

Increasing Chronic Cannabis Use and Cyclic Vomiting Syndrome Witnessed in Pediatric Population: A Case Report and Literature Review

Faiza Ahmed^{1*}, Andre Thompson², Kim Andrews³, Praneeth Nekuri³, Ishita Gupta⁴, Nikita Chellapuram⁵, Godsgift Enebong Nya^{6,8}, Gertrude O Bassey⁷, Uzoamaka Nwokorie⁶ and Cicily Vachaparambil⁹

¹Medical Student, Avalon University School of Medicine, Curacao

²Doctor of Medicine Graduate, Washington University of Health and Science, Belize

³Medical Student, John F. Kennedy University School of Medicine, Curacao

⁴Bachelor of Medicine and Bachelor of Surgery Graduate, Dr. Rajendra Prasad Government Medical College, India

⁵Medical Student, Bhaskar Medical College and Hospital, India

⁶Doctor of Medicine Graduate, University of Science, Arts and Technology, Montserrat

⁷Department of Family Medicine, Bon Secours Medical Group, USA

⁸John Hopkins Hospital, USA

⁹Internal Medicine Resident Physician, Emory University School of Medicine, USA

*Corresponding Author: Faiza Ahmed, M.D Program, Avalon University School of Medicine, Curacao.

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Abstract

Cyclic Vomiting Syndrome (CVS) is a common disorder which is characterized by the occurrence of nausea and vomiting that typically lasts for 1 - 5 days followed by asymptomatic periods [1]. The etiology of CVS is unknown, however it has been related to various other associations such as menses (catamenial CVS), migraine headaches, diabetes mellitus, pregnancy, chronic cannabis use and many more (See table 1) [2,3]. CVS tends to affect all age groups. Many reports link cannabis, also called cannabinoid or marijuana, use to CVS as high as 40 - 50% in male population [1]. Adults are often associated with cannabinoid-induced CVS, meanwhile there are limited reports linking cannabinoid-induced CVS to the pediatric population. We came across a very young case of a 13-year old male who visited the Emergency Room 9 times over a 24-month period with severe cognitive impairment and symptoms of CVS. Each time this patient was admitted for hospitalization, diagnostic imaging, laboratory tests and toxicology screening were performed. The toxicology reported positive for cannabinoids. This is just one of many cases on the rise in United States that involves increasing use of cannabis among adolescents. Through our observation, all physicians should start considering the role of cannabis in diagnosis of CVS, particularly in adults and pediatric males.

Keywords: Cyclic Vomiting Syndrome (CVS); Nausea; Vomiting; Cannabinoid

Introduction

Cyclic Vomiting Syndrome (CVS) is an idiopathic occurrence of recurrent vomiting episodes that alters between symptom induced and normal health intervals and is often challenging to diagnose. Increasing targeted diagnostic tests, clinical studies and medical laboratory findings have shown that the pediatric population is currently included in the group of patients that suffer from cannabinoid-induced cyclic vomiting. This new addition has contributed to high financial costs associated with screening for CVS. The increasing number of diagnostic screening evaluations needed often result in inconclusive clinical or medical managed treatments for CVS patients [4].

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Gastrointestinal system	<ul style="list-style-type: none"> • Abnormal fixation and twisting of the intestine with intermittent twist • Pancreatitis • Gallstone disease • Infection with H. pylori • Gastritis • Idiopathic inflammatory bowel disease (IBD) • Gastroesophageal reflux disease Hirschsprung disease • Chronic appendicitis
Endocrine Disorders	<ul style="list-style-type: none"> • Addison’s disease • Diabetic ketoacidosis • Pheochromocytoma
Metabolic Disorders	<ul style="list-style-type: none"> • Disorders of fatty acid • Oxidation disorders of urea cycle • Mitochondrial encephalomyopathy • Acute intermittent porphyria
Neurological Diseases	<ul style="list-style-type: none"> • Migraine and abdominal migraine • Brain tumors (cerebellar medulloblastoma, glioma stem) • Panayiotopoulos syndrome • Chiari malformation • Riley-Day syndrome
Psychiatric Disorders	<ul style="list-style-type: none"> • Anorexia • Bulimia • Depression • Munchausen by proxy

Table 1: Differential diagnosis of CVS.
 Copyright 2019, George Katsaras., et al. [3].

Case Report

A 13-year old severely cognitive impaired male patient was admitted to the hospital 9 times in a year due to episodes of cyclic vomiting syndrome (CVS). The symptoms began abruptly yet resolved themselves within 3 to 15 days. The physical exam presented with intermittent hypertension and abdominal tenderness. This young patient was hospitalized during each episode and was treated with intravenous fluids, anti-emetics, and acid-suppressing medication. Several diagnostic tests were performed, and all results were mostly normal except the endoscopy which displayed mild erosion of the distal esophagus (See table 2). Laboratory tests were done, and again the results came out normal (See table 3). Both sets of tests were followed by a urine toxicology screening, which displayed positive results for cannabinoids. There was no history of compulsive bathing but was advised by his physician to discontinue use of the drug. The

standard therapy for CVS, tricyclic antidepressant (TCA) medication amitriptyline in 100 mg initial dose with maintenance of 40 mg and anti-anxiety medication, lorazepam dose of 2 mg, was prescribed. Regardless of the advice and prescription, the patient refused to stop his usage of the drug and was often seen in the hospital with the same symptoms following that year.

Test Name	Results
Colonoscopy	Normal
Abdominal computed tomography (CT)	Normal
Abdominal magnetic resonance angiography (MRA)	Normal
Abdominal ultrasound (US)	Normal
Head CT scan	Normal
Head magnetic resonance imaging (MRI) scan	Normal
Hida Scan	Normal
Upper GI series (UGI)	Normal
Endoscopy	Distal esophagus exhibits mild erosion

Table 2: List of diagnostic tests performed with results.

Test Name	Results
Amylase	Normal
Lipase	Normal
Metabolic panel	Normal
Liver function test	Normal
24-hour urine catecholamines	Normal
Blood count	Normal

Table 3: List of laboratory tests performed with results.

Discussion and Conclusion

In United States of America, there are over 16.7 million cannabis users and each year 2.6 million are added to the existing populous and become illicit drug users under the age of 19-years old [5]. In 2018, there were more than 11.8 million young adults reported using marijuana in the past year [6]. Several cases have been reported in an attempt to show that there is a correlation between adult cannabis users and cyclic vomiting syndrome (CVS) [1,7,8,19]. Recent reports describe cannabis as an inducer of vomiting in chronic users despite cannabinoids being known to treat nausea and vomiting. This increasing rate of cannabis abuse has introduced a new clinical condition to the healthcare industry known as Cannabinoid Hyperemesis Syndrome (CHS). This syndrome was first described in a case series in 2004 by Allen., *et al.* and is distinguished by chronic cannabis use, cyclic episodes of nausea and vomiting, and the repeated behavior of hot bathing [9]. Allen and his team observed 19 patients who were chronic cannabis users for 3 - 25 years. His patients displayed symptoms such as abdominal pains and cyclic vomiting numerous years after they initiated the use of cannabis drug. The patients often experienced symptomatic relief by taking hot showers followed by the advice of complete drug abstinence. The authors concluded that chronic use of cannabis is associated with cyclic vomiting patterns as witnessed in their patients.

The correlation between cannabis use and CVS is reinforced in a case reported by the Mayo Clinic in 2012. They reported a 5-year case history that was conducted from 2005 to 2010 of chronic cannabis use and cyclic vomiting involving 98 patients. Eighty-four patients reported abdominal pain and fifty-two patients reported improvement of symptoms after they took a hot shower, or a hot water bath [10].

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In addition to Mayo Clinic report, another case was reported involving a 22-year-old that experienced abdominal pain with refractory vomiting after using marijuana for 6 years. It was noted however, that after the cessation of marijuana use the symptoms were completely resolved [11].

Whether or not the etiology of CVS is triggered by marijuana use still remains uncertain. Several hypotheses to support the aforementioned statement have been presented. Studies have demonstrated that the main active cannabinoid ingredient Delta-9 tetrahydrocannabinol, also known as THC, works on different cannabinoid receptors, such as type 1 (CB-1) and type 2 (CB-2) [12]. The CB-1 receptors are found in the central nervous system (CNS) and enteric nervous system (ENS), while the CB - 2 receptors are mostly found in the spleen and immune cells.¹ In the CNS, due to the CB - 1 receptor's stimulation on the dorsal vagal location of the brainstem, anti-emetic effects are common. Therefore, the treatment of chemo induced vomiting and nausea is viable through the use of cannabis [13,14]. This sect of patients are different than the group who abuses cannabis use. Moreover, the cannabinoid CB-1 receptors mediate gastrointestinal effects that inhibit lower esophageal sphincter relaxation, gastric acid secretion, and changes in motility which is demonstrated in the rat models of McCallum [15]. Furthermore, studies have shown that when used for anti-emetic doses THC can cause significant gastroparesis [15]. The synthetic form of THC, known as Dronabinol, has delayed gastric emptying effects as well [14].

The inconsistent episodic occurrences of vomiting and severe colicky abdominal pain with periods of no symptoms has led to focused analysis of the metabolic mechanism linking the chronic use of THC. The mechanism is still not fully understood but it has been connected to the endogenous cannabinoid system sustained stimulation due to its dysregulation [1]. The unpredictable behavior has also been contributed to the fact that the cannabis plant has sixty posing structures with hundreds of components of which only two, the cannabidiol (CBD) and cannabigerol (CBG), have been studied widely in humans [14]. Another potential contributor to the paradoxical behavior is cited as chemical and toxin contaminations of marijuana [16].

As current legislation is providing more legal access to marijuana [17] a surge of cases is to be expected with an increasing number in the pediatric population. Doctors and scientist can anticipate treating young adolescents presenting with episodes that have longer duration times with severe signs and symptoms that require a growing number of ER visits and hospital stays. This legislation increased medical attention, which translates into an increasing financial burden put on an already stressed healthcare system. An understanding of the cannabinoids pro-emetic results, and their metabolites on the gastrointestinal system as it supersedes anti-emetic CNS would result in the proper choice of diagnostic testing and thus decrease wasteful medical costs while improving the quality of life [18]. As aforementioned, this case is the youngest reported case of cannabis related CVS we came across and we can expect a massive increase in the number of children that will be presented to the ER, gastroenterologists, and primary care physicians due to this condition. So, immediate routine drug screening measures for young patients presenting with CVS signs must be in place along with marijuana abstinence advice in order to resolve CVS symptoms long-term. All physicians, particularly in the Emergency Department should be aware of such clinical issue.

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