CASE REPORT

Accidental ingestion of cannabis in two infants and a preschool child reported by the Tunisian poison control center: Three case reports and review of literature

Intoxication accidentelle par le cannabis chez deux nourrissons et un enfant d'âge préscolaire signalée par le centre antipoison Tunisien: Rapport de cas et revue de la littérature

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Abstract

Introduction: Cannabis or delta-9-tetrahydrocannabinol (THC) is responsible for psycho-affective effects. Even though it has been legalized in some countries around the world, it remains illegal in Tunisia although its consumption has alarmingly increased. Although its ingestion is known to be asymptomatic in adults, among infants/preschool children, its ingestion has been reported to cause drowsiness and coma. We reported the first cases of accidental cannabis ingestion complicated with drowsiness and coma, occurring in infants/preschool children in Tunisia.

Observations: We reported three cases of accidental cannabis ingestion in three infants/preschool children aged 7, 10, and 30 months. These were ingestions called into the Tunisian poison control center over a period of one year. Two patients were drowsy on admission and the third patient was comatose requiring mechanical ventilation. All three patients had positive urinary drug screen for cannabis. After surveillance and stabilization, the patients were discharged and no further complications were reported.

Conclusion: In the cases of infants/preschool children presenting with drowsiness or coma, physicians must search for accidental ingestion of THC or a history of illicit substance use in the infant/preschool child's entourage.

Key words: Case Reports, Pediatric, Poisoning, Tetrahydrocannabinol

Résumé

Introduction: Le cannabis ou delta-9-tétrahydrocannabinol (THC) est responsable d'effets psycho-affectifs. Bien qu'il ait été légalisé dans certains pays à travers le monde, il demeure illégal en Tunisie et sa consommation ait augmenté de manière alarmante. Bien que l'ingestion de cannabis soit généralement asymptomatique chez les adultes, elle a été signalée comme provoquant une somnolence et un coma chez les nourrissons et les enfants d'âge préscolaire. Nous rapportons les premiers cas d'ingestion accidentelle de cannabis compliquée par de la somnolence et un coma, survenant chez deux nourrissons et un enfant d'âge préscolaire en Tunisie.

Observation: Nous avons rapporté trois cas d'ingestion accidentelle de cannabis chez trois nourrissons/enfant d'âge préscolaire âgés de 7,10, et 30 mois. Ces cas ont été signalés au centre antipoison tunisien sur une période d'un an. Deux des patients étaient somnolents à leur admission et le troisième était dans un état comateux nécessitant une ventilation mécanique. Tous les trois avaient un test urinaire positif au cannabis. Après surveillance et stabilisation, les patients ont été sortis et aucune autre complication n'a été signalée.

Conclusion: Dans le cas des nourrissons/enfants d'âge préscolaire présentant une somnolence ou un coma, tout médecin doit évoquer une ingestion accidentelle de THC et rechercher une éventuelle consommation de substances récréatives dans l'entourage.

Mots clés: Intoxication, Pédiatrique, Rapports de cas, Tétrahydrocannabinol

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Introduction

Delta-9-tetrahydrocannabinol (THC) remains the most common illicit drug used worldwide (1). It is known to be responsible for psycho-affective effects (1). THC poisoning in infants/preschool children is becoming a serious health problem worldwide (2). In fact, there has been an increase in ingestion called to poison control centers worldwide (3). In adults, cannabis is mainly ingested for recreational use and in some parts of the world its consumption has been legalized for therapeutic use (2).

With the rise of its accessibility worldwide, there has been an alarming increase of accidental ingestion among infants/preschool children (3, 4). Although its ingestion is known to be asymptomatic in adults (1), among infants/preschool children, its ingestion has been reported to cause drowsiness and coma (4).

We reported the first three cases of accidental ingestion in infants/preschool child complicated with drowsiness and coma, occurring in Tunisia. These cases were called into the Tunisian poison control center during the year 2021. Then we conducted a literature review. PubMed/Medline was searched using the following combination of keywords [(Cannabis) OR (Marijuana) OR (THC) OR (Delta-8-tetrahydrocannabinol) OR (Hashish)] AND [(Intoxication) OR (Poisoning) OR (Exposure) OR (Ingestion)] AND [(Children) OR (Pediatric) OR (Infants)] AND [(Symptoms) OR (Diagnosis) OR (Toxicology) OR (Management) OR (Intervention) OR (Outcome)]. The final search was completed on June 30, 2024.

Observations

The clinical findings of the three patients are detailed in table 1.

Clinical observation n◦ 1

A seven-month-old girl with no previous medical history was symptomatic with drowsiness followed by the onset of fever and a decreased level of consciousness. On arrival at the emergency department (ED), she had a Pediatric Glasgow Coma Scale (PGCS) of 8-9. Her temperature was 38.5°C, heart rate was 125 beats/min with sinus rhythm, respiratory rate was 30 breaths/min, ambient oxygen saturation was 94%, and systolic and diastolic blood pressure were 92/42 mmHg. The oral examination revealed the presence of a brown paste resembling cannabis resin. Cerebral computed tomography (CT) was normal and lumbar puncture and laboratory findings were within normal range. The parents reported that she might have ingested fragments of cannabis resin belonging to the father's friend. Cannabis intoxication was confirmed by the presence of urinary THC. The patient was discharged after returning to her baseline neurologic and activity level.

Clinical observation n◦ 2

A previously healthy 10-month-old girl with normal development who was admitted to the pediatric ward for drowsiness followed by the onset of bilateral mydriasis and a coma developing within a few hours. On arrival, she had a decreased level of consciousness; pupils were dilated but responsive to light. Her heart rate was 120 beats /min, respiratory rate was 17 breaths/min, ambient oxygen saturation was 92%, and systolic and diastolic blood pressure were 90/50 mmHg. No oral residues were observed. She required mechanical ventilation (MV). Laboratory findings reveled a normal blood count, basic metabolic panel and no coagulation abnormality. She was extubated after 16 hours. A urine drug screen was positive for THC and the parents reported the presence of unspecified forms of cannabis at home. Her condition improved and she was discharged after five days of hospitalization.

Clinical observation n◦ 3

A 30 month-old boy (weight: 15 kg), healthy with a normal development, was admitted to the pediatric ward for drowsiness followed by the onset of generalized hypotonia on the same day. In the ED, the child was afebrile, lethargic, had a GCS of 15 and pupils were mid-size responsive to light. No oral residues and no signs of respiratory or cardiovascular compromise were observed. His heart rate was 90 beats/min, ambient oxygen saturation was 98%, and systolic and diastolic blood pressure were 85/54 mmHg. His blood count, chemical screening and coagulation report were normal. Parents reported that he had accidentally ingested the remnant of a cannabis joint belonging to the father, five hours prior to his consultation. Later toxicology screening showed the presence of cannabis in urine. Within 24 hours of the initial presentation, he returned to his baseline neurologic and activity level and he was discharged after 48 hours of hospitalization.

Urine toxicology screening was positive for THC in all three patients. They were discharged after symptoms subsided. Therefore, the diagnosis of acute intoxication with cannabis was retained in all three patients. The outcome was favorable and no further complications were noted.

Discussion

We reported three cases of accidental cannabis ingestion in Tunisian infants/preschool children, highlighting the need for physicians to investigate THC exposure in cases of drowsiness or coma in this age group.

The cases observed in our study were consistent with those reported in the literature by Claudet et al. (4) who conducted a 10-year review of cannabis ingestion in infants/preschool child under 3-years old. Additional studies revealed similar findings (3, 5–9) (Table 2).

Table 1. Clinical findings of the three cases of accidental cannabis ingestion.

Sex Age	Cannabis product ingested	Symptoms	PGCS or GCS	Pupils	Imaging	Laboratory findings	Management	Urine toxicology test for THC	Length of stay
Girl 7 months	Resin	Drowsiness Fever Decreased level of consciousness	8-9	-	Head CT normal	Lumbar puncture normal Blood test normal	Surveillance	Positive	Not mentioned
Girl 10 months	Unknown	Drowsiness Coma	8-9	Dilated	None	Blood test normal	MV Hydration	Positive	5 days
Boy 30 months	Joint	Drowsiness Hypotonia Lethargy	15	Mid-size	None	Blood test normal	Hydration	Positive	48 hours

CT: computed tomography. **GCS**: Glascow coma scale. **MV**: mechanical ventilation. **PGCS**: Pediatric GCS. **THC**: delta-9-tetrahydrocannabinol.

Table 2. A summary of publications regarding cases of accidental cannabis ingestion in infants/preschool children

Authors	Sex/Age	Cannabis product ingested (source)	Objective findings	GCS or PGCS	Pupils	Tonus	Intervention	Urine toxicology test for THC	Hospital length of stay (hours)
Emoto et al. (5)	Boy 3 years	Unknown (Oral?)	Generalized seizure	-	-	-	Head CT scan Brain MRI EEG Levetiracetam	Positive	-
	Girl 3 years	Oral (Brownies)	Altered mental status Lethargy Vomiting Seizure activity	6	-	-	Head CT scan Brain MRI EKG Benzodiazepines	Positive	-
Akpunonu et al. (6)	Girl 2 years	Oral (delta-8 THC gummies)	Minimally responsive to stimuli Acute encephalopathy Tachycardia	3	-	-	PICU Intubated using fentanyl and ketamine for 10 hours Monitored on the paediatric floor for an additional 24 hours	Positive	58
Idris et al. (7)	Boy 2 years	Oral (laced gummies)	Drowzy and weak Sinus bradycardia First-degree atrioventricular block	15	2 mm equally reactive.	Decreased	Continuous cardiac monitoring.	Positive	36
Abdennour et al. (8)	Girl 10 months	Oral	Drowsy Hypotonic Polypnea Tachycardia	-	-	Decreased	Hyperhydrated Stopped eating and used a nasogastric tube	Positive	72
Bradley et al. (9)	Girl 2 years	Oral (candies)	Bradypnea Continued intermittent periods of agitation	8	-	-	PICU Labs Observation Non-invasive positive pressure ventilation via high flow nasal cannula then intubation (17 hours)	Positive	45
	Girl 4 years	Oral (candies)	Somnolent Bradypneic Arousable to sternal rub	8	-	-	PICU CMP CBC EKG Observation Non-invasive positive pressure ventilation via high flow nasal cannula	Positive	45
Van Oyen et al. (3)	Boy 6 years	Oral (gummy candy)	Unresponsiveness Tachycardia	-	-	-	Intubation (24 hours) Head CT scan CXR Serum laboratory tests	Positive	-
	Girl 3 years	Oral (gummy candy)	Lethargy Depressed mental status	-	-	Decreased	Head CT scan Serum laboratory studies	Positive	72
	Girl 2 years	Oral (THC infused candy)	Unresponsiveness	-	-	-	Head CT scan	Positive	7
	Girl 2 years	Oral (THC infused candy)	Somnolence Drowsiness	-	-	-	Head CT scan	Positive	12
	Boy 4 years	Oral (THC infused candy)	Somnolence	-	-	-	Observation	Positive	12

CBC: complete blood count. **CMP**: comprehensive metabolic panel. **CT**: computed tomography. **CXR**: chest x-ray. EEG: electroencephalogram. **EKG**: electro cardiogram. **GCS**: Glascow coma scale. **MRI**: magnetic resonance imaging. **PGCS**: Pediatric GCS. **PICU**: pediatric intensive care unit. **THC**: Tetrahydrocannabinol.

THC remains one of the most common illicit drugs used worldwide (1). The incidence of accidental ingestion in infants/preschool children has increased significantly (3,4). The legalization of its consumption by adults in some developed countries and illegal use in others render it increasingly accessible in infants/preschool children, which can explain the increase in occurrence of accidental cannabis ingestion in this vulnerable population (4).

Although it has been described to not have severe effects in adults (1), cannabis ingestion in infants has been well described in literature over the past decade (ie; 2014-2024) and described as more severe (3,4,6). Pediatric patients are more likely to develop an altered mental status ranging from drowsiness, somnolence and even coma requiring mechanical ventilation in some cases (10).

This could be explained by a different arrangement of cannabinoid receptors 1 in the brainstem (11). Cannabinoid receptors 1, presynaptic G protein-coupled receptors (GPCRs), bind THC, the main psychoactive constituent of cannabis, and mediate most of its central nervous system effects (12). Predominantly found in the neocortex, hippocampus, cerebellum, basal ganglia, and brainstem, their activation inhibits the release of multiple neurotransmitters including acetylcholine and dopamine (12). In adults, the limited expression of cannabinoid receptors 1 explains why there is no significant risk directly attributable to cannabis poisoning (13). However, in infants/preschool children, the presence of cannabinoid receptors 1 in the brainstem causes neuro-vegetative and central toxicities (11). This is why neurological symptoms in infants/preschool children are so common and can be severe.

Unfavorable doses, unfavorable weight ratios and specific sensitivities in this age group may explain the higher frequency of severe cases in infants/preschool children, also including cannabis intoxication (14).

Recognizing and identifying TCH by a urine screen can avoid extensive workup (eg; lumbar punction, CT scan) in infants/preschool children symptomatic with drowsiness and altered mental status (8,9). Clinicians should also require for the presence of this illicit substance at home or its consumption by caregivers at home (10).

Management of THC intoxication in infants/preschool children requires monitoring in an intensive care setting for many symptomatic infants/preschool children following ingestion (6,9,10). Indication for hospitalization in the intensive care unit include infants/preschool children with central nervous system depression requiring airway monitoring, recurrent seizures, hemorrhagic or ischemic cerebrovascular accidents (15). Asymptomatic infants/preschool children may be medically cleared after six hours of observation (16). Child protective services should be notified in all situations (17).

The use of flumazenil in the context of coma reversal remains a topic of debate in the literature, with no consensus on its efficacy (2). While there are documented cases of successful flumazenil administration for reversing coma induced by cannabis in pediatric patients (18, 19), other reports indicate a lack of effectiveness (20).

Dosing regimens vary significantly among studies. For instance, Glaizal et al. (19) administered three intravenous boluses of flumazenil at a dosage of 10 µg/kg, with 1-minute intervals, achieving successful coma reversal. In contrast, Carstairs et al. (20) reported the use of a single bolus of 0.2 mg, which did not lead to coma reversal. Rubio et al. (18) utilized two boluses of 0.1 mg at three-minute intervals in one case, and a single 0.2 mg bolus in another, both resulting in effective coma reversal. These findings are summarized in Table 3.

Table 3. Administration of flumazenil in cases of coma related to cannabis ingestion in young children.

Author	Sex/Age	Symptoms	GCS or PGCS	Dose of Flumazenil	Reversed Coma
Rubio et al. (18)	Boy 54 months	Euphoria Nausea Hypotonia Drowsiness	6	0.2 mg	Yes
	Boy 18 months	Coma	6	2 bolus of 0.1 mg	Yes
Carstairs et al. (20)	Girl 14 months	Lethargy Hypotonia Coma	7	0.2 mg (18.2 µg/kg)	No
Glaizal et al. (19)	Boy 14 months	Somnolence Drowsiness	10	3 bolus of 0.1 mg (10 µg/kg)	Yes

GCS: Glascow coma scale. **PGCS**: Pediatric GCS.

To the best of the authors' knowledge, there are no reported cases in Tunisia involving the use of flumazenil in similar circumstances. We suggest that flumazenil should be administered in cases of cannabis ingestion in infants/preschool children symptomatic with somnolence or coma. Preventive measures should be implemented to address the risks associated with cannabis ingestion in infants/preschool children. Addressing public health strategies, educational programs for parents, and legal implications related to cannabis storage could significantly contribute to preventing such incidents in the future.

Although we reported the first case reports addressing accidental cannabis ingestion in Tunisia, this report presented some limitations that should be acknowledged. We recognize the absence of discussion of socioeconomic factors that may contribute to cannabis poisoning in infants/preschool children and its long-term consequences. Second, Flumazenil was not used in our cases, which may be attributed to either its unavailability in the pediatric ward at the time or a lack of awareness regarding its indications. Finally, the limited sample size of three cases may represent only a small fraction of actual cases and restricts the generalizability of our findings. The lack of statistical data on the incidence of cannabis ingestion among children in Tunisia and comparable regions limits our ability to contextualize the severity of

the issue. We encourage further epidemiological studies to better inform public health initiatives.

Conclusion

We described three cases of accidental cannabis ingestion in infants/preschool children. Drowsiness, somnolence and even coma have been well described in literature following THC ingestion in the pediatric population. Alongside with the alarming increase in recreational THC consumption in adults, cases of accidental pediatric ingestion have been increasingly reported. Clinicians must consider THC ingestion in infants/preschool children consulting for altered mental status and flumazenil administration should be considered to revers coma related to cannabis ingestion in this young population.

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