, each sample was transitioned to an Inductively Coupled Plasma – Mass Spectrometer (ICP-MS) and analyzed for Lead, Mercury, Arsenic and Cadmium. These analytes are the four metals required to be screened for all cannabis products in CA, prior to market introduction, according to DCC regulations. With the recent passing of Assembly Bill No. 45, all hemp and CBD products in CA will adhere to the same testing methods and requirements as cannabis. Each sample strictly followed the testing methods and procedures required by the DCC for distillate oil. The ICP-MS analyte results are quantified in micrograms/grams and are calculated in accordance with DCC approved detection limits.

Results

Upon completion of the ICP-MS instrument procedure, results were empirically analyzed by professional scientists to determine heavy metal content. The action limits were executed and evaluated in accordance with DCC approved LOQ and LOD. All nine, individual samples resulted in below experimental LOD and LOQ for all four (Lead, Mercury, Arsenic and Cadmium) heavy metal analytes.

See attached Certificate of Analysis for each sample screened

Conclusion

The present case report demonstrated no heavy metal contamination to Hemp/CBD distillate within the Ispire LVL 280 cartridge vaping device, following normal consumer use. The ICP-MS results confirmed that each vaping cartridge's coil and corresponding metal components, did not introduce or contribute to heavy metal concentrations that exceed DCC regulation detection limits.

The unique approach to the present report is lab testing the distillate after the vape device has been used under normal consumer conditions. Similar testing methodologies and case reports should be completed with additional brands and devices, to provide additional insight to vaping cartridge performance. These techniques will help identify manufacturing advancements, alleviate consumer health concerns, and circumvent DCC involvement.

Conflict of Interest:

The companies involved in this report declare that there is no conflict of interest. Excelbis Labs is a third-party, California licensed testing laboratory with no conflicts of interest with the Ispire or the distillate manufacturer, who wishes to remain anonymous.

References:

- 1.) Centers for Disease Control and Prevention *Outbreak of Lung Injury Associated with the Use of E-Cigarette, or Vaping, Products*. February 25, 2020, https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html (accessed 11/30/2021).
- 2.) Mallampati, S. R., McDaniel, C., & Wise, A. R. (2021). Strategies for Nonpolar Aerosol Collection and Heavy Metals Analysis of Inhaled Cannabis Products. *ACS omega*, 6(26), 17126–17135. <https://doi.org/10.1021/acsomega.1c02740>