

Infant with Altered Consciousness after Cannabis passive Inhalation

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List of Abbreviations

THC - Delta (9)-tetrahydrocannabinol

DSM-IV - Diagnostic and Statistical Manual of Mental Disorders IV

ECG – Electrocardiogram

GC/MS - Gas Chromatography / Mass Spectrometry

THCCOOH - 11-nor-9-carboxy-delta9-tetrahydrocannabinol

Abstract

We report on an infant who was admitted to hospital with severe neurological symptoms following passive inhalation of cannabis. To date, cannabis abuse has been described almost entirely in adolescents and adults. In early childhood, however, cannabis effects were almost exclusively discussed in the context of maternal prenatal exposure, and the direct exposure of infants to cannabis substances was rarely discussed or taken into consideration in clinical assessment under daily settings. To the best of our knowledge this is the first case to report on cannabis toxicity in infant after passive inhalation. This case report is aimed to draw attention to the differential diagnosis of cannabis toxicity in infants. Moreover, facing the increasing number of cannabis smokers this case might foreshadow a new form of child abuse and neglect and therefore physicians, health workers and parents should be alerted about the health hazards of cannabis substances abuse in the presence of children.

Introduction

Cannabis is the most commonly used illicit drug worldwide (Bauman & Phongsavan, 1999). Its primary active ingredient is THC (Delta (9)-tetrahydrocannabinol) which exerts its biological effects by activating the cannabinoid receptor CB1 in the brain.

Cannabis abuse has been described almost exclusively in adolescents and adults. In 2002, 50% of 18 year olds reported using cannabis during their lifetime. Of these, 22.4% have met DSM-IV criteria for cannabis abuse and 15.8% have met DSM-IV criteria for cannabis dependence (Cooper & Haney, 2009).

In infancy, cannabis effects are merely discussed in the context of maternal prenatal exposure. These effects include neurobehavioral symptoms such as inattention,

impulsivity, increased externalizing behavior and decreased cognitive performance with memory and learning impairments (Huizink & Mulder, 2006).

However, the direct exposure of infants to cannabis substances is discussed neither in clinical assessment nor in public health education. This is the first reported clinical case of passive inhalation of cannabis smoke by an infant. The infant was admitted to hospital with severe neurological symptoms, following this toxic exposure. The significance of this topic is far beyond being the first reported case, but it also carries a significant social importance due to the increasing number of young parents who smoke near their children and thus, may foreshadow a new and severe form of child abuse and neglect. Such an abuse is probably under diagnosed as toxicology screens are uncommon in this age group; this fact underscores the importance of this report.

Since this new form of abuse has the potential to jeopardize the lives and health of young infants, in this report we have aimed to draw attention to the differential diagnosis of THC toxicity in infants; and to alert health workers, educators and parents about the health hazards of cannabis substances smoking in the children's presence.

Case Report

A previously healthy 13-month-old male infant was admitted to the emergency ward due to apathy, unresponsiveness, loss of appetite and mild fever (38°C). His parents, a young couple who were vacationers in our area, noticed that once the infant woke up he appeared ill, did not respond to verbal stimuli and refused to eat. They ruled out convulsive fits and the possibility of digestion of toxic substances. Physical examination disclosed mild fever (37.9°C), lethargy with intermittent restlessness, normotensive fontanel and equal pupils reactive to light. The physical examination

was otherwise unremarkable. Complete blood count showed mild microcytic anemia with normal white blood cells count. Blood chemistry including electrolytes, liver enzymes and renal functions was normal. Erythrocyte sedimentation rate, urinalysis, ECG and chest roentgenogram were normal. Blood and urine cultures were obtained and intravenous ceftriaxone was started. Retrospectively, these cultures were sterile. Qualitative toxicology urine screen was performed by using lateral flow chromatographic immunoassay (INNOVACON), confirmed for accuracy above 97% by Gas Chromatography / Mass Spectrometry (GC/MS). This screen revealed the presence of THC, which was double checked and verified in an additional urine sample. At this stage, the parents ~~disclosed~~ admitted that in the evening before they had participated in a party of 20 cannabis smokers in the parents' room at a resort house where the infant was sleeping. Consequently, the infant was passively exposed to cannabis smoke for manyseveral hours. A child welfare worker interviewed the parents and was under the impression that the parents were genuinely amazed that cannabis smoke could harm their baby and that intentional abuse or neglect were unlikely in this case. During hospitalization the child was monitored and within hours showed marked improvement under supportive treatment. He was discharged after 48 hours under the supervision of the social department.

Discussion

The clinical effects of THC are highly variable among individuals (Ellenhorn M.J & Barceloux D.G, 1988). In adolescents and adults, the acute effects of THC include dizziness, heart rate changes, blurred vision ,altered sensorium, cognitive impairment, hallucinations and psychosis (Reece, 2009).

Despite the extensive knowledge on the effect of inhaled THC in adults, the reports on THC effects in infants are scarce and toxicity following passive inhalation of THC in this age group has never been described. The extremely rare clinical reports on children's exposure to THC have been related only to digestion of cannabis cookies. The clinical signs include tachycardia, conjunctival hyperemia, pallor, ataxia, nystagmus, fine tremor, lability of affect and stupor. Signs and symptoms begin several hours after ingestion and usually resolve uneventfully 6 hours later (Weinberg, Lande, Hilton, & Kerns, 1983). In a single case report, a 4-year-old girl was described to have mild hypothermia, ataxia, labile affect, confusion and stupor after swallowing cannabis cookies containing up to 200mg THC (Bro, Schou, & Topp, 1975). Accidental cannabis ingestion has been reported to lead to coma in children (Macnab, Anderson, & Susak, 1989).

In the present case, the infant was presented with mild fever and altered state of consciousness after inhaling cannabis smoke. Considering the fact that marked improvement was observed within hours following admission under supportive treatment alongside normal physical and laboratory assessments made infection unlikely the cause of the infant condition. Electrolytes' imbalance and kidney and liver failure were also ~~examined~~ considered and ruled out. However, urine toxicology screen was positive for 11-nor-9-carboxy-delta9-tetrahydrocannabinol (THCCOOH), the primary urinary metabolite of THC. The parents' confirmation of lengthy and heavy exposure to cannabis smoke alongside the natural history of rapid improvement under supportive therapy, confirm the clinical and laboratory diagnosis of THC toxicity in this case. This etiology should be ~~considered~~ taken into consideration in the differential diagnosis of altered states of consciousness, after excluding more common etiologies.

The parents consistently and firmly denied any drug abuse other than cannabis smoking. Several studies demonstrated that THC metabolites could be detected in adults, for several hours and even days after prolonged and heavy passive THC inhalation (Law, Mason, Moffat, King, & Marks, 1984; Morland et al., 1985; Zeidenberg, Bourdon, & Nahas, 1977).

Notably, THC pharmacokinetic has not been studied in infants. THC, a lipophilic compound, tends to accumulate in fat tissues. Thus, it readily crosses the blood-brain barrier and reaches high levels in the brain. Its effect on infants might be depended on respiratory parameters as well as body weight, total volume of distribution with regard for the relatively abundant fat tissues in infants and the susceptibility of the developing brain. The fact that the infant is smaller in [body size mass](#) than an adult may hypothetically result in higher concentrations of THC followed by its noxious effects.

The circumstances under which cannabis might cause intoxication is particularly relevant in the light of the current trend in cultural habits of young parents to smoke cannabis in their children's presence. A survey in 1960 showed that 3% of the USA population aged 18-25 had used cannabis. By 1970, this rate has increased to 40% and by 1980 to 70% (Gahlinger P, 2004). This data suggests that cannabis abuse due to passive inhalation might be found [even](#) in young normative and well functioned families as opposed to other forms of abuse where additional risk factors are usually identified.

It is, therefore, highly important to draw parents' attention to the possibility of abusing effects of passive inhalation of THC in children. As infants seem to be more

vulnerable to THC toxicity, passive inhalation of the drug might seriously endanger them.

Pediatrician's and health workers awareness to the characteristics of cannabis intoxication is also essential since it is not routinely considered in medical assessment under daily clinical settings. Discrepancy between the severe neurological presentation and the paucity of other findings in the physical examination and routine laboratory assessment should raise the diagnostic possibility of poisoning. In such cases, urine toxicology screen is imperative.

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