Lactose Intolerance — Etiology and Symptoms

See online here

Lactose intolerance or lactose incompatibility is a classic example of a malabsorption of disaccharides. Lactose intolerance is frequently described in case examples of metabolic disorders. It is one of the most common disorders within the population and is thus of high relevance in practical work.

Definition of Lactose Intolerance

The intolerance to lactose

Lactose intolerance is caused by a deficiency of the enzyme lactase. This enzyme cleaves the disaccharide lactose in the small intestine. Lactase is essential for the digestion of lactose since the intestine can absorb sugar molecules only in form of monosaccharides.
Many people suffer from lactose intolerance, which is caused by a lack of lactase because the mucosal cells of the small intestine are unable to produce sufficient amounts of lactase. Lactase has a strong osmotic effect and causes diarrhea. If lactase enters the colon it is cleaved by intestinal bacteria. This process produces gases, which leads to flatulencies.

**Note:** Lactose consists of two monosaccharides - glucose and galactose!

### Epidemiology of Lactose Intolerance

Many people worldwide suffer from lactose intolerance due to a gradual decrease in enzyme activity of lactase after breastfeeding, which can lead to primary lactose intolerance. The prevalence of lactose intolerance significantly increases from Northern- to Southern Europe. About 2% of the Scandinavian population suffers from lactose intolerance, whereas 2 out of 3 people are affected in Italy.

Depending on ethnic background, 15 – 80 % of the respective population groups are affected in the USA. The overall number of people suffering from lactose intolerance in the USA is estimated at 25 %.
Congenital lactose intolerance is very rare in healthy infants. Very few infants are born with alactasia. They are unable to tolerate the mother’s milk, which contains lactose and develop serious diseases if not treated in time.

**Etiology of Lactose Intolerance**

Lactose intolerance can have primary and secondary causes. Primary causes are either hereditary (rare) and present from birth or due to a continuously decreased activity of lactase after infancy. This type of lactose intolerance is called adult lactase deficiency.

Secondary types are caused by gastrointestinal diseases due to injuries of the mucosa of the small intestine. Secondary lactose intolerance can be caused for example by celiac disease, enteritis, IgA-deficiency or short bowel syndrome.

**Symptoms and Pathology of Lactose Intolerance**

**Complaints correlate with the amount of consumed milk products**

Lactose intolerance frequently manifests itself in childhood and adolescence. However, secondary types can occur at any age.

Undigested lactose enters the colon directly via the small intestine. Subsequently, it is fermented by bacteria, which produces gases (hydrogen and carbon dioxide) and causes following symptoms:

- Strong spastic flatulencies
- Abdominal cramps

Lactose has strong osmotic effects and binds water. This process results to an increased water flow from the tissue inside the colon, which causes more fluid stools and an acceleration of the vermicular movement of the intestine. This leads to diarrhea.

Symptoms can be very mild or very severe, which might require medical help.

**Note:** A case example can for instance present a 19-year old girl regularly suffering from
diarrhea for years especially after consuming milk products.

Diagnosis of Lactose Intolerance

Recognizing the lactase deficiency

A commonly used examination for the diagnosis of lactose intolerance is the H2-breath test. Only little hydrogen can be detected in persons with sufficient amounts of lactase.

Hydrogen is one of the gases that are formed in the bacterial fermentation process of undigested lactase in the colon. Hydrogen is reabsorbed by the intestine and transported to the lungs via the blood stream where it is then exhaled.

In cases of self-diagnosis of lactose intolerance, the affected person has the possibility of carrying out a diet-test or an exposure test. However, contrary to the hydrogen breath test, they are usually not clear.

If an affected person refrains from eating products rich in milk and no symptoms are observed during this time, one can assume lactose intolerance. A following exposition test can confirm the assumption by having the person with assumed lactose intolerance drink a glass of water containing solved lactose. After a few hours, mentioned symptoms can be observed in case of lactose intolerance.

Note: For examinations, only the H2-breath test is relevant in diagnosis.

Therapy of Lactose Intolerance

The most useful therapy is to refrain from consuming lactose. Every patient can test his or her own tolerance limit in this process.

Persons suffering from lactose intolerance can use food supplements such as lactase pills, which aid the digestion of lactose. However, the patient should still pay attention to lactose-free nutrition.

Note: Non-pasteurized yoghurt contains enough bacterial lactase and can therefore be consumed!

Prevention

A thorough repair of the intestinal flora as well as abstaining from milk products supports the regeneration of the intestinal mucosa and promotes the formation of new healthy intestinal mucosal cells.

People suffering from lactose intolerance should pay attention to industrially produced foods, which can contain hidden lactose. Most people tolerate small amounts of lactose e.g. medicaments containing lactose or ripe cheese.

Review Questions

The answers are below the references.

1. Which part of the intestine is affected in lactose intolerance?
   A. Sigmoid colon
B. Rectum
C. Small intestine
D. Large intestine
E. Transverse colon

2. Which of the following diseases frequently causes lactose intolerance?

A. Celiac disease
B. Glycogenosis
C. Hereditary fructose intolerance
D. IgG-deficiency
E. Ulcerative colitis

References

Lactose Intolerance Among Different Ethnic Groups via nationaldairycouncil.org
Das Hammerexamen von M. Buchta, D.W. Höper, A. Sönnichsen (2. Auflage) – Urban&Fischer
Praktische Gastroenterologie von Peter Layer und Ulrich Rosien (4. Auflage) – Urban&Fischer

Correct answers: 1C, 2A

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