

# A Study on the Awareness of Lactose Intolerance among Common People in India

## Research Article

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### Abstract

According to statistica.com, India is the second-largest consumer of cow's milk in the world. Milk possesses great qualities that aid digestion, metabolic response to absorbed nutrients, growth and development of specific organs and resistance to disease, apart from these factors, it is a powerhouse of nutrients. Many people suffer from an intolerance of a disaccharide present in milk called lactose. Some ill-effects of being unable to digest lactose is bloating, diarrhea, nausea, borborygmi and abdominal pain. This is a sample survey of a small heterogeneous population (n=211) to understand Lactose Intolerance awareness in India. This study aims to understand the awareness of Lactose Intolerance (LI) among common Indian people and if they can detect their symptoms associated with LI. A survey method was used for this study. 71.5% of the respondents knew the term LI. 78.7% of the respondents did not experience the listed symptoms. 21.3% of those who observed symptoms, observed bloating apart from other listed symptoms. Also, when asked if they would try lactose-free alternatives, 59.7% of the respondents chose yes. This may conclude that even though milk products are consumed on a large-scale in India, many do not suffer from LI. Those suffering from common symptoms associated with LI are willing to consume the alternatives. This also shows that there is adequate endorsement and awareness about the availability of alternatives to milk products. There is no such study available in literature, hence these results could provide a baseline data for further research in this area.

**Keywords:** Lactose Intolerance; Milk products; Symptoms

## Introduction

Lactose is the disaccharide made up of galactose attached to glucose and is of utmost value in animals. The brush-border enzyme lactase must hydrolyse the monosaccharides in order to absorb lactose. The enzyme lactase is present along the microvilli of the small intestine enterocyte [1]. An essential source of energy in a breastfed child is the lactose present in mother's milk [2].

Lactose Intolerance is defined as "Lactose malabsorption with gastrointestinal symptoms."

Also, Lactose Malabsorption can be defined as: "Not all ingested lactose was absorbed and that some has reached the large intestine." The common symptoms associated with the maldigestion of lactose are bloating, diarrhoea, nausea, borborygmi, and abdominal pain. Due to the mix-up between the terms LI and Cow's milk allergy (CMA), there is a possibility of misidentification of the condition [3]. Lactose Intolerance depends on self-diagnosis based on symptoms after consuming lactose, but deficiency and malabsorption must

be tested unbiasedly. If patients with primary hypolactasia and lactose intolerance can be distinguished, it would be advantageous for diagnosing and treating the condition, but this is not yet very accessible clinically [4]. There are four ways by which deficiencies can potentially hint to intolerance to lactose:

1. Primary lactase deficiency: It is also known as lactase non-persistence. This form of deficiency is seen in the majority of the people. Usually, after the age of two, there is a reduction in the production of lactase. Those suffering from this condition observe the symptoms during puberty. Those who have inherited the genes for primary lactase deficiency also observe the ill-effects.
2. Secondary lactase deficiency: It can occur from any damage caused to the small intestine. An underlying condition, if treated, can be beneficial to overcome the intolerance.
3. Developmental lactase deficiency: This form of deficiency is seen in premature infants. However, this is seen for a small period after they are born.

4. **Congenital lactase deficiency:** This is a rare condition, where there is no production of lactase in the small intestine since birth. Those who inherited the genes for this condition are the ones who experience this condition [5]. However, often, those ignorant of their intolerance towards lactose may experience Irritable Bowel Syndrome (IBS) like symptoms [6]. Lactose intolerance persists throughout life; it can be short-lived due to an infection in the jejunal mucosa. Lactase persistence is another term that means: "The ability of adult humans to digest the milk sugar lactose - lactase persistence - is a dominant Mendelian trait" [17].

LI is common in some parts of the world. In Middle Eastern, European, African, and Southern Asian individuals, as Lactase persistence is a genetically determined trait, there is a sustained lactase production even through adulthood [7]. Indians are reported to have a better tolerance to lactose as they are known to include milk products in their everyday foods [8] India is also the major consumer of milk products in the world. Here, the individual whose body is accustomed to lactose consumption can enjoy more dairy [3].

The treatment for LI should be governed on how severe the intolerance is [9] Most of the world's milk is obtained from cows, while buffalo, goat, sheep, and camel milk are least consumed [10]. Some alternatives that can be consumed as a replacement to cow's milk include almond milk, oat milk, coconut milk, cashew milk and rice milk. But there are discussions if these kinds of milk should be addressed as 'milk' or 'beverages or juice or drink' [11]. Even then, these alternatives can be safely consumed by lactose-intolerant people because they do not contain lactose but provide similar flavour and texture to the palate. Various forms of fermented dairy foods can provide the necessary nutrients without causing any ill-effects [9].

Lactose intolerance can be examined based on a patient's history as well as the management of the diet [1]. In some countries, where lactose intolerance is widely prevalent, the lactose-free industry is significantly developing [6]. However, complete elimination of lactose from the diet can be damaging to health. A vital method to control LI symptoms is to apply nutritional tactics such as reducing or eliminating lactose consumption from the diet. Hence, patients are advised to go the extra mile and check the ingredients of the foods they consume [12]. When lactose is reduced from the diet, Vitamin D and calcium levels are lower than the daily requirement making the elderly prone to declined bone density [6].

Therefore, it is essential to increase awareness of Lactose Intolerance among the common Indian population. With the basic knowledge about symptoms and use of alternatives of milk, LI can be significantly reduced. In this study, we aim to understand if common people learn that they could be intolerant to lactose by self-assessing their condition after consuming dairy products and if people can relate the mentioned symptoms to the consumption of milk products. Awareness of symptoms of LI and the available alternatives to milk can help people to reduce their symptoms.

## Methods and Materials

### Sampling

As this study is a small representation of India's populations, we

have used the random selection method. The survey was conducted between 6<sup>th</sup> January 2020 and 21<sup>st</sup> June 2020 by way of a structured questionnaire to collect the data for the primary analysis. The survey was sent to 240 people, out of which 211 responses were chosen/selected for further analysis of the data. The remaining 29 responses were eliminated as they were incomplete or repetitive. The survey contained 13 questions that included the demographics, if they consume milk and milk products daily, the milk products they consume if they are aware of Lactose Intolerance and the source of information. They were also asked if they would consume the alternatives to milk products (almond milk, oat milk, tofu, groundnut curd). However, three questions were eliminated from the survey as they did not render any relevance to the other questions on further study. Most questions were multiple-choice based, and few were open-ended. The survey was conducted on an honorary basis.

### Statistical Analysis

The statistical analysis was formulated with the graphs and pie-diagrams supplemented with Google Sheets and MS Excel.

For analysis, secondary data was collected from research articles, newspapers and journals.

### Analysis

#### Observation of the symptoms

The general symptoms associated with Lactose Intolerance in the survey's population included bloating, diarrhoea, nausea, borborygmi, and abdominal pain.

These symptoms were also included in the questionnaire, for the respondents to identify themselves as lactose intolerant. The pie-diagram below describes the occurrence of symptoms after the consumption of dairy products. Only 0.9% respondents identified chose was for stomach pain, bloating, diarrhoea and increased gas, followed by 1.4% identified stomach pain, bloating and increased gas, 1.9% said they experienced stomach pain and nausea. Some members under the survey identified only one of the mentioned symptoms after consumption of milk products. 4.3% observed increased gas and 5.2% of the people experienced stomach bloating. Given that, the majority, i.e., 78.7% of respondents observed no symptoms after consuming milk and milk products.

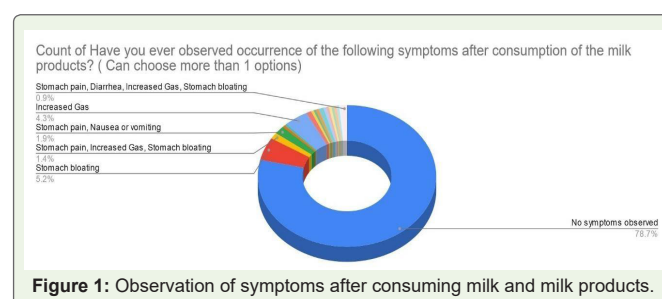
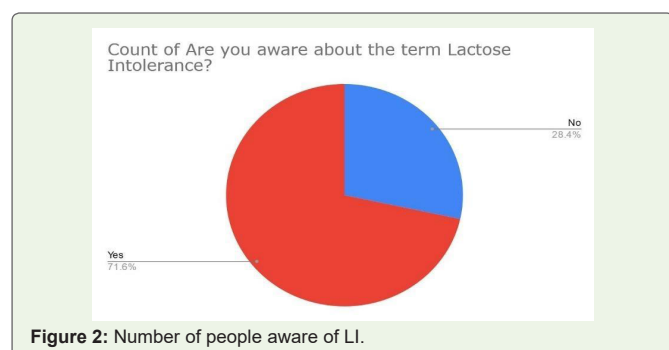


Figure 1: Observation of symptoms after consuming milk and milk products.

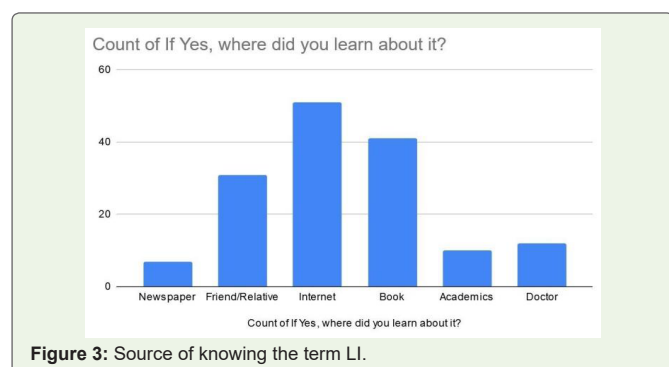
#### Awareness of Lactose Intolerance:

The survey was intended to evaluate the awareness of respondents towards LI. This observation has been represented in the form of a bar

chart below gives. 60 or 28.4% of the respondents were unaware of the term, while 151 or 71.6% claimed that they know the term LI.

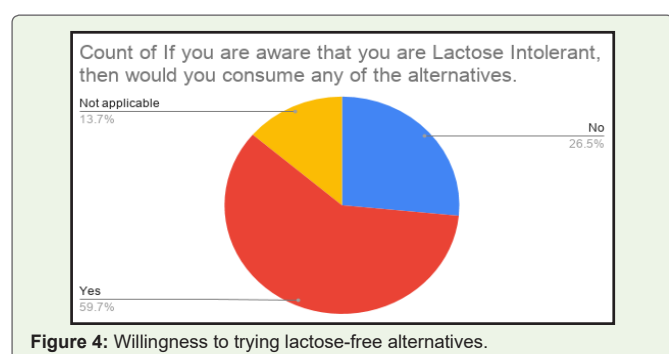


Along with knowing the term, we aimed at identifying where the responders learned about LI. The diagram below shows the various sources of knowing the term. The majority, i.e., 33.6% respondents learned about LI from the Internet, while 27% learned from a book, and 20.4% respondents learned from their friend or relative about LI. Only seven respondents learned about LI from a newspaper.



#### Agreement to try Lactose-free alternatives:

Those suffering from LI can include lactose-free alternatives in their diet, including almond milk, oat milk, cashew milk, coconut milk, groundnut curd, and tofu. The pie diagram shows the respondents willing or unwilling to try the alternatives. 126 or 59.7% people agreed to try lactose-free alternatives. 56 or 26.5% of the respondents were reluctant to try the alternatives, while for 13.7% of the respondents, this question was not applicable.



However, to get a better understanding of the above question, we filtered the responses into two categories:

1. Those who experience symptoms and are willing to try the alternatives.
2. Those who experience symptoms and are unwilling to try the alternatives.

We concluded that when trying to inculcate Lactose-free alternatives to the people with symptoms, 71.1% agreed to try them.

Nevertheless, 28.8% of the self-identified lactose Intolerant respondents were reluctant to try the alternatives.

#### Reasons not to consume Lactose-free alternatives

When asked to state the reasons for not opting for the lactose-free alternatives, we considered the respondents who experienced symptoms. 50% of the respondents refused to consume the alternatives due to the taste; 33.3% chose not to eliminate milk from their diets while the remaining 16.7% respondents assumed that consuming the lactose-free alternatives would be harmful.

#### Results

As seen in Figure 1, 78.7% of the respondents did not observe any symptoms after consuming milk and milk products daily. However, 21.3% of people experienced symptoms. Out of the 21.3% who experienced symptoms, increased gas was the symptom most observed, followed by stomach bloating.

When considering the awareness of LI, 151 respondents knew the term. Though, we are not sure that the respondents were fully aware of the LI and its implications or have heard the term. They were also observing Figure 2, it is evident that 60 respondents are unaware of the term LI. In (Figure 3), we can note the various sources of knowing the terms. The most voted source was the Internet, followed by book and the least voted was Newspaper.

Figure 4 shows us the willingness of the respondents to try lactose-free alternatives. 59.7% of the respondents answered positively to try the lactose-free alternatives, while 26.5% of the respondents would not consume the lactose-free alternatives (Table 1).

**Table 1:** Plant-based alternatives to milk [14].

1.Cereal based:	Oat, Rice milk.
2.Legume based:	Soy milk.
3.Nut based:	Almond, Cashew, Coconut milk.
4.Seed based:	Flax, Sunflower milk.
5.Pseudo-cereal based:	Quinoa milk.

When considering the respondents who experienced symptoms and did not choose to try the alternatives, the top reason was the taste of the alternatives.

#### Discussions

It is now evident from the results that LI awareness is quite common in India (71.6%). However, as this study is only a small representation of people in India, it is not a sure fact that many are aware of LI. Also, we are unsure if awareness of the term implies that the respondents know about the ways to diagnose the condition and take proper measures to reduce their symptoms. A previous study on

South American Indians conducted in 1969, showed that about 58.3% of the subjects observed digestive symptoms after consuming 50 g of lactose diluted with 500 ml of water. The authors concluded that lactase deficiency was commonly seen in the subjects of Indian descent [13]. This shows that this observation is not true for the common Indian population living in India. Also, many respondents did not complain about ill-effects after consuming dairy products, Indians are not very prone to LI. We are unsure if the symptoms are due to consuming milk products or due to a prolonged condition. Many of the respondents were willing to try lactose-free alternatives. India is a geographically and culturally diverse country. As stated before, this study is a small representation of the Indian population, irrespective of the region they belong to; the number of people suffering from LI can differ in different regions of India. For the small percentage of people that can be suffering from LI, there are not many options available in the Indian market to replace the milk in their diet.

Cow's milk is the most popular and contributes to 83% of the global consumption, while buffalo milk contributes to 13%, goat milk contributes 2.3%, while sheep milk contributes 1.4% and camel milk contributes 0.3%. Nutrition-wise, buffalo milk contains higher amounts of fat and provides added energy as compared to cow milk. Goat milk contains the amounts of lipids and proteins like cow's milk but is lacking vitamin B12 and folate. Milk obtained from sheep has more lipids, proteins and lactose compared to cow's milk [15].

### Lactose-free alternatives for those suffering from LI

For people suffering from LI, consuming dairy-free alternatives could help them avoid the symptoms. But often these alternatives are very difficult to find or simply not suitable to their taste buds. Nevertheless, over-the-years, there is a development in the lactose-free industry.

### Plant-based alternatives

These alternatives are prepared using water and the plant-based substance by homogenizing the mixture, which makes it resemble cow's milk. The plant-based alternatives are of five types, such as [14].

Among these kinds of milk, almond milk has been a part of the diets of many in North America, European Union, and Australia and hence is considered the most popular alternative. Soy-incorporates foods are known to be consumed on a large-scale in South Asian countries. Those who are allergic to soy and almonds can consume rice milk [11]. To increase the shelf-life of plant-based milk, heat treatment is an old-method to prevent it from spoiling faster. In terms of the nutritional value of these kinds of milk, it is different in every kind. Combining two plant-based milks can add to its nutritional value.

To those concerned about not meeting their daily calcium requirements, companies are enriching the milks with additional calcium [14]. Another possible alternative for the lactose intolerant is the consumption of lactase tablets and drops as it contains the enzyme lactase that can minimize the risk of developing symptoms [5].

Milk supplemented with bacterial strains like Bifid bacteria and *Lactobacillus acidophilus* can enhance its nutritional properties considerably [16].

### Future perspective of LI

LI is already well-known, but the term must be included in the educational curriculum to make it known on an even larger scale. When the awareness is made to a bigger audience, the diagnosis and prevention will also increase significantly. This will help eradicate or reduce the symptoms associated with LI to a greater extent.

As the lactose-free product industry is just developing in India, an increase in affordable lactose-free alternatives will ensure all types of people purchase, consume and avoid the symptoms.

However, if a survey, along with clinical testing of the condition is conducted in various regions in India, it could help the medical professionals understand the types of symptoms and give better treatments to Indian populations. More research about LI in Indians living outside India, their dietary and environmental changes can help us establish a broader demographic about LI among people of Indian descent.

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