Research Article

The Relationship Between Consumptions of Dairy and Fermented Dairy Products in Lactose Intolerance Among Students of A Foundation University In Istanbul

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Abstract

This study was conduct to determine the gastrointestinal symptoms after the consumption of milk and dairy products, lactose intolerance status and knowledge with Pre-school Teacher Education departments students at a Foundation University. The study was carried out with 200 female students on a voluntary basis. A data information form with 22 questions was applied to the participants. NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) program was used for statistical analysis. General information, milk, milk products and foods that may contain lactose consumption frequencies, gastrointestinal symptoms such as abdominal pain, diarrhea, gas, bloating in the stomach, stomach cramping, vomiting and nausea after

consumption of milk and fermented milk products like yoghurt, kefir, cheese were obtained via data information form. Monthly consumption of milk and dairy products of the participants, total energy, calcium, lactose amounts were calculated. . It was observed that the students consumed cheese and yoghurt more. Among those participating in the study, the rate of those who were diagnosed with a health care provider and had lactose intolerance was found to be 1%, while those who are suspected of lactose intolerance were 36%. It was found that 76.3% of the students who thought that they had lactose intolerance started to feel the symptoms later. The rate of lactose intolerance in patients with chronic disease compared to patients without chronic

disease was found to be statistically significantly higher. When evaluated according to lactose intolerance after drinking milk, the distribution of the severity of the cases of abdominal pain, diarrhea, gas passing, stomach bloating, cramping and nausea show statistically significant difference. When the patients with and without lactose intolerance were compared, monthly calorie, lactose and calcium values from ayran and cheese were found to be statistically significantly lower in patients with lactose intolerance. It was seen that most of the students who experienced symptoms of lactose intolerance were not diagnosed and it was seen that the society should be made aware of this issue.

Keywords: Lactose intolerance; Milk and dairy consumption; Milk consumption habits

1. Introduction

Milk, which is an important nutritional source in terms of balanced diet, contains many macro and micro nutrients [1]. 100 milliliters of milk consists of about 87.2 g water, 4.9 g lactose, 3.5 g of protein, 3.5 g of fat, 0.9 g of mineral and trace amounts of vitamin, enzyme, hormone, hormone like substances and organic acid [2]. Generally, the production of fermented dairy products comprises the steps of heating the milk to its boiling point to kill bacteria, cooling to body temperature and adding a small amount of fermented milk to serve as a starter culture. For this purpose, the milk starter is mixed with culture and kept at room temperature overnight. The milk, which is clotted until the morning, acquires a sour taste and the typical taste and flavor of the fermented milk. Although fermented milks can be produced in traditional way, due to reasons such as urbanization they are also produced commercially [3, 4] Fermented milks are consumed worldwide. There are about 400 general named fermented milks produced industrialized and traditionally throughout the world [5, 6]. Lactic acid bacteria are basic microorganisms in milk fermentation. They are converted into lactose to lactic acid. This situation increases the acidity of the environment and prevents the growth of organisms other than lactic acid bacteria in the environment [6, 7]. Especially lactic acid bacteria of Lactococcus, Leuconostoc, Lactobacillus, Streptococcus and Pediococcus species play an important role in the production of yogurt, cheese, butter and cream that are consumed more than other dairy products. S. thermophilus and Lb. bulgaricus starter culture mixtures containing equal amounts are used in production of yogurt that are the most important dairy product in our country. Cheese that are secondly important dairy product in the world are produced variously in different parts of world. In producing of cheese, other than lactic acid bacteria, yeast species are also used [7]. Lactose is a disaccharide just found in milk and in its products. It is formed by binding D -galactose molecule to a D - glucose molecule with a β-1,4 glycosidic bond [8-10]. Lactose intolerance can be related diversity of clinical symptoms [11]. After eating of the lactose containing food, symptoms can happen between 30 minutes and 2 hours [12]. Diarrhea, bloating, nausea, borborygmi, flatus and abdominal pain are gastrointestinal symptoms that almost always present in lactose intolerant patient [8]. In addition to these symptoms, other gastrointestinal symptoms which are constipation, vomiting, and systemic symptoms for example, headaches, loss of concentration, light headedness, muscle pain, tiredness, joint pain can be caused [8, 11, 12].

Lactose malabsorption and intolerance diagnosed in several ways [13]. Jejunal biopsy, absorption test (overload of lactose or gaxilosa), hydrogen breath test, genetic test, and symptoms surveys after ingestion of lactose are diagnosis methods for lactose intolerance [14]. Although diagnosis of lactose malabsorption and intolerance has more than one method, there is no gold standard test for diagnosis of lactose malabsorption

currently [13]. The most commonly used tests for the diagnosis of lactose intolerance are lactose hydrogen breath test and lactose absorption test (lactose tolerance test) [11, 15]. Although lactose intolerance is not a well-known issue in our society, it does not have sufficient awareness about what measures can be taken in its presence. Considering the importance of nutritional values in dairy products, it is important to raise awareness of people with digestive difficulties and draw attention to the measures they can take. This study will be carried out to determine the gastrointestinal symptoms that may occur after dairy consumption habits, milk and dairy consumption, and to determine the distribution of lactose digestive difficulties.

2. Materials and Methods

2.1 Universe and Sample of Research

Research universe consists of a Foundation University Pre-school Teacher Education Departments students between dates of 21 Sep - 21 Oct 2019 when application of the research was planned. The research was conducted by female students because male students number is not enough to compare. Approval of ethical board was taken (Number: 61351342-/2019-84). Inclusion Criteria: Participants over the age of 18; declare verbal and written consent to participate in the research. Exclusion Criteria: Not verbal consent to participate in the research; Being outside the group designated for the research; Inconsistent answers to surveys and conditional questions.

2.2 Data Collection Tools

Data information form was used in the research. This form was prepared by using the literature research and the studies of Bıyıklı and Tutumlu who are close to the subject of the research [15, 16]. The form consists of 22 questions about general information of students, frequency of consumption of milk and milk products, and their lactose intolerance status and knowledge.

Monthly consumption of milk and dairy products of the participants, total energy, calcium, lactose amounts were calculated.

2.3 Evaluation of Data

After collecting the data, necessary coding was done.NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) program was used for statistical analysis. Descriptive statistical methods were used while evaluating the study data. The suitability of quantitative data to normal distribution was tested by Shapiro-Wilk test and graphical examinations. Mann-Whitney U test was used to compare the quantitative variables that did not show normal distribution between the two groups. Pearson chi-square test and Fisher-Freeman-Halton exact test were used to compare qualitative data. Statistical significance was accepted as $p < 0.05$.

3. Results

The study was conducted between 21 Sep - 21 Oct with a total of 200 female, who were the students of Foundation University, Department of Pre-school Teaching, aged between 18 and 31 years old with an average age of 20.78 ± 2.26 years. All 200 participants of the study are female.

3.1 Distribution of Demographic Characteristics

Body Mass Index(BMI) measurements varied between 14.88 and 38.97 kg/m^2, and the average was determined as 21.15 ± 3.44 kg/m^2. Of the cases, it was observed that 25% (n=50) were 1st class students, 25.5% (n=51) were 2nd class, 25% (n=50) were 3rd class, and 24.5% (n=49) were 4th class students. It was observed that 22.5% of the cases (n=45) had a chronic disease. Of the cases with chronic diseases, 2.2% (n=1) had diabetes, 6.7% (n=3) had cardiac diseases, 33.3% (n=15) had stomach diseases, 2.2% (n=1) had renal diseases, 53.3% (n=24) had allergy, and 24.4% (n=11) had other diseases.

3.2 Distribution regarding milk consumption

Of the cases included in the study, 31.5% (n=63) specified that they liked to drink milk, while 36% (n=72) liked milk, 19% (n=38) liked it less, 7.5% (n=15) did not like milk but drank, and 6% (n=12) did not like and never drank it. While 47.3% (n=26) of the cases stated that the reason for not liking milk was its odor, 38.2% (n=21) specified the reason as they didn't like its taste, 3.6% (n=2) as they didn't like it due to allergic disorders, 7.3% (n=4) due to nausea, vomiting, diarrhea, and 3.6% (n=2) due to other reasons. Of the cases, 11.4% (n=21) stated that they formed a habit for drinking milk between 0 and 1 year, while 6.5% (n=12) had this habit between 2 and 3 years, 5.4% (n=10) between 4 and 6 years, 6.5% (n=12) between 7 and 9 years, and 70.3% (n=130) in 10 years and more. As 24.6% (n=45) of the cases specified that they consumed milk during breakfast, 6% (n=11) consumed in the lunch meal, 20.2% (n=37) in the evening, 24.6% (n=45) before bedtime, and 24.6% (n=45) between the meals. Of the cases, 31.2% (n=58) stated that the reason for consuming milk was to like its taste, 37.1% (n=69) thought that it was nutritious, 15.6% (n=29) said that this was a habit, 8.6% (n=16) thought that it is saturating, and 7.5% (n=14) consumed due to other reasons.

3.3 Distribution regarding the changes in the body after drinking milk

Among the cases, it was specified that 78.1% (n=153) had no stomach pain, 13.8% (n=27) had low, 5.6% (n=11) had moderate, 2% (n=4) had high, and 0.5% (n=1) had excessive stomach pain. Among the cases, it was specified that 90.8% (n=178) had no diarrhea after drinking milk, 5.1% (n=10) had diarrhea at a low rate, 3.1% (n=6) at a moderate rate, and 1% (n=4) at a high rate. Among the cases, it was specified that 57.1% (n=112) had no gas, 22.4% (n=44) had gas at a low rate, 10.2% (n=20) at a moderate rate, 9.2% (n=18) at a high

rate, and 1% (n=2) at an excessive rate. Among the cases, it was specified that 53.6% (n=105) had no bloatedness after drinking milk, 25% (n=49) had low, 11.2% (n=22) had moderate, 8.2% (n=16) had high, and 2% (n=4) had excessive bloatedness. Of the cases, it was specified that 86.2% (n=169) had no abdominal cramp after drinking milk, 3.6% (n=7) had low, 1.5% (n=3) had moderate, 0.5% (n=1) had high, and 1.5% (n=3) had excessive abdominal cramp. Among the cases, it was specified that 92.9% (n=182) had no vomiting after drinking milk, 3.6% (n=7) had low, 1.5% (n=3) had moderate, 0.5% (n=1) had high, and 1.5% (n=3) had excessive vomiting. Among the cases, it was specified that 80.1% (n=157) had no nausea after drinking milk, 10.2% (n=20) had low, 3.6% (n=7) had moderate, 2.6 (n=5) had high, and 3.6 (n=7) had excessive nausea.

3.4 Distribution regarding lactose tolerance and intolerance

When lactose intolerance of the cases were examined, it was found that 1% (n=2) stated that their lactose intolerance has been diagnosed in a health institution before, 7% (n=14) expressed that they were suffering from the mentioned disorder every time when drinking milk however they were not sure about lactose intolerance, 29% (n=58) stated that they had the mention symptoms occasionally, however they were not sure about lactose intolerance, 62% (n=124) declared that they had absolutely such a disorder, and 1% (n=2) gave the "other" response. Of the cases participated in the study, it was found that monthly whole-fat milk consumption amount varied between 200 and 12000 ml and the average amount was 2170.07 ± 2147.10 ml; monthly semi-skimmed milk consumption amount varied between 200 and 16000 ml and the average was 2252.94 ± 2551.54 ml, monthly skimmed milk consumption amount varied between 200 and 4800 ml and the average was 1066.67 ± 1231.04 ml, monthly

buttermilk drink consumption amount varied 200 and 24000 ml and the average was 3281.44 ± 3575.36 ml, and monthly kephir consumption amount varied between 200 and 6000 ml and the average was 1008,00 ± 1519.91 ml. It was determined that total lactose amount taken by the cases from whole-fat milk varied between 9.5 and 570 and the average was 103.08 ± 101.99, lactose amount taken from semi-skimmed milk varied between 9.8 and 784 and the average was 110.39 ± 125.03, lactose amount taken from skimmed milk varied between 10 and 240 and the average was 53.33 ± 61.55, and the lactose amount taken from buttermilk drink varied between 5.6 and 672 and the average was 91.88 ± 100.11 (Table 1). The rate of lactose intolerance in the patients with chronic diseases was found to be statistically significantly higher than the patients without any chronic diseases (p=0.016; p<0.05) (Table 2).

The distribution of the severity of abdominal pain in the patients after drinking milk showed a statistically significant difference in terms of lactose intolerance (p=0.001; p<0.01). In the patients with lactose intolerance, the rate of low and moderate diarrhea after drinking milk was higher than those without lactose intolerance. In the patients with lactose intolerance, the rate of moderate and extreme gas after drinking milk was higher than those without lactose intolerance. The distribution of the severity of bloatedness in the patients after drinking milk showed a statistically significant difference in terms of lactose intolerance (p=0.001; p<0.01). The distribution of the severity of abdominal cramp in the patients after drinking milk showed a statistically significant difference in terms of lactose intolerance (p=0.001; p<0.01). The distribution of the severity of diarrhea in the patients after drinking milk did not show a statistically significant difference in terms of lactose intolerance (p>0.05). The distribution of the severity of nausea in the patients after drinking

milk showed a statistically significant difference in terms of lactose intolerance (p=0.021; p<0.05) (Table 3).

The calories taken by the patients with lactose intolerance from monthly buttermilk drink consumption was found to be statistically significantly lower than those without lactose intolerance (p=0.025; p<0.05). The calories taken by the patients with lactose intolerance from monthly white cheese consumption was found to be statistically significantly lower than those without lactose intolerance (p=0.018; p<0.05) (Table 4). According to the presence of lactose intolerance, the monthly lactose amount taken by the patients from whole-fat milk, semi-skimmed milk, skimmed milk, yogurt, strained yogurt, fruit yogurt, kashar cheese, quark cheese, and butter consumption did not show a statistically significant difference (p> 0.05).

The lactose amount taken by the patients with lactose intolerance from monthly consumption of buttermilk drink was found to be statistically significantly lower than those without lactose intolerance (p=0.025; p<0.05). The lactose amount taken by the patients with lactose intolerance from monthly consumption of white cheese was found to be statistically significantly lower than those without lactose intolerance (p=0.018; p<0.05).

		Consumption amount (Month)	Total Kcal (Month)	Total Calcium (Month)	Total Lactose (Month)
Whole-fat milk (ml) (n=147)	*Min-Max* *(Median)* *Mean ± Sd*	200-12000 (1600) 2170.07 ± 2147.10	113.8-6828 (910.4) 1234.77 ± 1221.7	240-14400 (1920) 2604.08 ± 2576.53	9.5-570 (76) 103.08 ± 101.99
Semi-skimmed milk (ml) (n=136)	*Min-Max* *(Median)* *Mean ± Sd*	200-16000 (1600) 2252.94 ± 2551.54	87-6960 (696) 980.03 ± 1109.92	240-19200 (1920) 2703.53 ± 3061.85	9.8-784 (78.4) 110.39 ± 125.03
Skimmed milk (ml) (n=54)	*Min-Max* *(Median)* *Mean ± Sd*	200-4800 (400) 1066.67 ± 1231.04	59.8-1435.2 (119.6) 318.93 ± 368.08	240-5760 (480) 1280 ± 1477.25	10-240 (20) 53.33 ± 61.55
Buttermilk drink (ml) (n=194)	*Min-Max* *(Median)* *Mean ± Sd*	200-24000 (1600) 3281.44 ± 3575.36	91.4-10968 (731.2) 1499.62 ± 1633.94	162.8-19536 (1302.4) 2671.09 ± 2910.34	5.6-672 (44.8) 91.88 ± 100.11
Yogurt (gr) (n=187)	*Min-Max* *(Median)* *Mean ± Sd*	120-18000 (1920) 2622.67 ± 2253.82	83.2-12480 (1331.2) 1818.39 ± 1562.65	158.4-23760 (2534.4) 3461.93 ± 2975.05	5.2-780 (83.2) 113.65 ± 97.67
Strained yogurt (gr) (n=148)	*Min-Max* *(Median)* *Mean ± Sd*	120-18000 (960) 1476.49 ± 2340.10	100-15000 (800) 1230.41 ± 1950.08	192-28800 (1536) 2362.38 ± 3744.15	2.8-420 (22.4) 34.45 ± 54.6
Probiotic yogurt (gr) (n=49)	*Min-Max* *(Median)* *Mean ± Sd*	120-7200 (240) 1192.65 ± 1725.35	80-4800 (1609) 795.10 ± 1150.23	160-9648 (321) 1598.15 ± 2311.97	5.2-312 (10.4) 51.68 ± 74.76
Fruit yogurt (tablespoon) (n=133)	*Min-Max* *(Median)* *Mean ± Sd*	120-10800 (240) 737.14 ± 1313.88	124.8-11232 (249.6) 766.63 ± 1366.44	152.4-13716 (304.8) 936.17 ± 1668.63	3.6-324 (7.2) 22.11 ± 39.42

Kephir (ml) (n=50)	*Min-Max*	200-6000	154.3-4626	288-8640	8.6-258
	(Median)	(200)	(154.3)	(288)	(8.6)
	Mean ± Sd	1008.00 ± 1519.91	777.7 ± 1172.6	1451.5 ± 2188.7	43.34 ± 65.35
White cheese (gr) (n=186)	*Min-Max*	30-4500	92.6-13890	126.6-18990	0.7-105
	(Median)	(900)	(2778)	(3798)	(21)
	Mean ± Sd	1232.26 ± 821.04	3803.57 ± 2534.28	5200.13 ± 3464.8	28.75 ± 19.16
Kashar cheese (gr) (n=181)	*Min-Max*	30-3600	127.6-15312	180-21600	0-0 (0)
	(Median)	(480)	(2041.6)	(2880)	0 ± 0
	Mean ± Sd	723.98 ± 728.91	3079.32 ± 3100.28	4343.87 ± 4373.44	
Quark cheese (gr) (n=108)	*Min-Max*	30-4500	25.5-3825	9.6-1440	0-0
	(Median)	(120)	(102)	(38.4)	(0)
	Mean ± Sd	361.67 ± 594.24	307.42 ± 505.1	115.73 ± 190.16	0 ± 0
Butter (gr) (n=163)	*Min-Max*	15-1800	113-13560	2.3-276	0.1-12
	(Median)	(240)	(1808)	(36.8)	(1.6)
	Mean ± Sd	313.07 ± 334.34	2358.44 ± 2518.7	48 ± 51.27	2.09 ± 2.23

Table 1: Distribution regarding the consumption amounts of food.

		Lactose Intolerance		Test Value
		No (n=124)	Yes (n=76)	*p*
Age	≤20 years old	63 (61.8)	39 (38.2)	χ^2:0.005
	>20 years old	61 (62.2)	37 (37.8)	[b]*0.944*
BMI	*Min-Max (Median)*	14.9-38.9 (20.7)	15.6-29.4 (20.5)	Z:-0.485
	Mean ± Sd	21.34 ± 3.76	20.85 ± 2.82	[c]*0.628*
Chronic Disease	Yes	21 (46.7)	24 (53.3)	χ^2:5.794
	None	103 (66.5)	52 (33.5)	[b]*0.016**

[b]Pearson Chi-Square Test ; [c]Mann Whitney U Test; [*]$p<0.05$

Table 2: Assessment of the presence of lactose intolerance according to demographic characteristics.

Changes in the body after drinking milk		Lactose Intolerance		
		None	Yes	Test Value
		n (%)	n (%)	*p*
Stomach pain	**None**	107 (88.4)	46 (61.3)	χ^2:24,037
	Low	12 (9.9)	15 (20.0)	*a0.001***
	Moderate	1 (0.8)	10 (13.3)	
	High	1 (0.8)	3 (4.0)	
	Excessive	0 (0.0)	1 (1.3)	
Diarrhea	**None**	116 (95.9)	62 (82.7)	χ^2:10.143
	Low	3 (2.5)	7 (9.3)	*a0.009***
	Moderate	1 (0.8)	5 (6.7)	
	High	1 (0.8)	1 (1.3)	
Gas	**None**	88 (72.7)	24 (32.0)	χ^2:41.632
	Low	24 (19.8)	20 (26.7)	*b0.001***
	Moderate	6 (5.0)	14 (18.7)	
	High	3 (2.5)	15 (20.0)	
	Excessive	0 (0.0)	2 (2.7)	
Bloatedness	**None**	78 (64.5)	27 (36.0)	χ^2:31.161
	Low	30 (24.8)	19 (25.3)	*b0.001***
	Moderate	11 (9.1)	11 (14.7)	
	High	2 (1.7)	14 (18.7)	
	Excessive	0 (0.0)	4 (5.3)	
Abdominal cramp	**None**	116 (95.9)	53 (70.7)	χ^2:24,155
	Low	3 (2.5)	9 (12.0)	*a0.001***
	Moderate	1 (0.8)	7 (9.3)	
	High	0 (0.0)	3 (4.0)	
	Excessive	1 (0.8)	3 (4.0)	

Vomiting	None	116 (95.9)	66 (88.0)	χ^2:5.176
	Low	3 (2.5)	4 (5.3)	*a0.221*
	Moderate	1 (0.8)	2 (2.7)	
	High	0 (0.0)	1 (1.3)	
	Excessive	1 (0.8)	2 (2.7)	
Nausea	None	103 (85.1)	54 (72.0)	χ^2:10.685
	Low	13 (10.7)	7 (9.3)	*a0.021**
	Moderate	2 (1.7)	5 (6.7)	
	High	1 (0.8)	4 (5.3)	
	Excessive	2 (1.7)	5 (6.7)	

[a]Fisher Freeman Halton Test; [b]Pearson Chi-Square Test; [*]$p<0.05$; [**]$p<0.01$

Table 3: Assessments according to Lactose Intolerance.

Calories (kcal)		Lactose Intolerance		Test Value
		None	**Yes**	***p***
Whole-fat milk	*n*	92	55	Z:-0.771
	Min-Max (Median)	113.8-5462.4 (910.4)	113.8-6828 (910.4)	*c0.441*
	Mean ± Sd	1131.82 ± 1038.53	1406.98 ± 1472.96	
Semi-skimmed milk	*n*	87	49	Z:-1.067
	Min-Max (Median)	87-6960 (696)	87-5220 (696)	*c0.286*
	Mean ± Sd	883 ± 1013.42	1152.31 ± 1255.93	
Skimmed milk	*n*	30	24	Z:-0.570
	Min-Max (Median)	59.8-1435.2 (119.6)	59.8-1435.2 (89.7)	*c0.596*
	Mean ± Sd	334.88 ± 375.46	299 ± 365.67	
Buttermilk drink	*n*	121	73	Z:-2.243
	Min-Max (Median)	91.4-10968 (1462.4)	91.4-5484 (731.2)	*c0.025**
	Mean ± Sd	1703.36 ± 1840.83	1161.91 ± 1150.34	

Yogurt	*n*	116	71	Z:-0.432
	Min-Max (Median)	166.4-9984 (1331.2)	83.2-12480 (1331.2)	*ᶜ0.665*
	Mean ± Sd	1843.31 ± 1470.61	1777.67 ± 1712.51	
Strained yogurt	*n*	87	61	Z:-0.481
	Min-Max (Median)	100-15000 (800)	100-15000 (800)	*ᶜ0.631*
	Mean ± Sd	1189.66 ± 1835.31	1288.52 ± 2117.32	
Fruit yogurt	*n*	84	49	Z:-0.930
	Min-Max (Median)	124.8-5990.4 (124.8)	124.8-11232 (249.6)	*ᶜ0.352*
	Mean ± Sd	753.26 ± 1171.12	789.55 ± 1661.99	
White cheese	*n*	118	68	Z:-2.364
	Min-Max (Median)	92.6-13890 (2963.2)	185.2-11112 (2778)	*ᶜ0.018**
	Mean ± Sd	4102.65 ± 2580.94	3284.58 ± 2381.33	
Kashar cheese	*n*	112	69	Z:-1.530
	Min-Max (Median)	127.6-12249.6 (2041.6)	127.6-15312 (1020.8)	*ᶜ0.126*
	Mean ± Sd	3382.54 ± 3287.26	2587.14 ± 2721.44	
Quark cheese	*n*	68	40	Z:-0.865
	Min-Max (Median)	25.5-3825 (76.5)	25.5-1224 (153)	*ᶜ0.387*
	Mean ± Sd	319.88 ± 584.76	286.24 ± 334.35	
Butter	*n*	101	62	Z:-0.848
	Min-Max (Median)	113-10170 (1808)	113-13560 (1356)	*ᶜ0.396*
	Mean ± Sd	2430.06 ± 2427.93	2241.77 ± 2676.12	

ᶜMann Whitney U Test; *p<0.05

Table 4: Assessment of Monthly Calories Taken From Milk and Dairy Products According to the presence of Lactose Intolerance.

Lactose		**Lactose Intolerance**		**Test Value**
		None	**Yes**	*p*
Whole-fat milk	*n*	92	55	Z:-0.771

	Min-Max (Median)	9.5-456 (76)	9.5-570 (76)	*ᶜ0.441*
	Mean ± Sd	94.48 ± 86.7	117.45 ± 122.96	
Semi-skimmed milk	*n*	87	49	Z:-1.067
	Min-Max (Median)	9.8-784 (78.4)	9.8-588 (78.4)	*ᶜ0.286*
	Mean ± Sd	99.46 ± 114.15	129.8 ± 141.47	
Skimmed milk	*n*	30	24	Z:-0.570
	Min-Max (Median)	10-240 (20)	10-240 (15)	*ᶜ0.569*
	Mean ± Sd	56 ± 62.79	50 ± 61.15	
Buttermilk drink	*n*	121	73	Z:-2.243
	Min-Max (Median)	5.6-672 (89.6)	5.6-336 (44.8)	*ᶜ0.025**
	Mean ± Sd	104.36 ± 112.79	71.19 ± 70.48	
Yogurt	*n*	116	71	Z:-0.432
	Min-Max (Median)	10.4-624 (83.2)	5.2-780 (83.2)	*ᶜ0.665*
	Mean ± Sd	115.21 ± 91.91	111.1 ± 107.03	
Strained yogurt	*n*	87	61	Z:-0.481
	Min-Max (Median)	2.8-420 (22.4)	2.8-420 (22.4)	*ᶜ0.631*
	Mean ± Sd	33.31 ± 51.39	36.08 ± 59.28	
Fruit yogurt	*n*	84	49	Z:-0.930
	Min-Max (Median)	3.6-172.8 (3.6)	3.6-324 (7.2)	*ᶜ0.352*
	Mean ± Sd	21.73 ± 33.78	22.78 ± 47.94	
White cheese	*n*	118	68	Z:-2.364
	Min-Max (Median)	0.7-105 (22.4)	1.4-84 (21)	*ᶜ0.018**
	Mean ± Sd	31.01 ± 19.51	24.83 ± 18	
Butter	*n*	101	62	Z:-0.848
	Min-Max (Median)	0.1-9 (1.6)	0.1-12 (1.2)	*ᶜ0.396*
	Mean ± Sd	2.15 ± 2.15	1.98 ± 2.37	

ᶜMann Whitney U Test; *p<0.05

Table 5: Assessment of Monthly Lactose Amounts Taken From Milk and Dairy Products According to the presence of Lactose Intolerance.

4. Discussion and Conclusion

In the study, the most preferred dairy products were white cheese and yogurt. Among the students participated in the study, 49.5% stated that they regularly consumed cheese every day. Also, 23.5% consumed yogurt every day regularly. According to TNHS-2010 data (Turkey Nutrition and Health Survey), 55.1% of people aged 20 and over consume yogurt, buttermilk drink, and kephir every day. Cheese is consumed every day with a rate of 76%. In TNHS-2010 data, the most consumed dairy product is found to be cheese [17]. Students stated that they consumed kephir at a ratio of 15% and probiotic yogurt at a ratio of 10% as less than once a month. In the study conducted at Selcuk University for the milk and dairy products consumption habits of the students, it was found that the students consumed kephir (75%) and probiotic dairy products (67.8%) among the fermented dairy products at the least [18]. When the distributions related to lactose intolerance are considered, no symptom was found in 54.5% of 109 people. The most common complaint is bloatedness with 25% and gas with 20.5%.

The presence of lactose intolerance symptoms depends on many factors. These factors are influenced by the colonic processes of lactose, such as small intestine lactase activity, passage rate, and the fermentation of lactose via the colonic microbiota. Therefore, it is thought that the modulation of the metabolism or composition of the colonic microbiota may affect lactose intolerance. Prebiotic, probiotic, and symbiotic food supplements can be used to regulate the colonic microbiota [19]. In a study conducted with 11 Chinese lactose-intolerant participants supplemented with yogurt enriched with *Bifidobacterium animalis* and *Bifidobacterium animalis* capsules for two weeks, it was showed that the symptoms of lactose-intolerant subjects were alleviated by regulating the metabolic activities of the colonic microbiota [19]. In another study, it was found that probiotic (especially *Bifidobacteria*) and yogurt supplementation may have an effect on colonic bacteria and decrease the symptoms of lactose intolerance [20].

In the study, when milk and dairy products are compared according to the complaints, it can be seen that fermented milk products cause less discomfort than milk. Fermented dairy products are used as a strategy to overcome lactose intolerance [21]. Fermented milk products can be considered in the diets of people with lactose intolerance. In a study conducted with 8 lactose-intolerant individuals, 500 ml of low-fat milk consumption caused complaints such as abdominal stress and diarrhea. No symptoms were observed after consuming the same amount of yogurt or milk with acidophilus (cultured with *Lactobacillus acidopbilus*) [22]. In the study conducted by Yücemen, lactose intolerance was found to be developed in 57.7% of 322 people after milk consumption, in 20.8% after milk pudding consumption, in 17.9% after yogurt consumption, and 3.4% after cheese consumption. Similarly, it was found that the complaints were at maximum level in milk consumption, and complaints decreased after the consumption of fermented milk products [23].

Generally, low calcium intake occurs among the people considering to be lactose-intolerant (self-reported lactose-intolerant people) [24]. In a study, participants, who thought that they had lactose intolerance, were found to be significantly statistically lower (p<0.05) than those who thought that they did not have any lactose intolerance [25]. Participants who thought they had lactose intolerance consumed less (p<0.05) milk, yogurt, dry soup, milk pudding, cheese, quark cheese, and ice cream. People who think they usually have lactose intolerance tend to eliminate milk and dairy products from their diet [25]. Participants who think

they have lactose intolerance consume less cheese, although most hard cheese contains negligible amounts of lactose [24]. In the present study, the calorie, calcium, and lactose levels of the patients with lactose intolerance were found to be statistically significantly lower than those without lactose intolerance. According to the result, it can be considered that the individuals suffering from lactose intolerance have consumed less cheese than those without lactose intolerance. Likewise, the calorie, calcium, and lactose levels of the patients with lactose intolerance were statistically significantly lower than those without lactose intolerance. Since fermented milk products are darker than milk, they can be digested better because their passage through the gastrointestinal tract is slower [26]. Similarly, in the present study, when the monthly consumptions are considered, it is found that the cheese consumption of the participants is lower than those without lactose intolerance.

In a recent review, based on available evidence, dietary lactose or lactase deficiency did not have a significant effect on calcium absorption in adult humans. However, lactose intolerance is thought to cause low bone density and bone fractures, especially in children, since the consumption of milk and dairy products is avoided [27]. In a study including 76 participants between the ages of 5 and 12 years, hydrogen breathing test was applied and they were divided into two groups as those with lactose malabsorption (n=47) and those who can absorb lactose. There was no difference between the two groups in terms of total calcium, milk calcium, milk, cheese, yogurt, ice cream, and calcium density in the diet. In addition, there was no difference in bone mineral content and bone mineral density of the lumbar spine. Bone mineral content, density, and calcium intake were not associated with lactose malabsorption [28].

When the cases are divided into two groups, including 20 years old and under 20 years old, and older than 20 years old individuals, the distribution of the severity of complaints such as stomach pain, diarrhea, gas, bloatedness, abdominal cramps, vomiting, and nausea were not found statistically significant in terms of age groups. According to age groups, diarrhea (p=0.084) and nausea (p=0.067) complaints were found close to their significance value. If the study was made to a larger sample group, these complaints were thought to be significant. In the study of Yücemen, when the distribution of complaints about milk consumption by age is examined, it is found that the said complaints occur between the ages of 21 and 25 years old with a ratio of 54.3%. This value is followed by the 26-30 age group with a ratio of 14.6% [23]. When we look at the number of individuals in the age group distributions of the people participating in the study that is conducted by Yücemen, it can be seen that 52.9% were between 21-25 years old, 14.2% were under 20 years old, and 12.9% were between 26-30 years old. In the study carried out by Yücemen, it can be considered that the reason for the excessive results in the 21-25 age group is related to milk consumption and the unequal distribution among the age groups.

In a recently conducted study, although the distribution of lactase deficiency in Turkey was about 70%, it was reported that there is an exact need for further detailed studies using the diagnostic method for determination of lactose intolerance distribution in Turkey [29]. In this study, the participants reported more severe symptoms after the consumption of fermented milk products such as yogurt, kephir and cheese after milk consumption. Therefore, the individuals, who feel gastrointestinal symptoms after milk consumption, can be directed to fermented milk products. It is very important to identify people with symptoms of lactose intolerance and take the precautions accordingly in order to maintain a

healthy and quality life. Population should be informed about this issue.

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