

Mini Review

The Public Safety Risk of Hemp Products Sold at Unlicensed Retailers

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Abstract

New cannabinoid products are being sold by unregulated retailers and marketed toward minors across the city of Chicago. A variety of both edible and plant cannabinoid products were analyzed to explore how well the contents of the products matched their packaging and labeling. The results showed that not only are most edible products being sold with a much larger dosage per package than is allowed by Illinois legislation, most of the edible and plant cannabinoid products do not match their packaging and labeling. This in conjunction with the absence of regulations and safety testing is a cause for concern for public safety as people (and minors) consume these products.

Cannabinoid Abbreviations

CBN: Cannabinol

CBD: Cannabidiol

CBC: Cannabichromene

CBG: Cannabigerol

CBDA: Cannabidiolic Acid

CBGA: Cannabigerolic Acid

Introduction

In 2023 there were multiple instances of school children, in the Chicago area, presenting to hospitals displaying overdose symptoms from the ingestion of Tetrahydrocannabinol (THC). In April

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that year, five students at Uplift Community High School, located in the Uptown neighborhood, were hospitalized in serious and critical condition after consuming edible products purchased from a nearby retailer [1]. This retail store marketed and sold hemp-based products.

The University of Illinois Chicago Analytical Forensic Testing Lab (UIC AFTL) launched a research study to begin to investigate what was actually being sold at these retailers. These products are not produced or sold under or in accordance with the rules, regulations, or licensing structure of the Illinois Cannabis Regulation and Tax Act (IL CRTA) [2]. The study was limited to some retailers in the city of Chicago and was intended to give a better understanding of the possible risks of these products and their intoxicating effects on the general public.

The primary goal of this study is to get an idea of what products are out there and to provide more information to Illinois' law enforcement, legislators and regulators, the medical community, and the public.

After reviewing what products are being marketed and sold not only to adults but also to minors with no regulation, it is obvious that change needs to occur. Whether that change should be enforcing existing regulations, new regulations directed at these types of retailers, or closing them entirely is the question that remains to be answered.

The Growth of Cannabis and Hemp

In 2013 Illinois passed the Compassionate use of Medical Cannabis Pilot Program (MCCPP) [3]. This was the foundation of building the cannabis industry in Illinois. In 2016 cannabis was decriminalized and the statute concerning Driving under the Influence (DUI) established a per se limit of 5ng/mL in whole blood. The year 2017 saw a proposal for legalizing recreational cannabis with the estimated profits listed between \$350 and \$700 million per year [4]. In 2019 the IL CRTA [2], was introduced and passed, which legalized adult-use cannabis. The CRTA regulates the production, distribution, and sale of THC products in Illinois.

On a parallel path, Illinois instituted the Industrial Hemp Pilot Program in 2015 [5]. This allowed researchers and institutions of higher education to cultivate hemp for educational and research purposes. In 2018 the Industrial Hemp Act [6], expanded the ability to cultivate and process hemp to farmers and others. The definition of hemp is, "the plant *Cannabis sativa* L. and any part of that plant, including the seeds and all derivatives, extracts, cannabinoids, isomers, acids, salts, and salts of isomers, whether growing or not, with a total delta-9-Tetrahydrocannabinol (THC) concentration of not more than 0.3% on a dry weight basis and includes any intermediate or finished product made or derived from industrial hemp" [6].

The result of these legislative acts was the growth of the legal cannabis and hemp industries. In the fiscal year of 2023, adult-use cannabis total sales revenue reached over \$1.5 billion and total tax revenue was approximately \$451.9 million. The profit possibilities of the legal cannabis industry sparked a trend of retailers opening shops, unlicensed under the IL CRTA, offering a wide variety of THC products, claiming to be derived from hemp instead of cannabis.

Basing their products on hemp arguably allows these retailers to operate without the licensures required for the legal cannabis industry and to avoid the regulations that are imposed on legal cannabis companies. Additionally, the extensive testing required to prove the safety of THC products in the legal cannabis industry is not followed by these new retailers that are marketing and selling hemp products.

Some of the products offered are labeled as delta-8-THC products, others as delta-10-THC products (both isomers of the delta-9-THC found in cannabis). Others list their product as being hemp simply due to a small presence of free delta-9-THC, yet they still have a large presence of Delta-9-Tetrahydrocannabinolic acid (THCA). The compound THCA is produced by the cannabis plant and when heated is converted to delta-9-THC, through a process called decarboxylation. All of these tactics are simply used as a means to circumvent the required licensing, taxation, and regulations imposed on the legal cannabis industry.

So Many Products!

The types of products being marketed and sold, claiming to be legal hemp or based on legal hemp, have an astonishingly large variety. The edible products alone include gummy candy, chips, drink mixes, jellybeans, and chocolate. The plant products range from pre-rolled individual cigarettes to actual containers with multiple flower buds. The packaging for all of these products is simply one of the issues at hand.

Down the Edible Rabbit Hole

Packaging/Labeling

In terms of the unregulated edible products, many of the packaging mimic familiar snack products, such as Cheetos™, Warheads™, Cheez-Its™, and Kool-Aid™. Under the IL CRTA, licensed and regulated cannabis companies are prohibited from packaging and marketing in this fashion because of the appeal it can have to minors and consumers who are familiar with the regular snack products and may not fully understand exactly what they are purchasing and ingesting [7]. In July of 2023 six companies received warning letters from the FDA for illegally selling copycat food products [8]. Not only are the unregulated products packaged in a way to market themselves to minors; these products have no minimum purchase age, nor do they require an ID check for age verification [9]. In addition, many of these retailers have shops that are close to school grounds, playgrounds, and other public places that are widely accessible to minors, which violates the rules set forth in the IL CRTA [7].

The FDA has strict requirements for packaging and labeling of food products to ensure the public is informed about what the product contains, any possible allergens, the nutrition facts, the name and address of the manufacturer, and other additional information. While much of the packaging has at least some of this information listed, others provide very little to none, making it difficult to impossible to understand what is being purchased and ingested. Without any regulations in place for these products and companies, there is no guidance as to what is necessary to keep the public informed and safe.

Present Active Cannabinoids

Fifteen different edible products from multiple retailers were tested, these were given exhibit numbers for anonymity. Many of the products were labeled as containing delta-8-THC, yet when they were analyzed for cannabinoids a wide variety of them were detected. In

more than one case, the cannabinoid labeled on the packaging was not even present in the sample of the edible analyzed see table 1.

Exhibit	Labeled Cannabinoid(s)	Detected Cannabinoid(s) after Analysis by GC/MS
12	delta-9-THC & CBD	CBC, delta-8-THC, delta-9-THC, & CBN
13	delta-8-THC	delta-8-THC & delta-9-THC
14	delta-8-THC	CBD & CBC
15	delta-8-THC	CBD & CBC
16	delta-10-THC	CBD, delta-8-THC, & CBN
17	delta-8-THC	delta-8-THC & CBN
18	delta-9-THC & CBD	CBD, delta-9-THC, & CBN
19	delta-8-THC, CBG, & CBN	delta-8-THC, CBG, & CBN
20	delta-8-THC	delta-8-THC
21	delta-8-THC	CBD, delta-8-THC, & CBN
22	delta-8-THC	delta-8-THC & CBN
23	delta-8-THC	delta-8-THC & CBN
24	delta-8-THC	delta-8-THC & CBN
26	delta-8-THC	CBD, delta-8-THC, delta-9-THC, & CBN
28	delta-9-THC	CBD, CBC, delta-9-THC, CBG, & CBN

Table 1: Present active cannabinoids.

Note: Please see a list of cannabinoid abbreviations previously undefined.

Dosage-Listed and Observed

The regulations for the legal cannabis industry limit the dosage level of cannabinoids allowed to be contained within a package to 100 milligrams (mg) [10]. In table 2 the dosage labeled on the packaging for each unregulated edible product is listed.

Exhibit	Labeled Cannabinoid(s)	Dosage Per Piece (mg)	Dosage Per Package (mg)
12	delta-9-THC & CBD	10	200
13	delta-8-THC	not listed	1000
14	delta-8-THC	not listed	not listed
15	delta-8-THC	not listed	500
16	delta-10-THC	not listed	600
17	delta-8-THC	100	1000
18	delta-9-THC & CBD	15	N/A
19	delta-8-THC, CBG, & CBN	350	7000
20	delta-8-THC	not listed	600
21	delta-8-THC	not listed	600
22	delta-8-THC	not listed	600
23	delta-8-THC	not listed	600
24	delta-8-THC	300	3000
26	delta-8-THC	60	300
28	delta-9-THC	30	N/A

Table 2: Dosage labeled on the packaging for each unregulated edible product is listed.

Nearly all of the unregulated products far exceed the 100mg dosage per package regulation. With many of the packages seeming to be small bags of chips or candy it is easy to see how people can consume far more of the active cannabinoid than intended, especially minors simply looking for a snack.

To investigate this further, the unregulated edible products were quantified to determine if the packaging was accurate. A 10mg portion of each product was extracted and analyzed with a calculated target amount of either delta-9-THC or delta-8-THC in nanograms (ng). These cannabinoids were targeted due to being the main cannabinoids listed on most products see table 3 for results.

Exhibit	Labeled Cannabinoid	Expected (ng)	Analyzed (ng)
12	delta-9-THC	17	17
13	delta-8-THC	38	15
14	delta-8-THC	20	not detected
15	delta-8-THC	20	not detected
16	delta-10-THC	33	not detected
17	delta-8-THC	18	>100
18	delta-9-THC	24	34
19	delta-8-THC	28	92

Table 3: Cannabinoids were targeted due to being the main cannabinoids listed on most products.

While many were close to the expected value, others were significantly different. There are many reasons this could occur, from the product not being fully homogenous across the entire batch to simply being made with the incorrect amount of cannabinoid. This creates a problem for consumers due to not being able to know what amount of active cannabinoid they are ingesting. This type of inaccuracy in the product’s labeling can lead to public health and safety issues.

Finally, it should be noted that the vast majority of these unregulated edible products are manufactured outside of Illinois see table 4.

Exhibit	State Listed on Packaging
12	Florida
13	California
14	California
15	California
16	California
17	California
18	Colorado
19	Florida
20	California
21	California
22	California
23	California
24	Texas
26	Illinois
28	Illinois

Table 4: States listed on packaging.

Flower and Plant Products-See How They Grow! Present Active Cannabinoids

The analysis of the unregulated flower products is more complicated than the unregulated edible products. Both hemp and cannabis will produce cannabinoids in a carboxylic acid form which, when heated, will convert into the non-acidic related cannabinoid. Due to this, flower (or plant) products will consistently have both acid and non-acidic cannabinoids. Similar to the unregulated edible products, the unregulated flower products also have some disparities between what is listed on the label and what is detected after analysis see table 5.

exhibit	Labeled Cannabinoid(s)	Detected Cannabinoid(s) after Analysis by GC/MS
1	delta-8-THC	CBDA, CBGA, delta-8-THC, CBG, CBN, & CBD
2	delta-8-THC	CBDA, CBGA, delta-8-THC, & CBD
3	THCA	THCA, CBDA, CBGA, delta-9-THC, CBN, & CBD
4	delta-8-THC	CBDA, THCA, CBGA, delta-8-THC, CBN, & CBD
5	THCA & CBGA	THCA, delta-9-THC, & CBN
6	THCA & CBGA	THCA, CBGA, delta-9-THC, & CBN
7	THCA & CBD	THCA, delta-9-THC, & CBN
8	delta-8-THC & THCA	CBDA, THCA, CBGA, delta-8-THC, CBG, & CBN
9	delta-10-THC	CBDA, CBGA, CBG, CBN, & CBD
10	delta-8-THC	CBDA, THCA, CBGA, delta-8-THC, CBG, & CBD
11	delta-8-THC, CBD, & THCA	CBDA, THCA, CBGA, CBD, delta-8-THC, CBG, & CBN
27	delta-8-THC & CBGA	CBGA, delta-8-THC, & CBN
29	THCA	CBDA, THCA, CBGA, delta-9-THC, & CBN
30	THCA	CBDA, THCA, CBGA, delta-9-THC, & CBN
32	delta-8-THC, CBD, & CBG	CBDA, THCA, CBGA, CBD, delta-8-THC, & CBN
33	THCA	CBDA, THCA, CBGA, CBD, delta-9-THC, CBG, & CBD
34	CBD, delta-8-THC, & delta-9-THC	CBDA, THCA, CBD, CBC, delta-8-THC, & CBN

Table 5: Listed on the label and what is detected after analysis.

Dosage-Listed and Observed

A similar analysis was conducted on the unregulated flower products to look at the expected dosage for a specific weight of the product compared to what was observed. A 10mg sample of the unregulated flower product was diluted into a specific volume of methanol which was then sampled and analyzed. Only the listed cannabinoids are shown in table 6.

As seen with the unregulated edibles, this could also cause problems for consumers not having accurate dosage information for a product meant for consumption.

Exhibit	Labeled Cannabinoid(s)	Expected (ng)	Analyzed (ng)
1	delta-8-THC	35	6
2	delta-8-THC	55	5
3	THCA	45	11
4	delta-8-THC	42	6
5	THCA	50	15
	CBGA	51	8
6	THCA	42	17
	CBGA	32	9
7	THCA	40	9
	CBD	40	5
8	delta-8-THC	44	14
	THCA	44	8
9	delta-10-THC	40	not detected
10	delta-8-THC	51	44
11	delta-8-THC	65	>100
	CBD	65	62
	THCA	65	8
27	delta-8-THC	55	18
	CBGA	50	14
29	THCA	40	14
30	THCA	46	19
32	delta-8-THC	42	27
	CBD	42	7
	CBG	42	5
33	THCA	40	11
34	CBD	52	11
	delta-8-THC	70	5
	delta-9-THC	not listed	3

Table 6: Dosage-listed and observed.

Shops without Regulations

The regulations (IL CRTA) for the legal cannabis industry are extensive and detailed [4]. Since the new retailers are neither monitored nor held accountable to the same standards, they violate the current regulations that are in place for the legal Illinois cannabis industry. For example, many of the shops use the term “dispensary” in their name and nearly all of the packaging has at least one image of the cannabis plant. Both are violations of the IL CRTA. The term “dispensary” is clearly defined in the IL CRTA and the usage of it by an unregulated shop, along with the use of imagery associated with legal cannabis retailers, may give a false sense of security, safety, and legitimacy to the products that they are marketing and selling to the public [11].

An additional concern is the fact that the majority of the THC products being marketed and sold are listing the main active cannabinoid as delta-8-THC. This is a synthetic cannabinoid that is created from CBD that is extracted from hemp material. In 2022 the FDA issued warnings that delta-8-THC may pose serious health risks [12]. Not only are consumers ingesting a new cannabinoid with serious concerns already linked to it, but they are also ingesting unregulated products that are not going through safety testing and in many cases are inaccurately labeled.

How Do We Solve This?

All of the above problems stem from the simple fact that these new retailers are entirely unregulated. Unfortunately, solutions are neither simple nor inexpensive. Currently there is not an entity that is meant to control or regulate these types of retailers. It is a simple idea to state they should just be closed, but that does not address how that should or could take place.

In terms of bringing regulations to these retailers, that too becomes a matter of how to put forth the regulations, what regulations should be required, and how they are to be enforced and by whom. Finding the personnel to not only create these types of regulations, but also to enforce them is likewise neither simple nor inexpensive.

Conclusion

In summary, all the new unregulated retailers marketing and selling THC products (both edible and plant) pose a clear danger to public consumers, as seen last year with the minors who were hospitalized after ingesting them. Marketing new and untested active compounds is a huge risk, especially in the absence of rules controlling the labeling and product safety testing. Without regulations being put in place and then fully enforced, this danger will continue, and more people will be harmed.

This study is meant to be a first look at what is out on the market currently. The analyses performed were not fully validated and are meant to be informational only.

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