

Some Facts on Lactose Intolerance

What is lactose intolerance?

Lactose is a prominent sugar found in all dairy products, as well as in mother's milk. Lactose maldigestion/intolerance is the term used to describe the inability to digest lactose in milk and milk products, producing symptoms of intestinal gas, abdominal distension, and flatulence with loose, watery, acidic diarrhea. Adverse reactions to the lactose portion of milk are primarily related to the absence or loss of the intestinal enzyme lactase. Individual reactions to lactose vary and depend on many factors such as the degree of lactase deficiency, lactose dosage, and

concomitant foods or ingredients consumed.

In the newborn, classic lactose maldigestion presents with symptoms of severe feeding intolerance, malnutrition, and rapid organ damage. In young children the severity of lactose malabsorption may vary. Some may be able to tolerate small amounts of lactose containing dairy foods, and others may not. Researchers have found that 10-15% of school aged children suffered recurrent abdominal pain in which lactose intolerance may play a role. These researchers also found that Recurrent Abdominal Pain leads to disability and learning difficulties.

How is lactose intolerance diagnosed?

Diagnosis of lactose intolerance is based on a variety of biochemical tests and the appearance of symptoms. The most common is the Lactose Tolerance test where following dietary exclusion of dairy products, the individual is challenged with a standard dose of lactose. Following ingestion the rise in lactose breakdown product and the appearance of signs and symptoms are monitored.

How does Lactose Intolerance develop?

The decrease in the activity of the lactase enzyme after weaning is a normal occurrence. Lactase enzyme activity is highest at birth when all nutritional needs are supplied for by mother's milk. Lactase activity then normally declines after weaning, the amount of lactase activity that remains after this period appears to be under the control of genetic, cultural and environmental factors. In many ethnic groups such as Asians and Africans, lactase deficiency develops early between infancy and adult life, leaving these individuals unable to digest lactose during childhood. In contrast, Caucasians develop some degree of lactase deficiency between 6 to 14 years of age.

Lactase deficiency may be characterised as:

1) Congenital, a rare genetic disorder in which low or absent lactase activity persists through

life, OR

2) Primary lactase deficiency that develops after weaning and is considered the most common type and affects approximately 70% of the world's population, OR

3) Secondary lactase deficiency may occur in a variety of clinical diseases or with consumption of some pharmaceuticals. Most cases of secondary lactase deficiency are associated with diseases or conditions that alter or damage cells of the small intestine where the lactose enzyme is located. This occurs in individuals that would normally be able to digest lactose but have suffered illnesses such as gastroenteritis which have resulted in the temporary loss of lactase producing intestinal cells.

Conditions which may result in transient loss of lactase activity

Conditions

Comments

Gastroenteritis, infectious diarrhea

Most common cause of secondary lactase deficiency. Produces temporary damage to intestinal cells.

Parasitic infections E.g. Giardia lamblia, Ascaris lumbricoides

Parasitosis can cause lactose maldigestion and intolerance as the parasites attach to the surface of the

Pharmaceuticals Cause damage to intestinal cells.

The most commonly implicated drugs are:

Antibiotics - neomycin, kanamycin; Chemotherapy drugs; Aminosalicylic acid;

Colchicine - used in treatment of gout; Mineral oil - can produce general intestinal malabsorption.

Inflammatory bowel disease

Ulceration and damage to the intestinal cells.

Celiac disease

Celiac disease can result in severe intestinal cell damage and lactose intolerance can occur during the

Other Food Intolerances

Any other food intolerance that disrupts intestinal activity will also affect lactase activity.

Cow's milk allergy

Allergy to milk protein can induce intestinal damage and diarrhea.

HIV/AIDS

Manifestation of general malabsorption syndrome

Cancer therapy

Radiation and chemotherapeutic agents damage intestinal cells

Surgery

Gastric surgery may speed gastric emptying resulting in inadequate time for full lactose digestion.

Other causes

Lactase deficiency may also arise from premature birth and alcoholism.

What are the differences between milk allergy and lactose intolerance?

Milk allergy is an immune reaction to the milk protein lactalbumin while lactose intolerance is an inability to adequately digest the milk sugar lactose.

Comparison of Milk Allergy and Primary Lactose Intolerance

Milk Allergy

Lactose Intolerance

Age of onset

Early infancy

After age 2 y

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Cause

Milk protein (lactalbumin)

Milk sugar (lactose)

Symptoms

Variable

Yes

- Diarrhea

Yes

Yes

- Vomiting

Yes

Uncommon

- Abdominal pain

Yes

Yes

- Abdominal bloating

Yes

Yes

- Dermatitis

Yes

No

-

-

-

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No

Duration

Usually declines rapidly after first year

Indefinite after onset

Milk protein contraindicated

Yes

No

Milk consumption contraindicated

Yes

Not if amount is moderate

What are the various sources of lactose?

Lactose is present in infant formula's, human and cow milk, and dairy products. Lactose is also used as an additive in foodstuffs such as baked goods, cereals and soft drinks. The major sources of dietary lactose in humans are dairy products and composite foods with dairy product added.

Levels of lactose in different mammalian milks

Milk

Lactose (g/100g)

Sea lion milk

0.0

Reindeer milk

2.4 - 2.6

Goat milk

3.6

Cow's milk, whole

4.6

Human milk

6.2 - 7.5

Processed cow milk products

Cow's milk, skim

5.0

Cow's milk, reduced fat/ protein increased

5.6

Cow's milk, skim, evaporated

10.6

Cow's milk, whole, evaporated

10.7

Cow's milk reduced fat, evaporated

10.8

Cow's milk whole, powder

37.7

Cow's milk skim, powder

51.3

Most matured or ripened cheeses contain little lactose since most is removed in the whey during manufacture. Unripened cheese such as cottage may contain significant amounts of lactose. Yogurt manufactured from milk may have extra milk solids added, and the lactose

content will vary.

As lactose has less sweetness relative to sucrose, fructose and glucose, it is widely used by the food industry and found in a wide variety of non-diary/milk products such as some breads, biscuits, confectionery and cereals, as well as pharmaceutical formulations. Approximately 13% of registered drugs and 2% of listed drugs in Australia contain lactose, while in the US, 21% of all prescription drugs and 6% of over-the-counter drugs contain lactose. Ingredients to watch out for in commercial products are those containing non-fat milk solids, whey and whey protein.

Approximate Lactose Content of common foods per 100g serving

| Food |
|-------------|
|-------------|

| Lactose Content (g/100g) |
|---------------------------------|
|---------------------------------|

| |
|-------------|
| Coca powder |
|-------------|

| |
|-----|
| 0.0 |
|-----|

| |
|-----------------------|
| White/wholemeal bread |
|-----------------------|

| |
|-----|
| 0.0 |
|-----|

| |
|-----------------------------|
| Cheese-cheddar, edam, gouda |
|-----------------------------|

0

Soy drinks

0

Plain or fruit bun

0-0.1

Biscuits, plain sweet

0-0.5

Chocolate, dark

0.4

Margarine, regular

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0.5

Plain cake

0.6-0.7

White milk bread

0.9

Butter, regular

1.0

Quiche

1.7

Cream

2.1-4.9

Yogurt, natural whole

4.7

Ice-cream

4.7-5.9

Ice confection

6.5

Chocolate, milk

9.1

Milo powder

12.7

Ovaltine powder

21.2

What other factors contribute to the development of lactose intolerance?

Individual reactions to a particular lactose load vary and depend on many factors such as degree of lactase deficiency, lactose dosage, and concomitant foods or ingredients consumed.

- **Level of residual lactase activity:** This affects the severity of symptoms, some individuals may have sufficient residual activity to digest moderate amounts of lactose while others may have very little activity and be unable to tolerate even small doses.

- **Dose of lactose:** Small doses are usually better tolerated than larger doses that may exceed lactase enzyme activity and cause intolerance symptoms.
- **Form of the lactose/milk:** Other components in foods such as fat content, presence of other sugars with the lactose load help prevent symptoms by slowing down the digestion rate. Lactose provided in chocolate milk, yogurt or fermented milk is usually better tolerated by those with lactase deficiency. Full fat milk or whole milk is better tolerated than non-fat or skim milk, which in turn is better, tolerated than lactose in aqueous solution.

- **Activity of colonic flora:** Large amounts of lactose in the colon are fermented by intestinal bacteria and produce the gases hydrogen, carbon dioxide and methane. The net result is intestinal gas, abdominal distension, and flatulence. Adaptation of the intestinal microflora plays an important role in preventing lactose intolerance and intestinal disorders.

- **Personal cultural factors:** Cultural factors may play a role in whether or not a symptom is reported and investigated.
- **Presence of other food:** Meal and food components such as dietary fiber may delay digestion reducing maldigestion or intolerance symptoms.
- **Age:** Children diagnosed as lactase non-persistent may be more able to tolerate lactose than an adult with deficiency.

So what can I do if I have lactose intolerance?

Symptoms of lactose intolerance will vary depending on the types of dairy products or other foods consumed. Dietary strategies need to consider effects of processing, enzyme additions, and total dietary nutrient content, as well as amounts of lactose in food and beverages and individual abilities related to tolerance.

In both primary and secondary lactase deficiency, avoidance of dairy products containing lactose or lactose reduced diet is continued until there is abatement of the major symptoms or the secondary cause has been treated and there has been sufficient time for intestinal repair. This can take up to several months. During this time lactose free soy milk may be used. Many seem able to tolerate yogurt and lactose-hydrolyzed milk.

Following recovery from secondary lactase deficiency, a normal lactose containing diet should be able to be tolerated but primary lactase non-persistent individuals will need to determine the amount of lactose that they can tolerate before symptoms and may be a question of adaptation to different levels of lactose intake. In cases of post-infectious diarrhea lactose should be removed from the diet during this period. Lactose can be reintroduced once the individual has recovered, although lactase deficiency may remain as long as four weeks or even longer.

For cases where severe intestinal damage occurs maldigestion or malabsorption of other nutrients such as protein, sucrose and fat may occur concomitantly and the diet or infant formula needs to be modified accordingly to avoid nutrients that are not well tolerated.

Some Dietary modifications to consider:

- **Avoid high lactose containing foods and beverages:** Individual tolerance should be determined and monitored. Foods to avoid are high lactose foods such as all forms of milk, yogurt, ice-cream, cream, cheese, milk chocolate, milk-based drink flavorings and any commercial or home made foods that contain milk, milk solids, whey or lactose.

- **Use lactose-free milk substitutes:** Lactose free soy milk may be used as necessary and is usually well tolerated.

- **Use lactose-reduce/hydrolysed products as necessary:** Lactose hydrolysed milk is generally better tolerated.
- **Fermented milk products:** Traditionally many populations with a high prevalence of lactose intolerance (eg Lebanon) use fermented milk products such as yogurt. Yogurt may be taken in small amounts as the yogurt culture will partially break down the lactose into the component sugars. While this is generally true it should be noted that the lactose concentration does vary in different yogurts.
- **Avoid high doses of lactose in short delivery times:** Small doses over a longer period are likely to be better tolerated.

A Final Word on Lactose Intolerance.

Milk from domesticated animals became an important food source thousands of years ago. Over our history milk has replaced other calcium sources such as animal bones, as a chief source of this important nutrient. The current shift in today's society is towards milk being the main and first choice of a calcium source. This is resulting in the consumption of large quantities of milk and therefore lactose by both children and adults. We now not only consume lactose in milk but also in foods produced by the food industry and is found in a wide variety of non-dairy products such as some breads, biscuits, confectionery, and cereals as well as in some pharmaceutical formulations.

The decline in lactase activity following weaning is a natural and normal phenomenon during the development of most mammals. The level to which lactase activity declines appears to be under both genetic and cultural influences. Cultures that domesticate dairy animals have an increased ability to digest lactose, while the predominately traditional hunting societies have a much higher incidence of lactose intolerance. The ability to digest milk into adulthood is a survival mechanism, but the residual activity of the lactase enzyme is now often overwhelmed by the quantity of lactose consumed. This leads to lactose maldigestion and intolerance symptoms.

Lactase deficiency normally occurs in about 70 to 75 % in all ethnic groups, except those of NorthWest European origin where the incidence is less than 20%. In Australia the overall prevalence rate is approximately 10% and varies with the ethnic origin of the population.

Australian High Risk Groups for Lactose Intolerance

Population

Prevalence

Children Caucasian:

6 - 12 years

3 - 9%

Young Adult Caucasian:

18-40 years

4 - 17%

Adult Caucasian:

19-61 years

19%

Southern Europeans

56%

Australian-born Chinese

80%

Australian Aborigines

84%

Asians in Australia

95%

SE Asians in Australia

95%

Added to the increased consumption of lactose in milk and milk products, is what would be controversially described as the "inferior quality" of today's pasteurised and homogenised milk. Dairy cows are often given hormones, drugs and sometimes chemically laden food. The milk produced by these animals is then pasteurised which denatures all enzymes and heat labile nutrients, changing the chemical structure of proteins and fats in the milk. Homogenization breaks down fat globules causing them to remain dispersed. Milk is pasteurised for Public Health reasons because of the poor health of dairy cows, and milk needing to be kept for long periods before consumption.

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Comments

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