

## Case Report

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# A Complex Conundrum: Investigating Auto-Brewery Syndrome as a Rare and Misdiagnosed Condition

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### ABSTRACT

Auto brewery syndrome (ABS) is a rare medical condition in which the gastrointestinal system produces alcohol that is absorbed into the bloodstream, leading to chronic intoxication without the consumption of alcohol. A 23-year-old female was referred to our clinic with symptoms including headache, nausea, altered mental state, and loss of coordination. She had a significant medical history for psychiatric illness, endometriosis, and polycystic ovarian syndrome. She had been turned down by numerous specialists before being diagnosed with ABS once consulting with an infectious disease physician, through breathalyzer test results and IV Miconazole treatment. This case highlights the importance of considering ABS as a possible diagnosis for patients with unexplained chronic intoxication and underscores the need for further research and standardization of diagnostic tests.

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### Introduction

Auto brewery syndrome (ABS) is a rare medical condition that is characterized by the overgrowth of yeast in the gut, leading to the production of high levels of alcohol. This condition is also known as gut fermentation syndrome and is an under-diagnosed condition that can present with a wide range of symptoms, including mood disturbances, gastrointestinal issues, and neurological symptoms. ABS can occur in individuals with normal gastrointestinal function or in those with underlying gastrointestinal conditions, such as inflammatory bowel disease. It has also been associated with the use of broad-spectrum antibiotics.

### Case Report

A 23-year-old female presented to our center with a one-year history of intermittent episodes of confusion, lethargy, and disorientation. The patient had a complex medical history that included severe psychiatric issues, endometriosis, and polycystic ovarian syndrome. She reported a history of frequent episodes of abdominal pain and bloating, as well as diarrhea and constipation. Laboratory investigations were significant for elevated liver function tests (LFTs), including aspartate aminotransferase (AST) of 128 U/L (normal range: 10-40 U/L) and alanine aminotransferase (ALT) of 124 U/L (normal range: 7-56 U/L). However, she had no history of alcohol abuse and denied any recent alcohol intake [1]. It is likely that the elevated LFT's were due to her course of Fluconazole as a medication regimen attempt from her Gastroenterologist.

The patient underwent a comprehensive evaluation, including gastrointestinal endoscopy and colonoscopy, as well as magnetic resonance imaging (MRI) of the brain. All investigations were negative except for a small hepatic cyst detected on MRI [2].

Given the patient's history of abdominal symptoms and elevated LFTs, a diagnosis of non-alcoholic fatty liver disease (NAFLD) was considered. However, the patient's BMI was within normal limits, and abdominal imaging did not reveal any evidence of hepatic steatosis. Further investigations, including serological tests for hepatitis B and C, were negative [3]. Given the patient's complex medical history, she was referred to over five different specialists, including gastroenterology, hepatology, psychiatry, and neurology; however, no definitive diagnosis was made. The patient continued to experience intermittent episodes of confusion, lethargy, and disorientation, which were becoming increasingly frequent and disabling [4].

The patient was then referred to an infectious disease specialist who ordered a comprehensive evaluation for potential infectious etiology for the patient's symptoms. The evaluation included blood and urine cultures, PCR testing for herpes simplex virus (HSV) and Epstein-Barr virus (EBV), measurement for mycotoxin blood levels, catecholamine metabolites, and autoantibodies. All evaluations, including microbial cultures and sensitivities, were negative [5].

Due to the persistence of the patient's symptoms, she underwent further testing. Breathalyzer measurements were recorded before and after consumption of heavy carbohydrate meals with no alcohol consumption. The breathalyzer test demonstrated her ethanol level to be severely elevated, therefore supporting the diagnosis of ABS. The patient was then started on six weeks of IV Miconazole 100 mg ml/hr IVPB q24 hours, initiated by the infectious diseases specialist, in which this regimen showed complete resolution of her symptoms. Additionally, the patient was then admitted to the inpatient floor for a carbohydrate challenge

test to further assess management. The patient received two doses of Micafungin with no carbohydrate intake at hours 1, 2, 4, 8, 16, and 24 with a baseline glucose blood level of 93 mg/dl. The patient was then challenged with 200g of oral glucose, and her blood and breath ethanol was monitored, revealing normal levels. Based on a thorough analysis of the results with a dietitian, a 70g carbohydrate intake daily and education on carbohydrate counting were also recommended [6].

## Discussion

Auto-brewery syndrome (ABS) is a rare medical condition that can cause unexplained chronic intoxication without alcohol consumption. It is believed to result from an overgrowth of yeasts in the gastrointestinal tract, primarily *Saccharomyces cerevisiae*, leading to the production of alcohol, which is then absorbed into the bloodstream. The symptoms of ABS are often mistaken for alcoholism or other psychiatric or medical diagnoses. ABS is a relatively unknown entity and there are neither standard diagnostic criteria nor established effective therapies [7].

The diagnosis of ABS is based on the presence of elevated blood alcohol levels in the absence of alcohol consumption with a concurrent evidence of increased levels of *saccharomyces cerevisiae*. There are numerous factors contributing to ABS, including a history of diabetes, stress, antibiotics use, consumption of a high carbohydrate diet, and obesity. Education plays an essential role in the management of the patient with ABS, and the importance of dietary modification cannot be overstated.

This case report highlights the need for clinicians to consider ABS as a possible diagnosis in patients with unexplained chronic intoxication, not resolving with the conventional diagnostic approach. Additionally, it underscores the need for a standardized diagnostic algorithm and treatment guidelines for ABS. With the recent advances in molecular biology, metabolomics, and industrial biotechnology, this rare condition may gradually develop into a far more well-understood clinical entity. Therefore, more extensive studies are urgently needed to establish effective diagnostic and therapeutic options that can help clinicians to better manage ABS. The treatment of ABS involves the use of antifungal agents, such as fluconazole and Micafungin. In addition, dietary modifications, including the restriction of carbohydrates and sugars, may also be effective. Also, patients are strongly advised to avoid alcohol to avoid secondary fermentation events, which can complicate the clinical picture.

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