

Article

Effect of lactose Intolerance on Oral Health by Estimating Some Biochemical Parameters

Shaimaa Essa Ahmed

College of Dentistry, University of Tikrit, Salahaddin, Iraq

Correspondance: shaema.essa@tu.edu.iq

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Abstract: There are several signs and symptoms of lactose intolerance. Alactasia can be acquired over time, but it can also be congenital. This illness affects around 65% of people worldwide from birth. Upon additional examination, it is discovered that almost 70% of adult East Asians are lactose intolerant. The study examines lactose intolerance globally, with a focus on the data that is currently accessible for Europe. According to the European Dairy Association, lactase insufficiency was more common than 40% in Hungary, Estonia, Greece, and Italy. Studies on the issue in Bulgaria are insufficient. We provide the first findings from a questionnaire study carried out in Bulgaria. It was determined whether the individuals' ethnicity and potential lactose intolerance were related. Information on how eliminating lactose-containing foods (milk and dairy products) might improve dental health is provided and explored. Here is a list of foods that people who are lactose intolerant can utilize to safeguard their dental health. Aim of the study to assess the potential effects of lactose intolerance on oral health. We take 25 patient of lactose intolerance (10 males and 15 females) and also take 20 normal persons (10 males and 10 females). The ages of study groups ranging from 15 – 35 year. Our study was done in Tikrit Teaching Hospital in Tikrit city from 1st of November 2024 to the end of February 2025. All subjects (patients and controls) were examined for dental problems. There was no significant difference of age between patient and control groups (P value 0.5) because we take almost similar ages between these two groups. There was a highly significant decrease (P value 0.001) of vitamin D3 and calcium in patients as compared with control 20 groups, and this may be related to the restriction of dairy materials in foods of lactose intolerant patients. It's unclear how lactose intolerance and dental health are related. It seems that the connection between lactose intolerance and dental health has not been thoroughly studied up to this point. To further investigate and validate the impact of lactose intolerance on dental health, further high-level evidence studies are needed.

Keywords: Lactose Intolerance, Oral health, Vitamin D3, Calcium

Introduction

Dairy products including milk, yogurt, cream, butter, ice cream, and cheese frequently include lactose. The so-called "hidden lactose," however, is also included in some bread and baked goods, ready-to-eat morning cereals, quick soups, confections, biscuits, salad dressings, sausages, gravy, drink mixes, and margarine. Furthermore, both over-the-counter and prescription drugs may include lactose [1]. Dairy products and milk are vital nutrients for all people from birth. Milk is a basic diet for almost

6 billion people worldwide, providing vital nutrients to the body. However, a sizable section of the population—roughly 65%—has lactose intolerance because they are unable to digest the lactose in milk. People steer clear of milk and dairy products as a result [2]. According to the European Dairy Association (2021), each nation's citizens should consume a specific amount of milk (measured in grams) each day. Residents of Spain (699 g/day), the Netherlands (678 g/day), Romania (647 g/day), Portugal (647 g/day), Germany (610 g/day), Greece (517 g/day), and Hungary (517 g/day) are advised to consume more than two big glasses of milk every day. For those from the UK (414 g/day), Italy (388 g/day), and France (310 g/day), two ordinary glasses of milk will be sufficient [3,4]. Lactose intolerance is the name for the unpleasant gastrointestinal symptoms that might result from limited lactose digestion. When undigested lactose enters the colon, gas-producing bacteria ferment it, which can result in diarrhea, bloating, flatulence, and stomach discomfort. When the body is unable to break down lactose into its component sugars, glucose and galactose, symptoms arise. Consequently, the symptomatic reaction to a certain lactose load (i.e., tolerant to 12 g of lactose; intolerant to 24 g) can be more accurately described as lactose intolerance [5]. Mammals are known to have a strong capacity for lactose digestion from birth. As a result, the lactase enzyme declines with age and may eventually reach dangerously low levels in adulthood. Conversely, this results in decreased dietary lactose absorption, which causes symptoms known as lactose intolerance (LI) [6]. This change causes the small intestine's osmotic load to rise and the bacterial flora to digest lactose, which increases the generation of gas and short-chain fatty acids [7]. In spring or summer, when the daily need for vitamin D is 7.5 g, exposure to sunshine for 20 minutes might prevent vitamin D insufficiency. Ergocalciferol (Vitamin D2) and cholecalciferol (Vitamin D3) are referred to as vitamin D in this article. The chemical structures of such substances are displayed on page 10. UVB irradiation converts ergosterol, the starting ingredient, into vitamin D2 in plants, fungi, and invertebrates. In contrast, sunlight converts 7 dehydro cholesterol into vitamin D3 in vertebrates, including humans. In addition to affecting the human skeletal system, vitamin D lowers the risk of cancer, diabetes, autoimmune disorders, and cardiovascular disease [5]. Whole cow milk has a yield of 0.3 to 1.0 µg/kg, whereas cheese and butter are greater sources of the vitamin (2.0 to 18.1 µg/kg for semi-hard and hard cheese, and 5.9 to 14.1 µg/kg for butter). Three bone minerals—calcium, magnesium, and phosphorus—are regulated by vitamin D together with the hormones parathyroid hormone, fibroblast growth factor 23, and calcitonin [8]. As a result, diets high in calcium and vitamin D are better. Spinach, broccoli, soy beans, cereals and cereal goods, eggs, and water are all natural sources of calcium. Due to their high mineral content and bioactivity, milk and milk products are good sources of calcium. However, if we are looking for meals high in both calcium and vitamin D without milk, we should concentrate on salmon and egg yolk [3, 4].

Materials and Methods

Study Population

We take 25 patient of lactose intolerance (10 males and 15 females) and also take 20 normal persons (10 males and 10 females) in Tikrit Teaching Hospital in Tikrit city from 1st of November 2024 to the end of February 2025. The ages of study groups ranging from 15 – 35 year. The blood sample drawn was about 3-5 ml, put in gel tube and let stand for about 15 minutes for clot formation, then centrifuged for 10 minutes at speed of 3000 rpm and the serum was isolated for estimation of calcium and vitamin D3. All subjects (patients and controls) were examined for dental problems. 0- Analysis 1- Calcium was analyzed by use of American full automated chemistry analyzer (smart 150). Material from the GIESSE DIAGNOSTICS company for quantitative determination in human serum sample. 2- Vitamin D3 was analyzed by use of full automated AFIAS-6 analyzer instrument. The assay is a fluorescence immunoassay (FIA) from biotech company for the quantitative determination of Vitamin D3 in human serum sample. 3- The bio statistical analysis was done as mean ± SD. The students t test also has used for analysis the results for both patients with control groups. The significant variation was established when P value less than 0.05.

Sample Collection

Fasting venous blood samples (5 mL) were collected between 8:00 and 10:30 AM. Serum was separated by centrifugation and stored at -20°C until analysis. Indices used for periodontal disease assessment.

Results and Discussion

Table 1. Dental abnormalities percent and biochemical markers in patients with lactose intolerance and healthy persons.

	Age (Years) Mean±S.D	Vit.D (ng/ml) Mean±S.D	Ca (mg/l) Mean±S.D	D.A. (No/%)
Patients with Lactose Intolerance (No.=25)	24.6±7.1	17.28±7.25	7.37±1.10	(18/72)
Normal subjects (No.=20)	25.1±6.8	44.30±6.20	9.65±1.0	(8/40)
P value	0.5	0.0001	0.0001	

Table 2. Dental abnormalities percent and biochemical markers in males and females with lactose intolerance patents.

	Age (Years) Mean±S.D	Vit.D (ng/ml) Mean±S.D	Ca (mg/l) Mean±S.D	D.A. (No/%)
Male Patients with Lactose Intolerance (No.=10)	24.9±6.6	18.21±6.24	7.65±1.2	(6/60)
Female Patients with Lactose Intolerance (No.=15)	23.8±7.4	15.42±7.6	7.05±0.8	(12/80)
P value	0.5	0.05	0.05	

In table 1, there was no significant difference of age between patient and control groups (P value 0.5) because we take almost similar ages between these two groups. There was a highly significant decrease (P value 0.001) of vitamin D3 and calcium in patients as compared with control 20 groups, and this may be related to the restriction of dairy materials in foods of lactose intolerant patients. A number of studies like Hodges et al have indicated that excluding dairy from diet is associated with nutritional deficiencies [9]. Due to these deficiencies there was increase in dental problem percent (72%) in patients as compared with control (40%) groups. This increase in percent due to calcium and vitamin D3 are important for health of bones and teeth. In table 2, there was a significant decrease (P value 0.05) of vitamin D3 and calcium in female patients as compared with males. Lapedes and Savaiano noted that there was no significant difference with gender. The difference in our study may be related to life behavior different between males and females like decrease of exposure to sun light, lack of exercise, and may pregnant women which all represent a predisposing factor for vitamin D3 and calcium deficiency [10].

Globally, the proportion of people with lactose intolerance and milk allergies is increasing, with certain racial groups exhibiting a greater propensity for sensitivity. In addition to its established impacts on youngsters, it is increasingly observed in adults. to evaluate the possible impact of lactose intolerance on dental health. Dairy-exclusion diets are frequently used by people with lactose sensitivity to prevent symptoms brought on by lactose consumption [11,12]. Children with dental caries had lower salivary calcium levels than children without caries, but their salivary phosphate levels were higher, according to an Indian research. The study found a connection between low salivary calcium

levels and vitamin D insufficiency. These findings suggest that both variables might be risk factors for the onset of dental cavities. While acid-producing bacteria encourage demineralization, vitamin D keeps saliva's calcium and phosphate levels adequate, which encourages later remineralization [13]. Additionally, research has demonstrated that vitamin D controls the immune system, resulting in the synthesis of antimicrobial proteins that target cariogenic bacteria, such as defensins and proteases. Both vitamin D2 and D3 demonstrated antibacterial qualities against *Streptococcus* mutants in an in vitro investigation, albeit the study's limitations should be taken into account when interpreting the findings [14]. According to our research, there is a substantial correlation between lactose intolerance and oral health, particularly with regard to teeth, with 72% of participants having dental issues. Affected people consume significantly less calcium as a result of this dietary limitation. The oral environment may also be affected locally if dairy products are replaced with alternative soy-based or lactose-free foods. There is discussion of how dietary limitations affect dental caries, periodontal disorders, osteoporosis and ridge resorption, dental fluorosis, and the function of probiotics in lactose-intolerant people [9,10]. It's unclear how lactose intolerance and dental health are related. It seems that the connection between lactose intolerance and dental health has not been thoroughly studied up to this point. To further investigate and validate the impact of lactose intolerance on dental health, more high-level research is needed [10]. Many oral health problems, such as dental mineralization abnormalities [15,16], caries susceptibility [17], decreased odontogenesis [18], delayed teeth eruption [19], implant failure [20], extended wound healing [21], and periodontitis [22], might also be linked to a deficiency in vitamin D. The effects of vitamin D may be divided into two categories: genomic and non-genomic. Its cellular receptor (VDR) contributes to alterations in gene expression by acting as a ligand-activated transcription factor; non-genomic activities take place when the VDR is situated outside the nucleus [23]. Serum 25-hydroxyvitamin D (25[OH]D) measurement is a trustworthy indicator of blood concentration levels and vitamin D status. A blood 25-hydroxyvitamin D [25(OH)D] concentration of ≥ 50 nmol/L is typically regarded as sufficient for bone and general health in the majority of individuals, according to expert committees [24].

Conclusion

It's unclear how lactose intolerance and dental health are related. It seems that the connection between lactose intolerance and dental health has not been thoroughly studied up to this point. To further investigate and validate the impact of lactose intolerance on dental health, further high-level evidence studies are needed.

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