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# Small Intestinal Bacterial Overgrowth



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## INTRODUCTION

Small intestinal bacterial overgrowth (SIBO) is a common but not very well-known clinical entity. This commentary briefly reviews small intestinal bacterial overgrowth, highlighting its symptomatology, pathophysiology, evaluation, and management. It is a medical condition in which abnormal numbers of bacteria in the small intestine present with gastrointestinal symptoms. Symptoms include abdominal pain, bloating, flatulence, and diarrhea, which are also common to patients with irritable bowel syndrome (IBS), celiac disease, and inflammatory bowel disease (IBD).[1] It is difficult to ascertain the true prevalence of SIBO due to its relationship and overlap with other disorders. SIBO is more common in females, and the incidence of the disease increases with age.[2]

## PATHOPHYSIOLOGY

The concentration of bacteria in the small intestine is low compared to the colon. Gastric motility and acidity keep the growth of bacteria in check. However, in individuals with structural or functional gastrointestinal obstruction, these protective mechanisms fail, leading to the overgrowth of the coliform bacteria in the small intestine. Escherichia coli, Klebsiella species, and Aeromonas are the most common bacteria identified in SIBO. These bacteria are usually coliforms and are typically found in the colon.[3] Patients with intestinal dysmotility due to a history of abdominal surgery, Crohn's disease, scleroderma, diabetes, or use of opiates are at the highest risk. Also, medications, including proton pump inhibitors, which change gastric microbiota by the reduction of acid secretion, increase the risk of bacterial overgrowth.[4]

## EVALUATION

Patients with SIBO present with vague and nonspecific symptoms. Attention to the presence of predisposing conditions for SIBO is important to pursue further workup. Obtaining a history regarding previous attempts at treatment for other gastrointestinal disorders and their response, including incidental improvement in gastrointestinal symptoms after antibiotic courses, may increase suspicion. Physical examination is often unrevealing except in patients with severe malnutrition.[1-3] Bacterial overgrowth can impair vitamin and nutrient absorption and cause anemia, low albumin, a low lymphocyte count, and low vitamin B12 levels. However, bacterial production paradoxically increases serum folate and vitamin K levels. The combination of low B12 along with high folate levels should arouse suspicion. Deficiency of fat-soluble vitamins has also been observed.[5]

Hydrogen (or methane) breath tests and endoscopic aspirates are two primary methods for diagnosis. For breath tests, patients should avoid all antibiotics and should not have had a colonoscopy for four weeks prior to the test. Promotility agents should be avoided for one week before, and complex carbohydrates should be avoided the day before the test. A 75-g glucose or 10-g lactulose oral dose is given, followed by ~ 250 ml of water. The concentration of hydrogen and methane in the breath is then measured. An increase in hydrogen concentration ≥20 parts per million (ppm) from baseline within 90 minutes of ingesting the carbohydrate solution suggests SIBO. A concentration of ≥10 ppm of methane at any point is considered a positive test result.

Small intestinal aspirate and culture is the gold standard test for SIBO. A North American consensus

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describes a concentration of ≥103colony-forming units (CFU)/mL of coliform bacteria in small bowel endoscopic aspirate, and culture as being diagnostic of SIBO.[6]

## TREATMENT

Eradication of bacterial overgrowth with antimicrobial therapy is the mainstay of treatment. Antibiotics that treat gut flora are used therapeutically, including metronidazole, amoxicillin-clavulanate, ciprofloxacin, and rifaximin. Rifaximin at 1000 to 1200 milligrams daily for 7 to 10 days has been widely studied. Bacterial eradication with rifaximin is seen in about two-thirds of patients who complete the therapy. However, the chances of recurrence and the risks associated with repeated and prolonged antibiotic use must be considered. About 40 % of patients experience recurrent SIBO infection following completion of antibiotic therapy, and a higher recurrence rate is seen in older patients and those on chronic proton pump inhibitors therapy.[7] Nutritional deficiencies should also be addressed if present.[8] A low FODMAP (Fermentable Oligo-, Di-, Mono-saccharides, And Polyols) diet has been shown to benefit patients with irritable bowel syndrome, but data in SIBO are limited. Probiotics in SIBO showed no significant difference compared to controls in a large 2017 meta-analysis.[9]

## PROGNOSIS AND COMPLICATIONS

The prognosis varies based on the underlying cause, with most cases having a favorable outcome. However, severe disease can lead to profound malnutrition and significant morbidity and mortality. If untreated, SIBO may result in intestinal failure.[10] A notable complication in patients with hepatic cirrhosis is the excess production of ammonia, which can trigger hepatic encephalopathy. Additionally, patients with short bowel syndrome often experience confusion due to D-lactic acidosis caused by small intestinal bacterial overgrowth.[11]

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