

Lactose Intolerance and Inheritance of Lactase Persistence: A Review

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ABSTRACT

A disaccharide named Lactose which is comprising of galactose molecules bound to glucose and it has the main significance in animal life because the main supply of calories from the milk of all mammals, which needs hydrolysis to its fundamental constituent's monosaccharaides via the brush border enzyme i.e. Lactase. A somatic chromosome is believed to be responsible for the 2 observable characteristics, with a dominant lactase persistence allelomorph and a non-dominant lactase restriction allelomorph. the distribution of the lactase observable characteristics in human populations is very changeable: however, the geographical regions where lactase insufficiency or persistence predominates are well planned. Abdominal pain and bloating remain usually caused by colonic fermentation of unabsorbed lactose by the micro flora resulting in the production of short chain fatty acids. Lactase persistence is one in every of the clearest example of niche construction in humans. Two third of the earth inhabitants are lactose intolerant because of the adult type of hypolactasia (ATH) by a restricted serving of milk and farm products in their diet. The further most common forms of cancers have been discussed as an adverse effect of milk and dairy foods. The role of dairy foods in inflammatory bowel disease has been provocative, about 1/3 of adults hold the capability to digest lactose where as others failed.

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INTRODUCTION

Lactose is a disaccharide involving of galactose molecules bound to glucose and it has main significance in animal life as it is the main source of calories from the milk of mammals [1].

Lactose needs Intestinal absorption through hydrolysis to its component monosaccharaides via the brush border enzyme Lactase. The action of lactase can be observed at the intestinal mucosal surface from the 8th week of

gestation. The lactase action increases by 34th week of gestation and reaches to highest point at the time of birth. Lactose digestion is necessary for infant's health during the lactation as congenital lactase deficiency can be proven fatal if not identified immediately after birth [1].

It is estimated that around 1/3rd of adults can digest lactose hence are lactase persistence or lactose digesters, whereas, the remaining cannot digest lactose therefore are said to be

lactose non-persistence or lactose maldigestors [2].

Genetics of Lactose Persistence

In other healthy individuals who have good history of the milk consumption i.e. a person of Northwest Europe and Afroarabian travelers, the persistence activity of lactase is kept at a similar level that is found in infants. An autosomal gene is responsible for the two main phenotypes with a recessive lactase restriction allele and a dominant lactase persistence allele. The distribution of the lactase observable characteristics in human populations is very changeable however; the geographical regions where lactase insufficiency or persistence predominates are well planned [3].

Niche Construction

Niche construction, a process where the organisms modify their own and each other niches through their activities and selections. By altering natural selection pressures, niches construction generates feedback in evolution. Lactase persistence is one amongst the clearest samples of niche construction in humans. There are many samples of this in human advancement; however, none are therefore well studied clear cut in depth and well supported because of the co-evolution lactose persistence and dairy farming [7].

Indications of Lactose Intolerance

Usual indications of lactose intolerance encompass abdominal pain, diarrhea, flatulence, bloating, borborygmi, and on some circumstances queasiness and vomiting. In uncommon cases, gastrointestinal (GI) motility is decreased and individuals can present with constipation possibly as a consequence of methane production. Bloating and abdominal pain is caused by fermentation in the colon of unabsorbed lactose through bacterial micro flora which further leads to the production of

the fatty acid short chain hydrogen, methane, carbon dioxide thus increasing gut transit time and intra colonic pressure (Figure 1) [4-6].

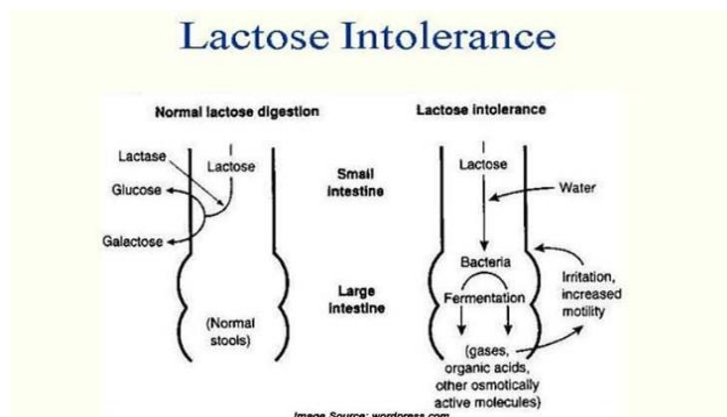


Figure 1. Comparison between normal lactose digestion and lactose intolerance Problems related to lactose non-digester.

The symptom which are experienced by lactose intolerant patients is the outcome, because of an altered fermentation of lactose in the colon [8].

Vonk *et al.* in 2003 done an experiment, they collect lactose intolerant subjects and divide them into two groups, due to the harshness of their indications. One of them described by diarrhea, while the other group was only proficient by mild symptoms without diarrhea. In small intestine the amount of lactose digestion was not different in both groups, which shows a very much similar activity and lead them to the hypothesis of "colon resistance factor" [8].

Lactose Intolerant Individual and Osteoporosis

An amount of revision shows that dairy products and calcium supplement might have no influence [9, 10] or even any side effects on body weight [11]. whereas, recent appraisals and Meta examinations of randomized controlled trials with or without attendant energy restriction designate that neither Calcium nor dairy products consistently support

weight loss [11-13]. Lactose intolerant individuals have been associated with a low number of dairy calcium intake so cause osteoporosis, although some of the evidence advise that lactose intolerant should not edge their calcium intake as some of the individuals can tolerate some servings of dairy nutrients [14, 15].

Adult-Type Hypolactasia (ATH)

More or less 2/3rd of the population inhabitant is lactose intolerant because of the adult type of hypolactasia (ATH) due to their diet without dairy foods. The common signs and symptoms i.e. diarrhea and weight loss of ATH patients are due to bacterial fermentation of unabsorbed carbohydrate and undigested lactose. Moreover, dairy foods are the main source of protein vitamins lipid and minerals predominantly calcium [16].

Colorectal Ovarian and Prostate Cancers

In different biological abnormalities where dairy farm foods exert a protective or adverse effect, an assessment between lactose intolerance and normal individuals has provided a fascinating body of evidence for valuation of the bioactive purpose of various dairy farm ingredients in the formation of health and disease conditions. Colorectal, ovarian and prostate cancers are the most shared cancer forms in which a defensive or adverse effect of milk and dairy foods has been examined and discussed for an extended time [17-19].

Inflammatory Bowel Disease and Ulcerative Colitis

The inflammatory bowel disease IBD, Crohn's disease and ulcerative colitis are complicated conditions with mysterious causes, pathogenesis involves interactions between a hereditarily susceptible host and a disturbed bacterial micro flora resulting abnormal innate and adaptive immune responses.

In IBD foodstuff may be important both for pathogenesis and nutrition although exact proof is lacking for the former. The role of dairy foods in IBD has been controversial, about 1/3rd of adult have the ability to digest lactose while the other lose it. The world's segregation into lactose digester, lactose mal-digester relates with a numeral disease, as well as IBD, raising the query of an accidental event or an evolutionary transformer of disease similar to latitudinal distributions. As such unequal phenotype distributions of lactose digester/lactose mal-digester in IBD may be an additional hazard factors for IBD or may prompt to lactose mal-digester. Patients with IBD may find that DAIRY foods worsen their symptoms, leading them and some professionals to recommend as to reduce the lactose diet [20]. Cystic fibrosis is a very common hereditary disease in the Caucasian population.

Decline Bone Mineral Density

Reduced bone mineral density is a known problem in this population, which disturbs the quality of life and lead to morbidity. Due to a low number of bone mineral density pathological fractures and kyphosis can cause, this can further lead to extreme pain and reduced lung function. The bone diseases give the injurious result as it prohibits the requirement for lung transplantation that is a lifesaving action for cystic patients [21, 22]. For reducing the bone mineral density of cystic fibrotic patients there are many risk factors. Significant causative conditions include non-absorption of vitamin D [23] poor nutritional status, glucocorticoid therapy [24] low physical activities [25] and the late pubertal menstruation or initial hypogonadism [26-28].

CONCLUSION

From the current review it can be concluded that insufficient dietary intake particularly the diet lacking in dairy foods is associated and

undoubtedly increases the load of continuing the lactase intolerance diseases. Though lactose containing foods is not the only source of energy or nourishment for our body, still the specified available dairy foods and its consumption outline are necessary. The low dairy food diets are mostly insufficient not only in calcium but in many other important nutrients as well. The best way to overcome this low nutrient in our body is to alter the diet with similar nutritional substances such as yogurt or cheese in order to meet our daily needs and monitor the individual for any symptom or adverse effect of lactose. In 2002 Jarvis *et al.* proposed some strategies for improving tolerance for dairy foods which states, regulate the quantity of consumed lactose, do not take milk alone always drink milk with some meal or snacks, choose the right dairy food for you, or it would be much better if you try lactose-free or lactose-reduced dairy products [28].

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