

Lactose maldigestion and intolerance: facts & figures



There is a lot of confusion around lactose, lactose maldigestion and lactose intolerance. What is lactose intolerance exactly, and how do you diagnose it? How common is it? This article takes a look at the most important facts.

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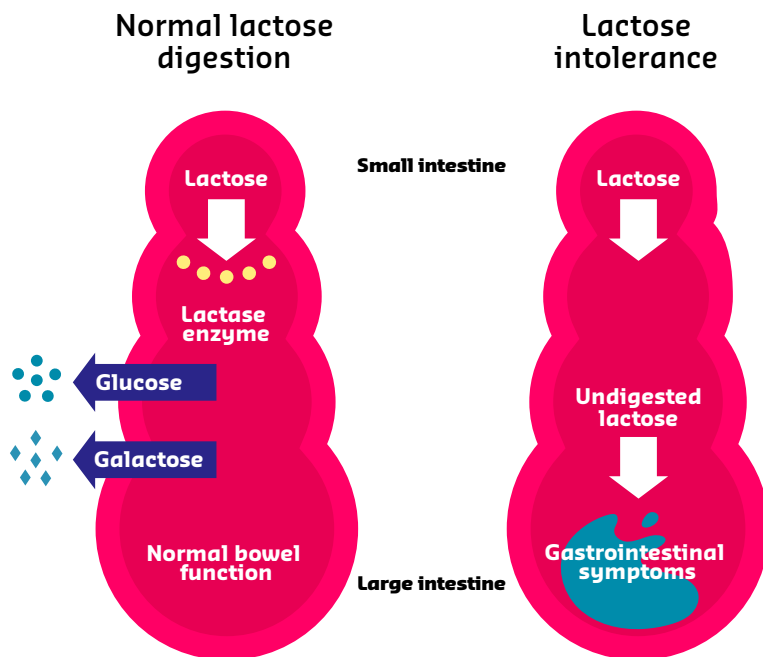


Figure 1. Lactose digestion in a normal gut and the effects in lactose intolerance

Maldigestion or intolerance

Lactose maldigestion and lactose intolerance are often used interchangeably, but there is a difference. In lactose maldigestion the body does not produce enough lactase. Lactose intolerance develops when lactase production drops dramatically. In that case, lactose ends up further up in the colon where intestinal flora convert lactose into organic acids and osmotically active substances, among other things. As a result, gastrointestinal symptoms such as gas, bloating and diarrhea occur. People with lactose intolerance actually suffer from these symptoms. People who are lactose maldigesters do not necessarily experience these clinical intolerance symptoms.

What is lactose?

Lactose is a naturally occurring carbohydrate found exclusively in milk. It is a disaccharide composed of galactose and glucose. In the small intestine, lactose is broken down into glucose and galactose by the enzyme lactase. Lactose is less sweet than many other sugars and less harmful to the teeth. Breast milk contains about 7.0 grams of lactose per 100 ml, and cow's milk 4.7 grams.

Why is it found in milk?

Milk is vital for babies and young mammals. It's for good reason that the World Health Organization (WHO) recommends we breastfeed babies as long as possible. The Netherlands Nutrition Centre advises breastfeeding for at least the first 6 months. If a mother is unable or unwilling to breastfeed, infant formula is a good and safe alternative. Infant formula is also milk-based and usually consists of cow's milk or ingredients from cow's milk. The composition of infant formula is defined by law, so

Congenital lactose intolerance

A special form of lactose intolerance is the rare hereditary condition in which a child does not produce lactase from birth, called congenital lactase deficiency. These infants cannot drink breast milk and do not tolerate milk products. It is very rare, occurring in about one in 60,000 babies.

Milk protein allergy

Lactose intolerance is sometimes confused with a milk protein allergy. The latter is an immunological response resulting in an allergy to the proteins in cow's milk. With a milk allergy, cow's milk and cow's milk-based formula should be avoided. The number of children who develop a milk allergy in the first year of life is estimated at 2 to 3%. Almost all children outgrow milk protein allergy by 3 years.

consumers can be sure that the infant's nutrition is complete regardless of the brand. Breast milk and infant formula contain all the nutrients a baby needs, including lactose.

The benefits of lactose

Lactose is an important source of energy for the infant, who grows quickly after birth. Lactose is also a source of galactose, which is important for metabolic flexibility. This refers to the body's ability to switch between metabolizing different energy sources, such as fats and carbohydrates, for the energy it needs.¹ In the infant, about 10 percent of lactose "escapes" digestion and then behaves in the gut as a bifidogenic fiber. This causes good bacteria to grow in the gut. There is evidence that this also supports calcium absorption in the gut. Galactose, along with glucose, is an important building block of glycosylated proteins in the developing immune and nervous systems.²

Diagnosis

Various methods are used to diagnose lactose intolerance. In the Netherlands, the following tests are common:

- **Hydrogen breath test**

This test measures the amount of hydrogen (H²) in the exhaled air before and after drinking a lactose solution. In lactose intolerance, intestinal bacteria produce hydrogen gas, which is then found in the exhaled air. When a threshold value is exceeded and gastrointestinal complaints are present, lactose intolerance is diagnosed.

- **Lactose tolerance test (LTT)**

In this test, a certain amount of lactose is consumed. If the blood glucose level does not rise as a result, the lactose has not been digested properly, indicating lactose in case of gastrointestinal complaints.

- **Elimination diet**

If after a lactose-free period the symptoms have disappeared, products containing lactose are reintroduced into the diet. Lactose intolerance can be diagnosed if the symptoms return.

Lactose maldigestion

The enzyme lactase breaks lactose down into glucose and galactose in the small intestine. In three-quarters of the world's population, lactase activity gradually drops after infancy. This is a natural process in mammals, and it leads to a reduced ability to digest lactose. The reduced ability to digest lactose is called lactose maldigestion. In fact, lactose maldigestion is the underlying physiological change, whereas lactose intolerance is the experience of any symptoms resulting from lactose maldigestion. Thus, not everyone with lactose maldigestion will experience symptoms of lactose intolerance (Figure 1 on the previous page). We speak of lactose intolerance only if there are symptoms such as upset stomach, bloating, flatulence, nausea, diarrhea and/or constipation due to lactose maldigestion after consuming products containing lactose.

Dietary recommendations

According to the Netherlands Nutrition Centre, people with lactose intolerance do not have to avoid all products containing lactose. They are advised to figure out how much dairy they can tolerate. The reason for this is that it is very rare for people with lactose maldigestion to react to small amounts of lactose (<6 grams per day). In general, people with lactose intolerance can consume 10 to 15 grams of lactose at one consumption moment without developing symptoms. This is

equivalent to the amount of lactose in a glass of milk. Figuring out how much dairy a person can tolerate allows them to maintain dairy intake so they may still benefit from the positive health effects of dairy. Consuming dairy is associated with a lower risk of type 2 diabetes and colorectal cancer. And in addition, milk and dairy products provide important nutrients such as calcium, B vitamins and essential amino acids through the milk proteins. For these reasons, dairy products are included in the Dutch food-based dietary guideline. If diagnosed with lactose intolerance, it is recommended to visit a registered dietitian for guidance. The dietitian can

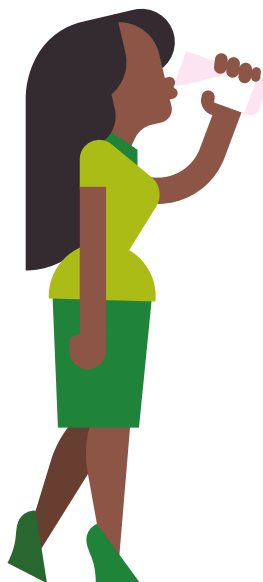
help establish a healthy lactose-restricted diet based on the patient's wishes, and can work with the patient to determine how much lactose can still be tolerated.

On the label

Products containing the allergen milk protein must declare it on the label. Sometimes lactose is also mentioned in the package's allergen declaration. How much lactose a dairy product contains is not stated on the label. Lactose falls under carbohydrates and more specifically under "of which sugars". If no sugars have been added to a dairy product, such as milk, buttermilk, unsweetened yogurt and cottage cheese, the sugars can be assumed to be or glucose or galactose derived from lactose. If there are added sugars in a dairy product, these added sugars are listed under "of which sugars". Sometimes a label will say "may contain traces of milk". This precautionary warning is for people with a milk allergy and is not relevant for people with lactose intolerance. If the label states that the product is "low in lactose", then the product contains less than 1 gram of lactose per 100 grams; for "lactose-free" the standard is <0.01 grams of lactose per 100 grams.

What to consume when lactose intolerant

Most people who suffer from lactose intolerance can still consume some dairy products or drink milk. The amount varies



by person. A recent study found that people who lack the enzyme lactase to digest lactose can still consume 12 grams of lactose twice a day without significant gastrointestinal symptoms.⁴ This is equivalent to two glasses of milk per day. Some 67 percent of the world's adult population lacks the lactase enzyme needed to digest lactose. In them, the undigested lactose can cause intestinal gas production that can lead to abdominal pain and bloating. In a recent study, "lactase non-persistent" individuals gradually increased their lactose intake from 0 to a total dose of 6, 12 or 24 g per day, each over a period of 4 consecutive weeks. This meant an increase from 0 to 1 to 2 glasses of milk per day, at 0.5 intervals. During this intervention period, levels of *bifidobacteria* were increased. *Bifidobacteria* are beneficial microbes

that can ferment lactose in the intestines without producing gas. The reduced gas production after lactose consumption was confirmed by a hydrogen breath test (see box Diagnosis), which measures gas production in the intestines. A higher ability to ferment lactose without experiencing gastrointestinal problems may allow people with lactose intolerance to keep dairy products in their diet. It is apparently possible for people to increase lactose tolerance after slowly increasing lactose in the diet with the help of beneficial intestinal bacteria.

Lactic acid bacteria

People with lactose intolerance can usually tolerate fermented dairy products such as yogurt and buttermilk. On the one hand because of the lower lactose content in the products, and on the other hand because the lactic acid bacteria in these products

contain lactase and can breakdown lactose into lactic acid and other components in the intestine. Dutch (semi-hard) cheese such as Gouda contains little or no lactose because the lactose is almost completely broken down during the ripening of the cheese (Figure 3). In addition to cow's milk products, lactose is also found in goat and sheep's milk, soft goat and sheep cheese, vitamin preparations, sweeteners and medicines.

Lactose-free milk

You will also find lactose-free milk in the dairy section. Some of the lactose in this milk has been removed by filtration, after which the milk has been treated with lactase to break down the rest of the lactose into glucose and galactose. This method retains the taste of milk. At pharmacies you will also find drops

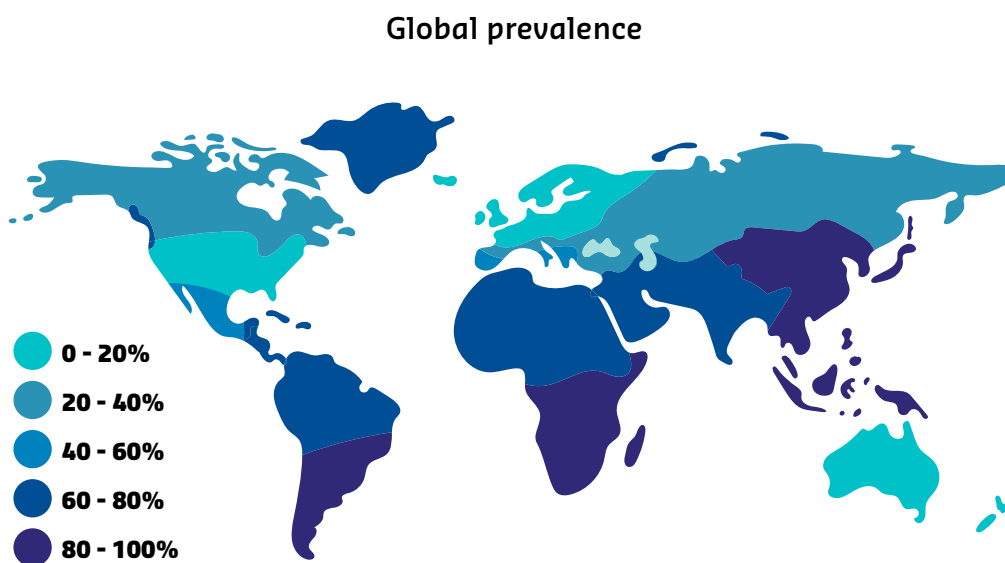


Figure 2. Global prevalence (%) of lactose intolerance.

It is not easy to provide figures on the prevalence of lactose intolerance in the Netherlands. Estimates range from 2% to 12%. This variation can be explained by several factors. Most cases of lactose intolerance are based solely on self-reports of complaints. However, the complaints arising from lactose intolerance are not specific to lactose intolerance alone. They also occur in other intestinal conditions such as irritable bowel syndrome. The best way to diagnose lactose maldigestion is the hydrogen breath test. The prevalence of lactose intolerance, however, appears lower when looking at only hydrogen breath test results. It should be mentioned here that not everyone with lactose maldigestion is ultimately tested. In addition, there are differences in prevalence between different population groups. In people with a Western European background, lactose intolerance occurs in up to about 10%, while prevalence can reach 90% in people with an East Asian background.³

ANALYSIS

Lactose intolerance

or tablets containing lactase that you can put into milk, for example, to ensure that the lactose is broken down.

Plant-based products

For people who cannot or do not want to eat dairy products, there are many choices in the supermarket of plant-based products that claim to be alternatives to dairy products. Plant-based products do not contain lactose. But not every beverage in a “milk package” is a healthy alternative. The same goes for yogurt and cheese look-alikes. The Netherlands Nutrition Centre has set criteria to make sure such products contain sufficient protein, vitamin B2, B12 and calcium. According to the Netherlands Nutrition Centre, fortified soy drinks are currently the only plant-based drinks that meet these criteria. But be sure to read the label, because sugar is added to most soy drinks.

Conclusion

Lactose, a natural milk carbohydrate, is essential for infants, but it can cause discomfort in adults who lack the enzyme lactase. Lactose intolerance is often misdiagnosed as a milk allergy. Although it is a common condition, especially among non-Western populations, most people with lactose intolerance can still enjoy dairy products in moderation, and tolerance to lactose can sometimes be improved through gradual exposure to increasing amounts of lactose. <



Lactose per serving of dairy product

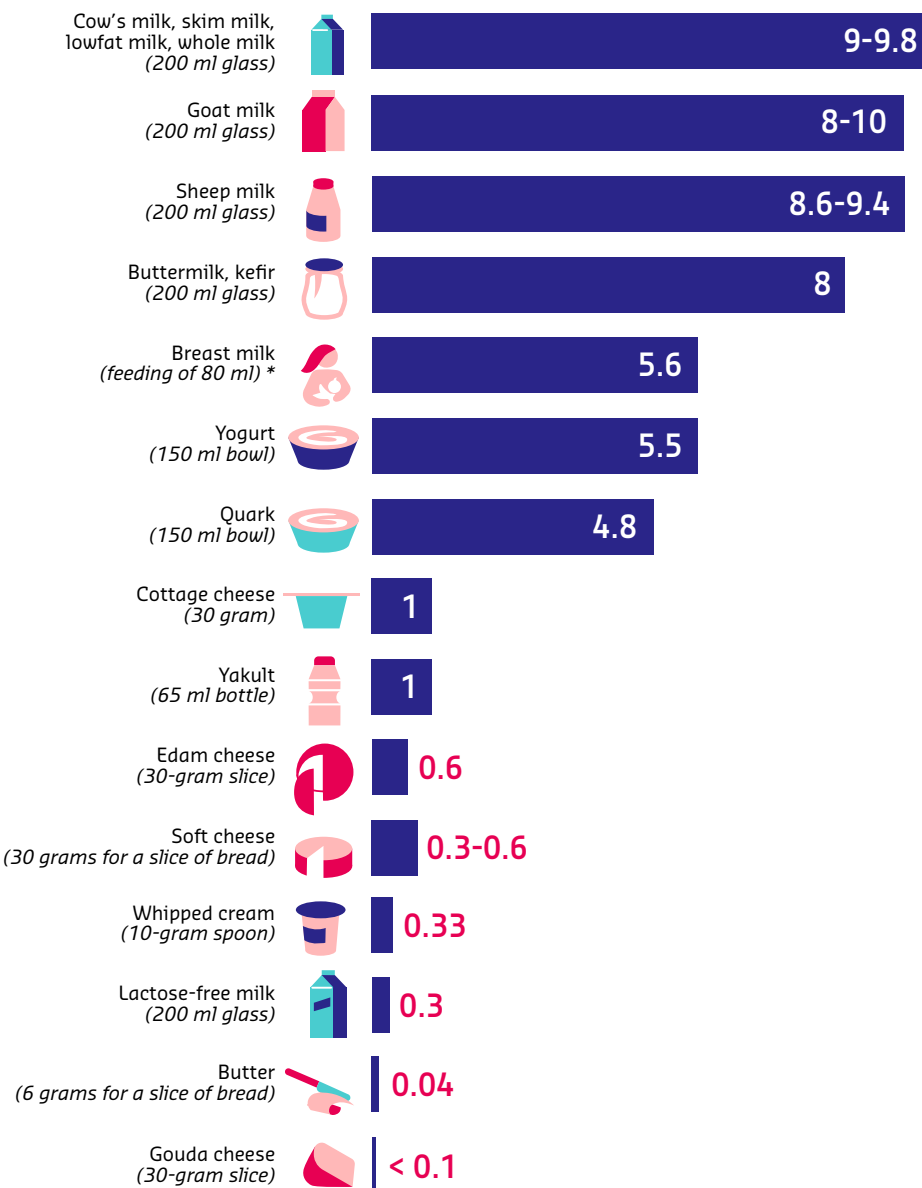


Figure 3. Lactose content (grams) per serving size (ml or grams) based on “Portie-online” (RIVM).
* Average feeding in a 3.5 month and 6.5 kg baby receiving 10 feedings daily. (Borstvoeding.nl)

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