

Malabsorption

Learning objectives

Relevant points in dietary history, GI tract symptoms and stool characteristics

Laboratory studies

Medical Care

Definition

Malabsorption disorder affecting the digestion or absorption of nutrients, manifests as abnormal stools, failure to thrive and specific deficiencies

Malabsorption clinically classify into three basic categories:

- (1) Selective, as seen in lactose malabsorption;**
- (2) Partial, as observed in a Beta-lipoproteinemia, and**
- (3) Total as in celiac disease.**

Causes

- 1. Infective agents ; traveler's diarrhea, Parasite as *Giardia lamblia*,**
- 2. Structural defects; Inflammatory bowel diseases as Crohn' Disease s**
- 3. Mucosal abnormality; Coeliac disease ,Cows' milk intolerance**
- 4. Enzyme deficiencies; Lactase deficiency inducing lactose intolerance**
- 5. Digestive failure ;cystic fibrosis**

History (3F)

Dietary history (The amount and type of fluids, fat and formula ingested)

The proper amount of **fluid** for most young children is around 100 mL/kg/day. Fluid intake that exceeds this amount may result in looser stools.

Fat is important for slowing the movement of food through the intestine via hormonal mechanisms. Fat intake of less than 3 g/kg/day may contribute to toddler's diarrhea, especially in the setting of excessive free fluid and carbohydrate intake (e.g., as occurs with large amounts of fruit juice intake).

Juice is commonly introduced into the diet in the latter portion of the first year of life. Purple grape juice has a high osmolarity, which can cause osmotic

diarrhea. Apple and pear juice contain a high fructose-to-glucose ratio, and consumption of these juices can result in fructose malabsorption and diarrhea.

GI tract symptoms:

Abdominal distention and watery diarrhea, with or without mild abdominal pain, associated with skin irritation in the peri-anal area due to acidic stools are characteristic of carbohydrate malabsorption syndromes.

Periodic nausea, abdominal distention and pain, and diarrhea are common in patients with chronic *Giardia* infections.

Vomiting, with moderate-to-severe abdominal pain and bloody stools, is characteristic of protein sensitivity syndromes or other causes of intestinal injury (e.g., inflammatory bowel disease).

Recurrent abdominal pain has been implicated as a symptom of dietary disorders, although psychological variables that relate to an elevated anxiety level have clouded the certainty of this relationship. Malabsorption syndromes can definitely cause abdominal pain or irritability (particularly seen in celiac disease).

Failure to identify the cause of malabsorption can result in the misdiagnosis of **physiologic syndrome as a behavioral disorder**. Some dietary items may cause symptoms only when they are taken alone or with other specific dietary items.

Poor appetite is common in food sensitivity syndromes. The child becomes conditioned to refuse foods that cause inflammatory reactions of the intestine. However, this is not typically obvious in celiac disease. Malabsorption syndromes not associated with inflammatory reactions typically cause an increase in appetite (eg, cystic fibrosis), unless the associated abdominal gaseous distention hampers intake and induces early satiety.

Other symptoms

- Systemic symptoms, including weakness, fatigue, and failure to thrive, are systemic consequences of chronically poor nutrient absorption.
- failure to thrive due to malabsorption of carbohydrates, fats, or proteins can cause,
- Pallor due to folate and B-12 malabsorption which result in macrocytic anemia.

- Retinitis pigmentosa and ataxia develop in patients with abeta lipo proteinemia because of chronic fat-soluble vitamin malabsorption and deficiency (vitamins A and E).

Stool characteristics

- Patients with toddler's diarrhea (chronic non specific diarrhea) often have loose stools with undigested food particles.
- Frequent loose watery stools may indicate carbohydrate intolerance.
- Pasty or loose foul-smelling stools indicate fat malabsorption, also termed steatorrhea. This symptom is commonly seen in *Giardia* infections, enterokinase deficiency, hepatic and pancreatic dysfunction, and protein sensitivity syndromes.
- Bloody stools are seen in patients with protein sensitivity syndromes but not in disaccharidase and pancreatic enzyme deficiencies or in patients with giardiasis.

Laboratory Studies

Stool analysis

- Reducing substances indicates that carbohydrates have not been properly absorbed.
- Acidic stool has a pH level of less than 5.5. This indicates carbohydrate malabsorption, even in the absence of reducing substances.
- Quantitative conjugated and un-conjugated bile acids may be measured
- Stool fat and the amount of fat intake should be measured and monitored for 3 days.
- Alfa1 -antitrypsin indicates leakage of serum protein and serves as a screening test for protein-losing enteropathy.
- stool for ova and parasites or testing for the stool antigen may reveal the presence of *Giardia* species
- Clostridium difficile* (assays for toxins A and B) or *Cryptosporidium* species (modified acid-fast examination of stool), may be performed.

Urinalysis

- In glucose-galactose malabsorption, the urinary glucose level is typically elevated when the serum glucose level is within reference range because of congenital malfunction of SGLT-1.
- Levels of urinary 4-hydroxyphenylacetic acid have been demonstrated to be elevated in the urine of children with bacterial overgrowth syndrome.

Blood tests

- CBC count may reveal megaloblastic anemia in patients with folate and vitamin B-12 malabsorption or neutropenia in patients with Shwachman-Diamond syndrome (associated with pancreatic insufficiency). In patients with A beta lipoproteinemia, blood smears may reveal a canthocytosis.
- Total serum protein and albumin levels may be low particularly in protein-losing enteropathy and pancreatic insufficiency or enterokinase deficiency.
- Untreated celiac disease, calcium metabolism defects are common with fat malabsorption or ileal resection, fat-soluble vitamin levels in the serum are lower than reference range.
- With bile acid malabsorption, levels of the low-density lipoprotein (LDL) cholesterol may be lower than reference range.
- In inflammatory bowel disease, the erythrocyte sedimentation rate, C-reactive protein level, or both are commonly elevated.
- In liver or biliary disease, the results of liver function tests may be high.
- Immunoglobulin G (IgG) and immunoglobulin A (IgA) anti gliadin and IgA antiendomysial antibodies, or especially tissue transglutaminase antibodies, are useful in the diagnosis of gluten-sensitive enteropathy.
- ¹³C-Sucrose breath test has been proposed as a noninvasive, easy-to-use, integrated marker of the absorptive capacity and integrity of the small intestine.

Treatment of malabsorption syndromes:

Depends on the specific entity being considered

- ❖ Coeliac disease treatment with Gluten-free diet, which is a diet completely devoid of wheat, barley, and rye
- ❖ Chronic diarrhea due to proximal small bowel bacterial overgrowth is treated with oral broad-spectrum antibiotics, particularly those with anaerobic coverage (e.g., metronidazole).
- ❖ Chronic diarrhea secondary to bile acid malabsorption, the use of cholestyramine (Questran) to bind bile acids may help to reduce the duration and severity of the diarrhea.
- ❖ Pancreatic enzymes can be replaced with oral supplements.
- ❖ Immunosuppressive medications can be used to control autoimmune enteropathy and should be prescribed only by a specialist.
- ❖ Food allergic enteropathy need to be on an elimination diet, avoiding offending food antigens.