



Lactose Intolerance: Definition, Symptoms and Treatment

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Introduction

The term lactose intolerance refers to the development of gastrointestinal symptoms following the ingestion of milk or dairy products. Lactose intolerance is caused by a shortage of a digestive enzyme called lactase, which is produced within the lining of the small intestine, although not all people with lactase deficiency develop symptoms. Lactose intolerance is an extremely common disorder and may have a prevalence of up to 100% in some populations. Lactose intolerance is sometimes confused with cow's milk allergy, however, they are very different. Cow's milk allergy triggers a response from the immune system while lactose intolerance is a problem arising from the digestive system. The following brief review of lactose intolerance will provide a summary of the populations most affected, symptoms, diagnosis, and treatment.

Populations Most Affected

The prevalence of lactose intolerance amongst persons living in the United States varies between 20 and 60% by most estimates. Individuals from certain areas of the world are more likely to develop lactose intolerance and Americans whose families originate from those areas are affected at a higher rate. For example, almost all persons from Southeast Asia have lactose intolerance, while in Scandinavia and Northwestern Europe, the prevalence is between 3 and 8%. Lactose intolerance is very common in individuals from Southern Mediterranean regions such as Italy and also is widespread among the indigenous population of Africa as well as among African-Americans.

Most adults with lactose intolerance are thought to have this as part of the normal developmental process. Studies have shown that the activity of the lactase enzyme (necessary for digesting lactose) begins to decline between the ages of 3 and 5. Thus, most adults have relatively low levels of the lactase enzyme, making them prone to the development of symptoms of lactose intolerance. Lactose intolerance may be a significant problem in children. Some children with lactose intolerance have an inherited absence of the lactase enzyme called congenital lactose deficiency.

Symptoms of Lactose Intolerance

Symptoms of lactose intolerance include abdominal discomfort, bloating, flatulence (intestinal gas), nausea, and diarrhea following the ingestion of milk or milk-containing products. The severity of symptoms varies dramatically from person to person. The symptoms of lactose intolerance can frequently mimic those of irritable bowel syndrome and other intestinal disorders, such as malabsorption syndromes (decreased absorption of nutrients in the intestines) or peptic ulcer disease. It is therefore important for your doctor to consider lactose intolerance when you present with these types of symptoms. In our clinical experience, it is common for patients to have many years of symptoms of lactose intolerance, which respond dramatically to the complete elimination of milk and dairy products from the diet. Unlike adults, children with severe lactose intolerance may develop chronic diarrhea, weight loss, and a kwashiorkor-like (severe protein malnutrition) syndrome that can severely affect health.

Persons with small intestinal conditions such as surgical removal of part of the intestines, radiation injury, and Crohn's disease often have lactose intolerance, and ingesting milk products can interfere with the absorption of other nutrients in these individuals. It is generally prudent for individuals with these disorders to remove milk products from their diet; however, milk products may later be successfully reintroduced into the diet. Studies have shown that even individuals with malabsorption due to removal of large sections of the small intestines (short bowel syndrome) may ultimately tolerate lactose and yogurt if these are gradually administered.

Just as the physician should consider lactose intolerance as a possible diagnosis in patients with symptoms of diarrhea, bloating, and dyspepsia (pain or discomfort in the upper abdominal area), it is important to be aware that symptoms such as fever, gastrointestinal bleeding, and weight loss in adults are not suggestive of lactose intolerance; other more serious bowel disorders must be ruled out.

Diagnosis of Lactose Intolerance

A physician can diagnose lactose intolerance usually without the need for the patient to be tested for this disorder. First and foremost, when a patient has symptoms suggestive of lactose intolerance a doctor will need a good detailed history of the individual's consumption of milk and dairy products. We find that persons will often underestimate the amount of lactose in their diets. For example, patients will frequently ignore the consumption of yogurt or ice cream and not consider these to be important during a dietary history. Other patients forget that chocolate milk or milk with cereal in the morning count as dairy intake.

Once a person with typical symptoms of lactose intolerance is found to be ingesting dairy products, we suggest complete elimination of milk and dairy products from the diet as an initial diagnostic

procedure. This may in itself be enough to prove the presence of lactose intolerance – especially if there is a marked improvement in symptoms.

If the patient is unwilling to stop dairy intake or the results of dietary restriction are unclear, a lactose breath test may be performed to help confirm the diagnosis. This test is performed by administering a known dose of lactose and then measuring the amount of hydrogen in the breath. If there is a lactase enzyme deficiency, undigested lactose will pass from the small intestine into the colon where fermentation by normal colonizing bacteria will occur. The by-product of this fermentation is hydrogen and sometimes methane gas. The concentration of hydrogen excreted into the breath is readily measurable. A rise in the hydrogen concentration (usually greater than 10 parts per million) occurring within the first two hours of taking a dose of lactose is considered to be a positive test for lactose intolerance.

The lactose breath test is very easy to perform but has several pitfalls. It is unclear what dose of lactose is needed to differentiate significant lactose intolerance from a relatively mild lactase deficiency. For example, the common dose of lactose used with the breath test is 50 grams while the average amount of lactose in an 8 oz. glass of milk is approximately 12 grams. It is also known that 5-20% of individuals do not excrete hydrogen and will appear to have a negative lactose tolerance test, even if the condition is present. Some authors suggest performing multiple blood tests to measure glucose levels at the same time as the hydrogen breath test. If the glucose levels do not rise after ingestion of the lactose, this suggests that the lactose has been malabsorbed whether or not breath hydrogen levels are detected after consumption. Patients may develop uncomfortable symptoms during the lactose intolerance test, especially with a 50-gram dose. Finally, the lactose breath test is unavailable in most physicians' offices.

Other less commonly used tests for lactose intolerance include small intestinal biopsy with measurement of lactase enzyme activity and measurement of urinary lactose and/or galactose levels following ingestion of lactose.

Treatment of Lactose Intolerance

The initial treatment for lactose intolerance is complete elimination of all lactose-containing products from the diet. It is advisable to include avoidance of yogurt, frozen yogurt, and cheese when on a lactose-free diet, since all of these may cause symptoms of lactose intolerance. Some studies have shown that up to 33% of individuals with symptoms of lactose intolerance may in fact be intolerant of proteins and the components of milk itself and will continue to have symptoms from lactase-enhanced milk. Once a complete lactose-free diet has been achieved, it may be possible to reintroduce yogurt or modified dairy products in a gradual fashion as tolerated.

A number of companies now produce lactase preparations that have been shown to improve the digestion of lactose. Several of these products including Lactaid®, DairyEase®, and Lactogest® have been tested in patients with lactose intolerance consuming a 20 or 50 gram dose of lactose. All have been shown to reduce the symptoms of lactose intolerance when given together with lactose. Common doses are two caplets of Lactaid®, two tablets of DairyEase® or four capsules of Lactogest® taken just prior to a lactose-containing meal. Each of these doses will supply approximately 6,000 international units of the lactase enzyme. (Note: Be sure to check dosage with your own physician.)

What is New in the Study of Lactose Intolerance?

Some new studies on lactose intolerance have revealed a positive correlation between a gene and lactose intolerance. Researchers at the Department of Internal Medicine, Medical University of Graz, Austria used the lactose tolerance breath test to see if

there was a relationship between people who are lactose intolerant and this gene (CC genotype of the -13910 T>C Polymorphism). With a test for this gene, doctors will be able to diagnose someone with lactose intolerance more efficiently in the future. This genetic test may be useful in differentiating lactose intolerance for other conditions such as irritable bowel syndrome and milk allergy.

Some interesting findings about the importance of consumption of dairy products are noted in a recent study conducted by the Division of Gastroenterology, Department of Medicine, The Sir Mortimer B. Davis Jewish General Hospital, McGill University in Montreal, Canada. They showed that high intake of dairy products help in the prevention of colon cancer. The study showed that milk products may have anti-colorectal cancer benefits. This study showed that dairy intake can help slow down growth in later stages of colon polyp development.

Another important recent finding is that patients who are receiving chemotherapy have a high chance of becoming lactose intolerant (94% of patients receiving chemotherapy studied become lactose intolerant). Another study showed that there is a positive correlation between lactose intolerance and intolerance of fructose (a sugar found in many foods). This study, published in the journal *Clinical Nutrition* suggests that 47% of subjects with lactose intolerance also have fructose intolerance.

Doctors may worry that patients with lactose intolerance may not incorporate enough calcium into their diet, thus increasing their risk of developing osteoporosis. A new study by the Department of Medical Genetics at the University of Helsinki, Finland, however, has shown that lactose intolerance patients have the same incidence of osteoporosis as those that tolerate lactose. In this study, 52 women (23%) with the lactose intolerance gene had osteoporosis while 59 women (15.3%) who did not have lactose intolerance gene had osteoporosis. The difference was not statistically significant.

The authors suggest that lactose intolerant patients consume calcium supplements more frequently since they are avoiding dairy products.

Another breakthrough study shows that sufferers of lactose intolerance can overcome symptoms of the condition by incorporating small amounts of certain foods that contain lactose. Seventeen African-American girls (ages 11-15) went on a diet of 33g of lactose per day. Hydrogen breath tests were conducted on the girls once a day. Fourteen of the seventeen girls had trouble digesting lactose. By the end of the study, all of the participants had a decrease in breath hydrogen production. This decreased hydrogen in the breath test shows that the colonic bacteria have the capacity to adapt to a lactose-containing diet.

Summary

Lactose intolerance is extremely common throughout the world and varies in different populations. Symptoms of lactose intolerance may mimic those of other intestinal disorders. Lactose intolerance should be considered as a possible diagnosis in persons with a variety of symptoms including diarrhea, bloating and abdominal discomfort after meals. Several diagnostic methods are available to determine whether lactose intolerance is present. The hydrogen breath test is the most commonly employed. Strict elimination of lactose from the diet or supplementation of the diet with lactase enzyme preparations or lactase-containing milk products may reduce the symptoms of lactose intolerance. New studies will continue to improve the diagnosis and treatment of lactose intolerance.

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