

# Analysis of information from cannabis-derived product exposure cases by reported gender among adults, using data from the America's Poison Centers National Poison Data System

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## Abstract

### Introduction:

Many cannabidiol (CBD) and delta-8 tetrahydrocannabinol (delta-8 THC) products are available to consumers through online and in-store retailers. Research on health effects of these novel products is in early stages with mixed findings. Some evidence indicates effects may vary due to hormonal and pharmacological mechanisms, warranting further investigation of cannabinoid use and outcomes by reported gender.

### Methods and Materials:

Data from non-cosmetic CBD and delta-8 THC adult (aged ≥17 years) single exposure cases reported to America's Poison Centers National Poison Data System in the years 2018- 2022 were assessed. Cosmetic cases ("creams/lotions/gels/") and cases with "unknown" gender were excluded. Cases labeled "pregnant" under gender were counted as female in alignment with NPDS definitions. The terms "sex" and "gender" are not synonymous, but for the purpose of this study, "male" and "female" were used in accordance with NPDS terminology. X<sup>2</sup> analyses were used to determine significance of differences between categorical variables. NPDS introduced delta-8 THC codes in 2020.

### Results:

For the 2020-2022 period, reported gender was available in 2326 delta-8 THC cases; 52% were reported as female, 49% were indicated as intentional abuse (male 57%). Among female delta-8 THC cases, 33% (male 32%) had minor, 32% (male 34%) moderate, and 2% (male 2%) major clinical effects. One death was reported among male delta-8 THC cases. For both genders, top three symptoms were tachycardia, agitation, and other (neurological). For the 2018-2022 period, reported gender was available in 2070 CBD cases; 58% were reported as female, 17% were indicated as intentional abuse (24% male). Among female CBD cases, 27% (male 28%) had minor, 19% (male 20%) moderate, and 1% (male 2%) major clinical effects. One death was reported among female CBD cases. For both genders, top three symptoms were tachycardia, other (neurological), and mild CNS depression.

### Conclusion:

CBD and delta-8 THC cases increased significantly for both genders during the study periods (P <.0001). There were significantly higher numbers of delta-8 THC reports than reports for CBD (P <.0001). Delta-8 THC and CBD case counts did not differ significantly by gender during the study periods. For males and females, intentional abuse reported to NPDS was more common with delta-8 THC than CBD products, suggesting that there may be more intentional abuse of delta-8 THC. Although delta-8 THC and CBD may differ in physiological effects, clinical symptoms presented similarly. Among adults, further research should include evaluation of emerging cannabinoid usage and outcomes.

## Introduction

- Cannabis-derived products (CDPs), including cannabidiol (CBD) and delta-8 tetrahydrocannabinol (delta-8 THC), are widely available through online and in-store retailers following the passage of the 2018 Agriculture Improvement Act
- Emerging evidence suggests that accurate cannabinoid content labeling and quality varies by manufacturer
- It is unclear how males and females differ in prevalence of CDP-related adverse events, although known sex differences exist in the effects of cannabinoids due to hormonal and pharmacological mechanisms
- APC NPDS collects surveillance data from exposure cases across the country and follows to medical outcomes
- Adverse event reports provide real-time data on how men and women are differentially using CDP products and experienced effects

## Materials and Methods

- Adult (≥17) single exposure cases indicating CBD or delta-8 THC exposure from 2018-2022 were extracted from America's Poison Center National Poison Data System
- Included: year, product type, gender, exposure reason, level of care required, clinical outcomes, and symptoms
- Excluded: cosmetic and prescription products; cases with unknown gender
- Descriptive and X<sup>2</sup> analyses were conducted using SAS version 9.4 (Cary, NC)

## Results

- Out of 2326 delta-8 THC and 2070 CBD cases reporting gender, more than half indicated females (52% and 58%, respectively). In total, there was a significantly higher proportion of delta-8 THC than CBD cases (P < 0.0001) (Fig. 1).
- NPDS single-exposure cases involving CBD declined from 2021-2022, while delta-8 THC cases continued to rise across genders. From 2018-2021, CBD cases rose significantly (P<0.0001). From 2020-2022, delta-8 THC cases rose significantly (P<0.0001) (Fig. 2).
- Top recorded symptoms showed some variation between cannabinoid, but no variation between gender. The top three symptoms recorded among delta-8 THC cases were tachycardia, other – neurological, and agitation. The top three symptoms across CBD cases were tachycardia, other – neurological, and mild CNS depression (Table 1).
- One female death was associated with CBD exposure, and one male death with delta-8 THC exposure. Causality is non-conclusive. All other tracked clinical outcomes are shown in Figure 4.
- A significantly greater proportion of exposures was categorized as "intentional – abuse" across all delta-8 THC cases (P < 0.0001), and within each gender. "Adverse reaction – drug" was the most common among female CBD reports; however, "intentional – abuse" was top cited among men. See Figures 4 and 5 for other top exposure reasons.

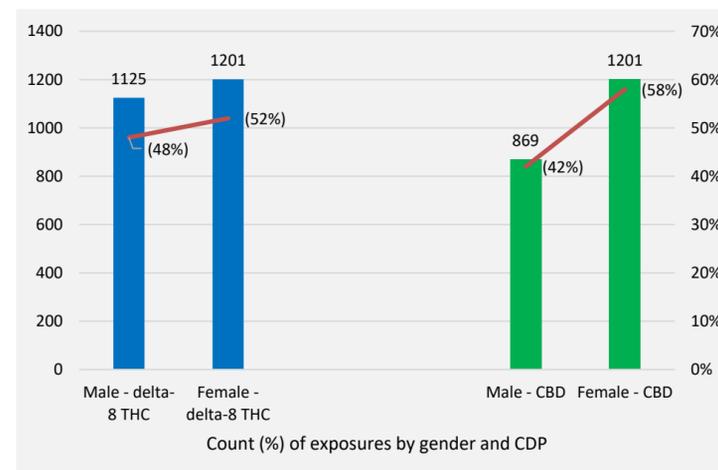


Figure 1. Count and percentage of exposure cases by reported gender and CDP. Percentages reflect breakdown within each cannabinoid group by gender.

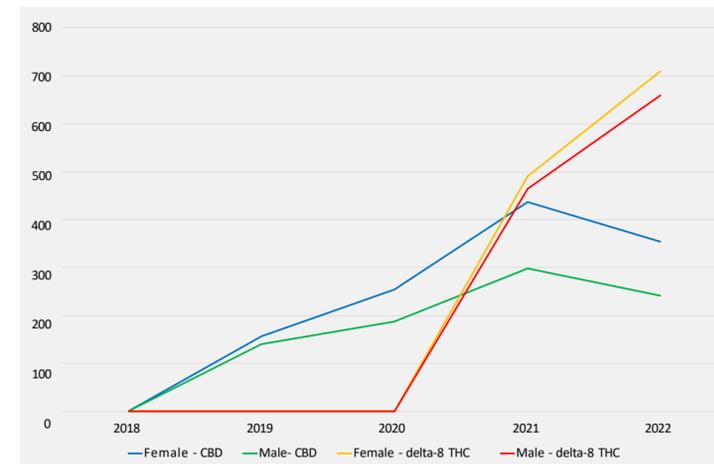


Figure 2. Count of exposure cases by year and gender/CDP.

Table 1. Count (%) of reported clinical symptoms by gender and CDP. Symptoms are not mutually exclusive.

Clinical Symptom	Female - delta-8 THC	Male - delta-8 THC
Tachycardia	387 (32%)	356 (32%)
Agitation	278 (23%)	276 (26%)
Other – Neurological <sup>1</sup>	224 (19%)	198 (18%)
Female - CBD		Male - CBD
Tachycardia	165 (14%)	124 (14%)
Other – Neurological <sup>2</sup>	165 (14%)	107 (12%)
CNS Depression – mild <sup>3</sup>	141 (12%)	105 (12%)

<sup>1,2</sup>This clinical symptom was implemented in Q1 2019. Prior, cases were documented as "other".  
<sup>3</sup>This clinical symptom was implemented in Q1 2019. Prior, cases were documented as drowsiness/lethargy.

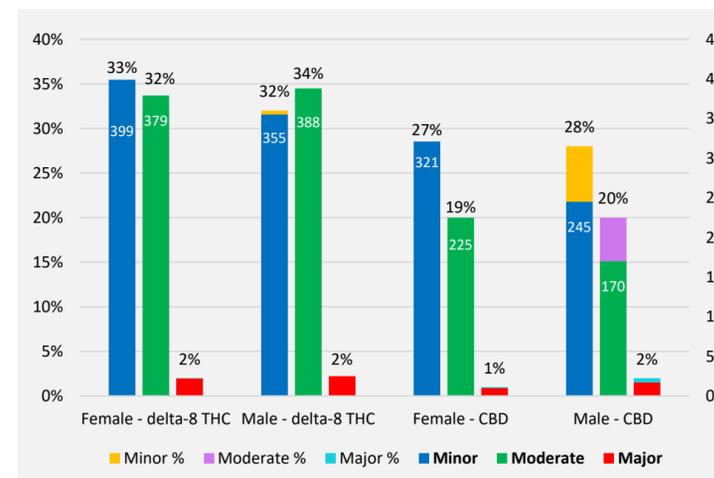


Figure 3. Count and percentage of clinical outcomes by gender and CDP. Not all cases are followed to a known outcome. Percentages reflect breakdown within each gender and cannabinoid group.

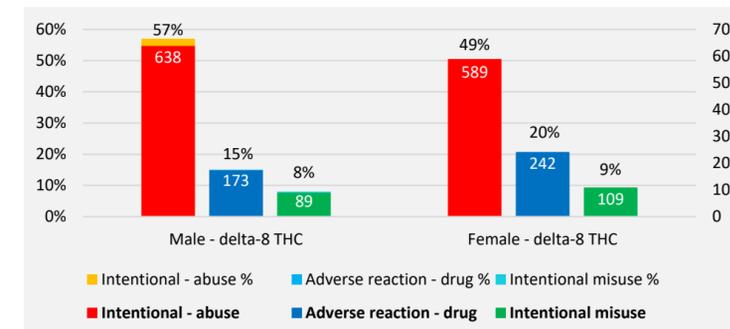


Figure 4. Count and percentage of top delta-8 THC exposure reasons by gender. Percentages reflect breakdown within each gender and cannabinoid group.

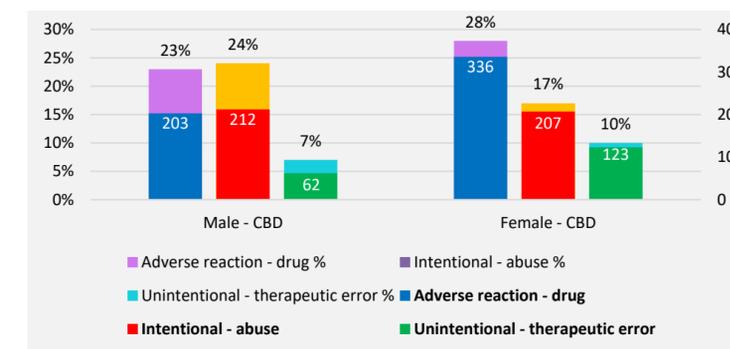


Figure 5. Count and percentage of top CBD exposure reasons by gender. Percentages reflect breakdown within each gender and cannabinoid group.

## Discussion and Conclusion

- Females had the same case count for delta-THC and CBD, although over different time periods. In a 3-year span, delta-8 THC cases matched the number of CBD cases recorded over a 5-year period. CBD cases saw a decline in the most recent year.
- "Intentional – abuse" was the most common reason for exposure among delta-8 THC reports; however, male delta-8 THC cases had a higher proportion at 57%. "Adverse reaction – drug" was the most commonly recorded CBD exposure reason among females, differing from males. Males had a slightly higher percentage of "intentional – abuse" compared to "adverse reaction – drug."
- Males and females presented with similar clinical outcomes for delta-8 THC exposures, with most categorized as minor or moderate severity. CBD exposures tracked similarly, but with greater proportions of minor to moderate outcomes.
- Although CBD and delta-8 THC have different physiological and psychological effects, symptoms presented similarly.
- Further surveillance of CDP adverse events is needed as the market continues to grow. Future research should examine sex and gender differences with respect to other emerging cannabinoids and associated outcomes.