Amnesia Associated With Recreational Cannabis Use in an Adolescent

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Cannabis has been used for centuries recreationally. With its legalization in some states of the US, one after the other, there is an increase in its availability and use. According to the National Survey on Drug Use and Health, the percentage of marijuana users 12 years of age or older increased from 11% in 2002 to 18% in 2019.[1,2] In a report published in 2015, a survey found an estimated 183 million people worldwide used marijuana in 2014.[3] Cannabis has over 100 active ingredients, and the most potent are δ-9-tetrahydrocannabinol (THC) and cannabidiol.[4] Cannabinoid receptors are seen in high density in the amygdala, prefrontal cortex, and hippocampus, controlling executive functioning and memory.[5,6] Cannabinoids also regulate anxiety and produce psychosis-like effects in some instances.[6,7] Cannabis can also cause impaired motor coordination, executive functioning, cognition, and memory.[5,6] Studies have shown more significant structural and functional impairment in the brain of adolescents using cannabis due to ongoing neurodevelopment.[6,7] In this report, we present a case of marijuana-induced amnesia, a rare adverse effect of cannabis use.

Case Report

A 17-year-old white girl with no prior psychiatric or medical history presented to the psychiatry emergency department via emergency medical services (EMS) for confusion and agitation. She was not oriented to time, place, or situation. She was accompanied by her mother, who provided the patient's history. Per EMS reports, a neighbor called them as the patient was screaming and agitated in her house, and her 2-year-old son was crying outside the home. EMS also detected a smell of recent marijuana use in the house. On psychiatric assessment, the patient did not have signs of psychosis, mania, or depression. No signs of a seizure or postictal state were noted. Her vital signs and routine laboratory blood and urine workup were within normal range, except for the urine drug screen, which returned positive for THC, confirming the history provided by neighbors and EMS. A head computed tomography scan revealed no abnormalities, and this was confirmed with negative brain magnetic resonance imaging (MRI). The neurology consult team found no neurological deficits or causes of amnesia, and her remote memory was intact.

The patient was given a single oral dose of olanzapine 5 mg for agitation after the initial evaluation and laboratory workup. She stayed in the emergency department for observation given her agitation and inability to take care of herself at the time of presentation. After about 10 hours of admission, the patient appeared less confused; became oriented to person, time, and place; and was able to form new memories. She admitted to marijuana use for the first time recently, which she obtained from a marijuana dispensary. Despite the improvement, she could not recollect the events that led to her hospital admission, including details from when she smoked marijuana until she was brought to the hospital.

Discussion

Transient global amnesia is a phenomenon of unknown etiology associated with either anterograde or retrograde memory loss.[8] Cannabinoids act on endocannabinoids in the body, which are CB1 and CB2, G protein–coupled receptors.[5,9] CB1 is abundantly seen in the central nervous system in the hippocampal region, where the memory center lies, and CB2 is seen in the peripheral nervous system.[9] In the central nervous system, the THC via CB1 receptors regulates the release of neurotransmitters like GABA, dopamine, and glutamate[9,10]; it influences neuronal functioning by modulating neuronal synaptic plasticity.[9,10] Research shows that it is dose-dependent, with detrimental effects of THC seen in heavy cannabis use in middle adolescence, and even lower doses are destructive in very young people. Repeated exposure to cannabis harms cerebral functioning by causing morphological and molecular changes at a neuronal level.[9,11] This may alter the brain circuits, especially in the prefrontal cortex and the hippocampal regions.[1,9] Proinflammatory cytokines are released by activated microglia and astrocytes if exposed to THC for a long time, causing memory impairment.[9–11] In most acute cases, imaging studies are without abnormalities. However, research in chronic adolescent users shows greater activation of the right inferior frontal gyrus and other areas involved in executive functioning and self-regulatory mechanisms even >25 days after abstinence on MRI.[12] Patients with symptoms of agitation and aggression are mostly treated with antipsychotics, but strategies are needed to find an alternative to the use of antipsychotics due to potential side effects.[13] More research and data are needed to guide providers about the management of patients with transient global amnesia.[13]

In most cases, transient global amnesia is self-limiting and rarely

recurs, but it can adversely impact a patient's mental health due to hospitalization and diagnostic evaluation stress. In the wake of easy access to cannabis due to recent changes in laws, first responders and medical professionals should be educated on cannabis use, its unusual clinical presentations, and their management.

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