


# Chronic Diarrhea in a Drinker: A Breakthrough Case of Pellagra in the US South

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## Abstract

The triad of diarrhea, dementia, and dermatitis constitutes the clinical diagnosis of pellagra. However, most reported cases of pellagra have occurred without all components of the triad. Pellagra was declared eradicated in the United States after an outbreak in the 1920s, and is now considered to be an exceedingly rare diagnosis in developed countries. In this article, we present a case of a 56-year-old man who presented with a significant history of alcohol use and chronic diarrhea. Pellagra was clinically diagnosed based on the triad of diarrhea, cognitive dysfunction, and dermatitis in this malnourished, alcoholic patient. The patient was treated and clinically improved with resolution of his diarrhea and cognitive dysfunction.

## Keywords

pellagra, diarrhea, cognitive dysfunction, alcohol

## Introduction

Diarrhea has a yearly incidence of 179 million cases in the United States<sup>1</sup> and is commonly caused by acute infections of the gastrointestinal (GI) tract. Diarrhea that persists for more than 4 weeks is referred to as chronic,<sup>2,3</sup> and common differentials include irritable bowel syndrome, inflammatory bowel disease, endocrine disorders, and food allergy or sensitivity.<sup>2</sup> Though pellagra is within the differential diagnosis for chronic diarrhea, it is infrequently the cause and rarely reported in the United States.<sup>4-7</sup>

## Case Presentation

A 56-year-old Caucasian man with a medical history of alcohol use disorder and coronary artery disease with stent placement in 2013 and 4 coronary artery bypass grafts in 2014 presented to the emergency room with complaints of diarrhea and sought assistance with discontinuing alcohol use. He had a 40-year history of alcohol use, with an increased intake in the past 2 years due to chronic pain from a work-related injury to his left hand. He had developed a 2-year history of daily episodes of loose, watery, nonbloody stools, and unintentional 60-pound weight loss on a diet consisting mostly of instant noodles. There was no alternating constipation or tenesmus. There was no recent travel or use of laxatives. He reported multiple falls during inebriation, a burning sensation to the sole of his feet, and nonpruritic skin changes

to the anterior surface of both arms and right side of face. He endorsed feelings of sadness and hopelessness since the work-related injury that triggered his alcohol consumption. He consumed half-gallon of liquor daily and his last drink was the morning of presentation. He had one prior attempt at quitting alcohol use 5 days prior to presentation, during which he experienced withdrawal symptoms of tremors and hallucinations. He also had an episode of seizure-like activity during which he had contractions of both upper extremities, loss of consciousness, and noted fecal incontinence when he regained consciousness.

On examination, he was afebrile but had a pulse rate of 107 beats/minute and blood pressure of 158/102 mm Hg. He appeared older than stated age, with an unkempt appearance, and was inattentive and confused with a Montreal Cognitive Assessment score of 20. Tongue and bilateral hand fasciculations were present, without a flapping tremor. His neurological examination revealed no other abnormalities of cranial nerves, sensation, proprioception, or tendon reflexes. He had normoactive bowel sounds and his abdomen was scaphoid,

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**Figure 1.** Symmetrical, scaly erythema on the dorsal surfaces of both forearms characteristic of the dermatitis seen in pellagra.



**Figure 2.** Well-demarcated areas of erythema on the sun-exposed area of right upper extremity characteristic of the dermatitis seen in pellagra.

soft, and nontender to palpation. There was a 1 × 1 cm-raised lesion of the right cheek, and symmetrical, well-demarcated areas of patchy, scaly erythema on the sun-exposed dorsal surfaces of both forearms (Figures 1 and 2).

Laboratory results revealed serum ethanol = 317 mg/dL, white blood cells count = 9200/mm<sup>3</sup>, hemoglobin = 12.3 g/dL, hematocrit = 38.8%, mean corpuscular volume = 113.5 fL, mean corpuscular hemoglobin = 36.0 pg, platelet = 416000/mm<sup>3</sup>, alkaline phosphatase = 160 IU/L, alanine aminotransferase = 54 IU/L, aspartate aminotransferase = 104 IU/L, albumin = 3.0 g/dL, calcium = 8.1 mg/dL, vitamin B<sub>12</sub> = 623 pg/mL, thyroid stimulating hormone = 7.86 μIU/mL, T-3 = 1.0 ng/mL, and T-4 = 5.9 μg/dL. He was admitted for alcohol detoxification and further evaluation of his GI complaints. He was started on the Clinical Institute Withdrawal Assessment for Alcohol protocol. A clinical diagnosis of pellagra was made and he was treated with niacin 100 mg 4 times

a day. He also received thiamine, folic acid, vitamin B<sub>12</sub>, and vitamin D. Stool studies were negative for *Clostridium difficile* or other infectious causes of diarrhea. There were clinical improvements, with the resolution of diarrhea and daily passage of formed stool, with medical treatment of pellagra. Montreal Cognitive Assessment also increased to a score of 29, but he admitted continued cravings for alcohol on naltrexone. He was discharged within 5 days of admission, and transitioned to an intensive outpatient substance abuse treatment program and halfway house placement.

## Discussion

Diarrhea has a yearly incidence of 179 million cases in the United States<sup>1</sup> and is commonly caused by acute infections of the GI tract. Diarrhea that persists for more than 4 weeks is referred to as chronic,<sup>2,3</sup> and common differentials include irritable bowel syndrome, inflammatory bowel disease, endocrine disorders, and food allergy or sensitivity.<sup>2</sup> Though pellagra is within the differential diagnosis for chronic diarrhea, it is infrequently the cause and rarely reported in the United States.<sup>4-7</sup>

Pellagra is defined as a medical disorder caused by a nutritional deficiency of niacin (vitamin B<sub>3</sub>).<sup>4,6,8,9</sup> Niacin deficiency may result from inadequate consumption, malabsorption, excess loss, medication side effect, or metabolic derangements.<sup>6,8</sup> Niacin primarily works as a cosubstrate or coenzyme in different oxidation-reduction reactions. Niacin is naturally found as nicotinic acid in plants or nicotinamide in meats, serving as precursors for the coenzymes nicotinamide adenine dinucleotide (NAD) and NAD-phosphate (NADP). If dietary niacin is insufficient, the liver can convert the essential amino acid tryptophan into niacin, but this requires thiamine, riboflavin, pyridoxine, and NADP.<sup>6,8,10</sup>

Pellagra was described as early as 1735 and the first known case in the United States was reported in Georgia in 1902.<sup>6,7,11</sup> There was an exponential increase in cases in southern states. This was attributed to the rise of the cotton industry that displaced local food production and led to decreased niacin consumption. By 1928, there were more than 200000 cases of pellagra, which equaled the population in Atlanta.<sup>7</sup> In Southern US, there was a mortality rate of approximately 7000 persons per year.<sup>7,11</sup> This led to the passing of state laws that mandated the fortification of breads and grains with niacin and other nutrients.<sup>5-7</sup> As a result of these changes, pellagra was declared to be eradicated in the United States and other developed countries,<sup>4-7</sup> though it remains endemic in areas of India, China, and some African countries.<sup>12</sup>

Our case shows that there continues to be cases, though rare, in the post-eradication era of pellagra. The few cases reported in the 21st century have been attributed to starvation resulting from homelessness or malabsorption in conditions such as AIDS and alcohol use disorder. In our case, the patient admitted to a poor diet consisting of instant

**Table 1.** Case Reports of Pellagra Published in the 5 Years, 2015 to 2019, Preceding This Index Case.<sup>18-24</sup>

Year of publication	Age	Sex	Symptoms	Outcomes with nicotinamide/niacin	References
2015	7	Female	Diarrhea, dermatitis, hallucinations, seizures	Resolution	18
2016	29	Male	Diarrhea, dermatitis, delirium	Resolution	19
2017	53	Male	Diarrhea, disorientation	Resolution	20
2017	37	Male	Altered mental status, seizures	Resolution	21
2017	49	Female	Diarrhea, dermatitis	Resolution	22
2018	50	Female	Dermatitis	Resolution	23
2019	62	Female	Diarrhea	Resolution	24

noodles, which do not provide adequate nutrition. Alcohol was his main source of dietary calories and it is deficient in nutrients. Alcohol also hinders absorption in the GI tract by directly destroying villi in the duodenum or indirectly causing pancreatic insufficiency or vitamin deficiencies.<sup>6</sup> The diarrhea caused by pellagra may further propagate a state of malnutrition. Other GI manifestations of pellagra may include nausea, vomiting, glossitis, or abdominal pain that were not seen in our patient.<sup>6,13</sup> The patient in this case experienced resolution of diarrhea with niacin as well as vitamin supplementation. Nicotinamide, at least 300 mg per day in divided doses, is also recommended for the treatment of pellagra.<sup>14,15</sup> Though there are no specific tests for niacin deficiency, a response to oral nicotinamide supports the clinical diagnosis.<sup>15</sup>

Not only was it rare for our patient to present with pellagra in the 21st century, but historically it was a seldom occurrence for patients to have all components of the triad. Despite the treatable nature of this condition with early detection, pellagra can be fatal if the diagnosis is missed and “death” is often stated as a fourth “D” in this condition.<sup>4,8,15</sup> It has been suggested that pellagra is underdiagnosed, with one report estimating that 27% of alcoholics who die during hospitalization had neuropathological features of pellagra on autopsy.<sup>16,17</sup> In this subset of patients, pellagrous encephalopathy may be mistaken for other causes of delirium or dementia, thereby masking the diagnosis of pellagra. The early clinical diagnosis in our case conferred a good prognosis, and cases reported within the past 5 years have resolved with treatment (Table 1).<sup>18-24</sup> Though considered by many as a disease of the past, clinicians should still maintain a high index of suspicion for pellagra as differential diagnosis for delirium or dementia in alcoholics, which may occur with or without dermatologic or GI manifestations.

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### Ethics Approval

Our institution does not require ethical approval for reporting individual cases or case series.

### Informed Consent

Written informed consent was obtained from the patient for his anonymized information to be published in this article.

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