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How Healthy are Commercial Cream and Butter-Creams? Assessment According to their Fatty Acid Composition, Cholesterol Contents, Atherogenic and Thrombogenic Indices

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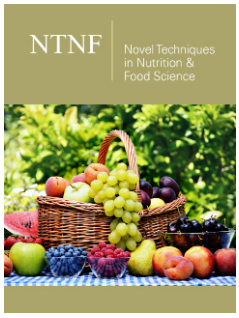

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Abstract

In this study, cream and butter-cream samples from dairy markets were analyzed for their fatty acid compositions and cholesterol concentrations. Their fat contents were also identified to characterize the nutritional quality. The Saturated Fatty Acids (SFA) contents of cream samples were higher when compared to butter-cream models. The average Polyunsaturated Fatty Acids (PUFA) and cholesterol contents of butter-cream samples are relatively higher than the average PUFA and cholesterol contents of cream samples. Atherogenic and thrombogenic indices of samples were calculated to account for the various impacts that specific fatty acids may have on human health.

Keywords: Atherogenicity index; Butter-cream; Cholesterol; Cream; Fatty acid composition; Thrombogenic index

Abbreviations: SFA: Saturated Fatty Acids; PUFA: Polyunsaturated Fatty Acids; UFA: Unsaturated Fatty Acids; CLA: Conjugated Linoleic Acids; CHD: Coronary Heart Disease

Introduction

Milk and other dairy products are important to many cultures' diets. The origin of the milks from which they are manufactured has a significant impact on the amount of fat and cholesterol they contain. For the benefit of consumers and the dairy sector, accurate results on the amounts of fat and cholesterol in commonly consumed products is essential [1]. According to the Turkish Food Codex, butter-cream (kaymak) is defined as "a cream having at least 60% milk fat in its composition and no additives used during manufacturing". Also, cream is defined as "an emulsion containing at least 18% of milk fat obtained by physical separation from milk" [2]. Buttermilk is widely consumed with honey or milk, or individually by pouring some sugar on it. In Turkey, butter-cream is generally used in manufacturing of confectionary like Turkish delight. The cream is consumed by adding to meals a flavoring. It is known that calorie value of butter-cream and cream is less than butter because the amount of milk fat in butter is approximately 82%. Besides, SFA amount of butter is higher than butter-cream. So, cholesterol amount of butter is higher than butter-cream. When these points are considered, it can be concluded that butter-cream is healthier than butter in terms of consumer health. Butter-cream is also rich in calcium [3]. It can be prepared from sheep, goat, or cow milk, but in Turkey, high-quality butter-creams are often made from cow or buffalo milk. Since buffalo milk is whiter than the others, this milk is preferred for manufacturing butter-cream. Also, the fat and dry matter amount in this milk is higher than in other types of milk. Butter-cream is obtained by the concentration of milk fat or cream. Depending on the feeding regimen, season, breed, and stage of lactation, milk fat naturally includes UFA in the range of 25-35% [4]. Rapeseed, sunflower, and linseeds, as well as pure oils such soybean, linseed, and fish oils, can be added to the animal's diet to enrich the UFA in milk fat [5-7]. Since Conjugated Linoleic

Acids (CLA) are thought to have positive effects on human health, recent research has emphasized boosting the quantity of UFA and CLA in milk and dairy products [4,7-9]. Due to the significant amount of SFA in milk fat and the fact that they have been linked to several diseases such atherosclerosis, dairy products are always a source of concern [10]. On the other hand, because of the CLA present as an important component in milk fat, dairy products are advised to be consumed in the human diet. According to several researchers, dairy products are either hypocholesterolemia or have no impact [11]. Furthermore, increased plasma cholesterol is not a risk factor for Coronary Heart Disease (CHD) in many individuals. Environmental factors are significantly more important than blood cholesterol levels [12]. For a very long time, it was believed that diets high in cholesterol and SFA and low in PUFA resulted in high blood cholesterol levels, which subsequently caused the formation of atheroma and CHD in humans [13]. As a result, bovine milk and dairy products have received a negative reputation. SFA containing 12 to 16 carbon atoms appear to increase total-, Low-Density Lipoprotein (LDL), and High-Density Lipoprotein (HDL) cholesterol concentrations in the blood, as well as the LDL: HDL ratio [14]. LDL cholesterol is damaging to the heart, but HDL cholesterol is good and helps protect against CHD. National health authorities' dietary guidelines have had a significant impact on food production and consumption. The following summarizes the involvement of fatty acids in the genesis of CHD: Although lauric acid (C12:0), myristic acid (C14:0), and palmitic acid (C16:0) are recognized atherogenic agents, stearic acid (C18:0) has no impact on serum cholesterol and short-chain (C7:0-C11:0) SFA have no effect on blood cholesterol concentrations [15]. Ulbright & Southgate [16] offer Atherogenic (AI) and Thrombogenic (TI) indices, proving that C12:0, C14:0, and C16:0 is atherogenic while C14:0, C16:0, and C18:0 is thrombogenic [16]. From these perspectives, the purpose of this study was to assess the fatty acid profile and cholesterol levels, as well as the corresponding health lipid indices, of cream and butter-cream samples under various trademarks to contribute information on their nutritional quality.

Materials and Methods

Materials

Six creams and thirteen butter-creams (kaymak) samples sold under different trademarks were purchased from local markets in Manisa, Turkey. Cream samples were kept at -18 ˚C until being analyzed. Analyses were repeated two times. Samples were collected from the same markets twice. The results of the analysis were evaluated by using SAS statistical analysis program [17].

Methods

Fat contents of the samples: 5g of cream were measured into a glass stopper beaker and transferred to a butyrometer. Sulphuric acid (d:1.522g/ml) was gently poured through the butyrometer's top entrance. The butyrometer was then immersed in a 70 °C water bath and repeatedly agitated until the protein was dissolved. To go back to the initial scale, sulfuric acid was added again, along with 1cc of amyl alcohol. The butyrometer was sealed and shook before being placed in a 70 °C water bath for 5 minutes. The mixture was then centrifuged for 5 minutes and tempered in a 65 °C water bath. Following that, a reading was conducted, and the fat content of the samples are determined [18].

Lipid extraction and preparation of fatty acid methyl esters: Renner's method of extracting lipids with purified kieselguhr and diethyl ether was used [19]. 20g of material is pulverized with 6-8g of kieselguhr before being combined with 50cc of diethyl ether. The liquid was mixed for 1 minute before being strained. The filtered solution was concentrated to a final volume of roughly 1-3ml using a rotary evaporator (Heidolph, Germany) at 45 °C, flushed with nitrogen until dry, and kept at -75 °C for further analysis. The AOCS method was used to synthesize fatty acid methyl esters [18]. A 200mg of sample was weighed into a glass centrifuge vial with a stoppered bottom. 2ml hexane was added, then 0.1ml 2 N methanolic KOH. The bottle was then closed and shook vigorously for 30 seconds before being centrifuged. Two drops of the top layer were taken and diluted in two milliliters of hexane. Split injection was used to inject the material into the capillary column GC analysis.

Determination of fatty acid composition by gas chromatography: The following was the apparatus utilized for the analyses: A flame ionization detector and an HP DB-23 fused silica capillary column (60m 0.25mm i.d., 0.25mm film thickness; Supelco Inc., Bellefonte, PA, USA) are included in the Agilent Technologies GC (model 6890 N). 1L was the injection volume. The carrier gas, nitrogen, had a flow rate of 1mL/min. The oven's temperature was programmed to start at 100 °C and rise to 220 °C at a rate of 4 °C/min. Temperatures of 300 °C were used for the injector and detector. A split ratio of 1:100 was used.

From the data on the fatty acid composition, the Atherogenicity (AI) and Thrombogenic (TI) indices were calculated according to the formulas given below [16].

$$AI=[(4xC14:0)+C16:0+C18:0]/[\Sigma MUFA+(\Sigma PUFA\text{-}n6)+(\Sigma PUFA\text{-}n3)]$$

$$TI=(C14:0+C16:0+C18:0)/(0.5x\Sigma MUFA)+(0.5x\Sigma PUFA\text{-}n6)+(3x\Sigma PUFA\text{-}n3)+(\Sigma PUFA\text{-}n3/\Sigma PUFA\text{-}n6)$$

Determination of cholesterol: The procedure given by Fletouris et al. [20] was used to measure cholesterol levels [20]. To prepare stock solution (2mg/ml), hexane was used to dissolve 20mg of the reference standard (Sigma Chemical Company, St. Louis, MO, USA) in a 10mL volumetric flask. Aliquots from the stock solution were properly diluted with hexane to create working solutions with concentrations between 10-80g/mL [21]. The following GC conditions were utilized for the analyses: Flame ionization detector and ZB-1 silica capillary column (30m 0.25mm i.d., 0.1m film thickness; Phenomenex) are features of the Agilent Technologies GC (model 6890 N). The oven was preheated to 285 °C. The temperatures of the injector and detector were 300 °C. Nitrogen flow rates were 2ml/min, hydrogen flow rates were 30ml/min, and air flow rates were 300ml/min. The split ratio for the 2µl injection was 20:1. According to the formula C=MxVx2.5, the

concentration of cholesterol (C) in the samples was determined. M is the estimated mass (nano-grams) of the analyte in the injected extract (1µl), and V is the dilution factor, if any, that was used.

Results and Discussion

Average fat contents of cream and butter-cream samples were given in (Table 1). According to the results obtained, the average fat content of cream samples was 35.8% (34.7%-38.1%), whereas this value was 65.1% (63.2%-66.7%) for butter-cream samples. Kolaric & Simko [22] estimated the fat content of Slovakian cream and butter-cream samples between 30% and 82% [22]. The total amounts of SFA, MUFA and PUFA in creams and butter-creams. As seen in the Table, the average SFA content of cream samples were 71.4%, whereas the highest and lowest SFA contents were calculated as 73.7% and 67.4% respectively. Butter-cream had an average SFA level of 67.96.7%. The SFA contents of butter-cream samples ranged from 52.6% to 75.7%. It was found that cream samples had greater total SFA contents than butter-cream samples ($P<0.05$). Total MUFA contents of cream samples were between 20.2%-29.3%, whereas the average MUFA content of cream samples were calculated as 25.6±3.5%. On the other hand, the average MUFA content of butter-cream samples were 26.6% ranging between 18%-37.4%. It was observed that there were no significant differences among the MUFA contents of cream and butter-cream samples ($P>0.05$). The average total PUFA content of cream and butter-cream samples were 3.60.6% and 8.06.6%, respectively, as shown in (Table 1). The PUFA content of butter-cream samples was found to be significantly greater than that of cream samples ($P<0.05$). PUFA contents of butter-cream samples were between 3.1%-26%, whereas these values were 2.9%-4.5% for cream samples. Unsaturated fatty acid compositions of both cream and butter-cream samples were given in (Table 2). According to the results, the major unsaturated fatty acid found in cream samples was oleic acid (C18:1). The average amount of cis-oleic acid found in cream samples was 23.13% and ranging between 17.44%-26.95%. Elaidic acid (C18:1, trans 9) was not detected in any cream sample. Seçkin et al. [10] achieved comparable findings [10]. They stated that they did not identify elaidic acid (C18:1, trans 9) in cream samples, and that the predominant unsaturated fatty acid in the same research was oleic acid (C18:1), with quantities ranging from 23.12% to 23.44%. Cis-linoleic acid (C18:2, cis 9,12) contents of cream samples were changed between 0.57% and 3.22%, and the average cis-linoleic acid content was 2.21%.

Table 1: Fat, Cholesterol contents, Total SFA, MUFA and PUFA amounts, atherogenic and thrombogenic indices of cream and butter-cream samples (Mean±SD).

	Samples	Fat (%)	Cholesterol (mg/100g)	SFA (%)	MUFA (%)	PUFA (%)	Atherogenic Index	Thrombogenic Index
Cream	1	38.1	33.5	73.7	23.8	2.9	3.39	4.55
	2	35.3	31	71.9	24.7	3.3	3.17	4.08
	3	36.3	29.5	67.4	29.3	3.3	2.68	3.18
	4	35.2	30.5	71.6	26.2	3.6	3.02	3.78
	5	34.7	34	66.9	29.2	4.0	2.55	3.13
	6	34.9	32	76.7	20.2	4.5	4.00	4.78
	Average	35.8±1.3	31.8±1.8	71.4±3.7	25.6±3.5	3.6±0.6	3.09±0.53	3.84±0.69
Butter-cream	1	63.2	31.5	66.1	30.2	3.7	2.5	3.07
	2	64.8	42.5	69.9	27.5	4	2.83	3.4
	3	66.7	34.5	64.7	32.5	4	2.29	2.77
	4	65.1	42	73.9	22.4	4.9	3.46	4.21
	5	64.8	45	71	25.7	3.3	3.06	4.02
	6	66.0	31.5	70.1	25.6	4.5	2.98	3.76
	7	65.4	27	62.1	24	10.8	2.05	3.22
	8	63.9	33.5	61	20.2	26	1.52	2.34
	9	64.7	27.5	52.6	37.4	10.9	1.34	1.85
	10	65.1	35.5	75.4	20.8	3.7	4.01	4.55
	11	65.3	30	54.5	39.1	12.8	1.13	1.84
	12	64.8	49	66.3	23	12.3	1.99	3.47
	13	66.2	37.5	75.7	18	3.1	4.41	6.09
	Average	65.1±0.9	35.9±6.9	66.4±7.4	26.6±6.5	8±6.6	2.35±1.0	3.17±1.16
	General Average	50.5±20.7	33.9±2.9	67.9±6.7	26.3±5.6	6.6±5.7	2.72±0.52	3.51±0.47

Table 2: Monounsaturated and Polyunsaturated fatty acids composition of creams and butter-cream(Mean±SD%).

	Sample Code	C14:1	C15:1	C16:1	C17:1	C18:1n9c	C18:1n9t	C18:2n6c	C18:2n6t	C18:3n6	C18:3n3	C20:1	C20:2
Cream	1	0.90	0.30	0.49	0.49	21.49	nd	2.03	0.4	0.26	0.13	0.16	0.09
	2	1.00	0.30	0.50	0.29	22.45	nd	2.42	0.39	0.22	0.23	0.17	0.08
	3	1.16	0.38	0.60	0.33	26.61	nd	2.37	0.42	0.20	0.27	0.20	0.07
	4	1.01	0.32	0.54	0.27	23.86	nd	2.63	0.49	0.22	0.23	0.16	0.08
	5	0.95	0.31	0.50	0.27	26.95	nd	0.57	2.79	0.23	0.30	0.20	0.08
	6	1.12	0.41	0.65	0.37	17.44	nd	3.22	0.73	0.28	0.20	0.22	0.08
	Average	1.02±0.1	0.34±0.05	0.55±0.07	0.34±0.08	23.13±3.54	nd	2.21±0.89	0.87±0.95	0.24±0.03	0.23±0.06	0.19±0.03	0.08±0.01
Butter-cream	1	0.97	0.37	0.58	0.30	27.82	nd	2.76	0.56	0.18	0.12	0.2	0.07
	2	1.03	0.4	0.66	0.35	24.87	nd	2.88	0.59	0.23	0.27	0.21	0.08
	3	0.94	0.35	0.55	0.31	30.13	nd	2.83	0.68	0.21	0.22	0.20	0.07
	4	1.12	0.40	0.69	0.36	19.6	nd	3.67	0.72	0.27	0.16	0.24	0.09
	5	0.90	0.30	0.51	0.24	23.57	nd	2.44	0.45	0.23	0.11	0.17	0.08
	6	1.04	0.33	0.71	0.44	22.86	nd	3.32	0.82	0.18	0.12	0.18	0.07
	7	0.37	0.10	0.23	0.11	23.13	nd	9.77	0.31	0.53	0.04	0.07	0.16
	8	0.4	0.13	0.27	0.15	19.13	nd	8.36	17.00	0.5	0.03	0.11	0.11
	9	0.51	0.17	0.35	0.20	35.83	nd	10.11	0.12	0.49	0.08	0.31	0.07
	10	1.17	0.4	0.68	0.41	17.95	nd	2.65	0.39	0.22	0.41	0.2	0.07
	11	0.23	0.1	0.17	0.14	38.35	nd	11.9	0.25	0.42	0.03	0.08	0.16
	12	0.17	0.07	0.13	0.10	22.52	nd	9.87	1.44	0.74	0.03	0.05	0.26
	13	0.81	0.37	0.58	0.28	15.76	nd	2.3	0.37	0.31	0.04	0.20	0.11
	Average	0.74±0.36	0.27±0.13	0.47±0.21	0.26±0.11	24.73±6.73	nd	5.6±3.71	1.82±4.57	0.35±0.17	0.13±0.11	0.17±0.07	0.11±0.06
	General Average	0.83±0.32	0.29±0.12	0.49±0.18	0.28±0.11	24.23±5.86	nd	4.53±3.47	1.52±3.79	0.31±0.15	0.16±0.11	0.18±0.06	0.10±0.05

Seçkin et al. [10] examined that the cis-linoleic acid contents of two cream samples were 2.43% and 1.95% [10]. Our results are similar to these findings. For all cream samples, trans-linoleic (C18:2, trans 9,12) acid was detected at amounts changing between 0.39% and 2.79%, whereas they could not detect this fatty acid in any of their cream samples [10]. For butter-cream samples, the major unsaturated fatty acid was oleic acid (C18:1) too. Oleic acid contents of 13 different butter-cream samples were between 15.76% and 38.35% and the average value was 24.73%. Elaidic acid was not detected in any butter-cream sample. Seçkin et al. [10] revealed that oleic acid (C18:1) contents of 4 different butter-cream samples were 25.10%, 25.33%, 25.63%, and 25.80%, whereas similarly, they could not detect trans-oleic acid in any butter-cream samples [10]. According to statistical analysis, the palmitoleic acid content of cream samples was higher than that of butter-cream samples; nevertheless, the trans and cis linoleic acid contents of butter-cream samples were higher than the trans and cis linoleic acid contents of cream samples ($P<0.05$). The average oleic acid concentration of cream and butter-cream samples was not significantly different ($P>0.05$). Palmitic acid (C16:0), stearic acid (C18:0), and myristic acid (C14:0) were the saturated fatty acids found in the highest concentrations in the dairy products studied. Palmitic acid is a significant saturated fatty acid that elevates blood cholesterol but not stearic acid [21]. In all samples, palmitic acid had the greatest quantity of saturated fatty acid. Palmitic acid levels were often greater in butter and processed cheeses. Saturated fatty acids of cream and butter-cream samples were given in (Table 3). As seen in the Table, palmitic acid (C16:0) was the most abundant SFA in both the cream and butter-cream samples. The palmitic acid level of six distinct cream samples ranged between 31.43% and 38.61%, with an average palmitic acid value of 35.29%. Cream samples had average stearic (C18:0), myristic (C14:0), lauric (C12:0), and butyric (C4:0) acid levels of 12.61%, 10.55%, 2.94%, and 2.53%, respectively. Seçkin et al. [10] found palmitic, stearic, myristic, lauric, and butyric acid contents of two cream samples as 29.31-31.33%, 11.93-10.52%, 10.25-10.68%, 2.94-3.04% and 8.24-7.38%, respectively [10]. The amounts of all fatty acids other than butyric acid were like our findings. The average of SFA, in a study by Pasdar et al. [23] on butters was higher (75.8%) than our samples [23]. Palmitic, stearic, myristic, lauric, and butyric acids levels averaged 32.95%, 14.5%, 8.46%, 2.48%, and 2.02% in 13 various butter-cream samples, respectively. In another study, Seçkin et al. [10] also performed these fatty acids on butter samples and found 27.96%, 11.55%, 9.75%, 2.6% and 8.36%, respectively [10]. According to statistical analysis, the average butyric acid content of cream samples was greater than the butyric acid level of butter-cream samples ($P<0.05$). Moreover, the average caproic acid, capric acid, myristic acid, and palmitic acid levels of cream samples were greater than those of butter-cream ($P<0.05$). On the contrary, butter-cream samples had stearic and arachidic acid contents that

were considerably greater than those of cream samples (P<0.05). (Table 1) shows the cholesterol level of cream and butter-cream samples. The average cholesterol level of cream samples was 31.81.8mg/100g, as given in Table 1. The cholesterol contents of cream samples were changed among the values of 29.5mg/100g and 34mg/100g. Piironen et al. [24] reported the average cholesterol levels of two cream samples to be 27.5mg/100g and 76.9mg/100g [24]. Differently, Seçkin et al. [10] reported that the cholesterol contents of two cream samples were 214.68mg/100g fat and 174.60mg/100g fat [10]. Our cream samples' cholesterol levels are quite low when compared to their findings. Seçkin et al. [10] also determined the cholesterol content of butter-cream (kaymak) sold under four different trademarks. According to this study, the average cholesterol contents of butter-cream samples were 172.26mg/100g fat and 250.15mg/100g fat, whereas these values were 27.0mg/100g and 49.0mg/100g sample [10]. Butter-creams from different origins varied significantly in their cholesterol content, from 148 to 369mg/100g, according to many studies [25-30]. Compared to what these authors reported, our study's measurements of butter-cream cholesterol levels were quite lower. The cholesterol content of the Slovakian cream and butter-cream samples ranged from 85.58mg/100g to 96.55mg/100g: 212.40mg/100g to 276.00mg/100g, respectively [29]. These values are rather higher than our findings. The atherogenic index denotes the relationship between the sum of the main saturates and the sum of the main unsaturated fatty acids, with the former considered pro-atherogenic (favoring the adhesion of lipids to cells of the immunological and circulatory systems) and the latter anti-atherogenic (inhibiting plaque aggregation and decreasing levels of esterified fatty acid, cholesterol, and phospholipids, thereby preventing the appearance of micro- and macro-coronary diseases), while the thrombogenic index indicates the tendency to produce clots in blood vessels [31]. This is described as the interaction between pro-thrombogenesis (saturated) and anti-thrombogenic fatty acids (MUFA, PUFA-n6 and PUFA-n3). Lower atherogenic and thrombogenic index dairy products are healthier for humans and may reduce the incidence of CHD [32]. This is because these indices report on the relationship between fatty acids in foods and their contribution to the prevention of cardiac illnesses [33]. The average atherogenic index calculated for creams was higher (3.09) than that found in butter-creams (2.35) (Table 1). The thrombogenic index exhibits the same trend. Butter-cream has a minimal risk factor for human health based on these lipid indices. Wieczorek et al. [34] found the atherogenic and thrombogenic indices in sheep milk fat as 1.39 and 1.65 [34]. In a study by Teixeira et al. [30], while AI values of creams and butter-creams were estimated as 2.54 and 2.23, TI values were identified as 2.68 and 2.46, respectively [30].

Table 3: Saturated fatty acids composition of creams and butter-cream (Mean±SD%).

	Sample Code	C4:0	C6:0	C8:0	C10:0	C11:0	C12:0	C13:0	C14:0	C15:0	C16:0	C17:0	C18:0	C20:0	C21:0	C22:0
Cream	1	2.12	1.48	0.94	2.11	0.06	2.61	0.07	9.49	1.07	38.61	0.73	14.2	0.18	0.04	0.03
	2	2.26	1.55	1.01	2.24	0.06	2.72	0.08	9.7.0	1.20	37.57	0.73	12.49	0.26	0.03	0.03
	3	2.62	1.8	1.14	2.51	0.04	3.00	0.08	11.05	1.14	32.52	0.62	10.59	0.24	0.03	0.04
	4	2.67	1.65	1.06	2.38	0.05	2.95	0.08	10.46	1.18	35.99	0.68	12.18	0.25	0.03	0.04
	5	2.59	1.72	1.07	2.34	0.04	2.87	0.07	10.10	0.99	31.43	0.56	12.81	0.26	0.03	0.04
	6	2.92	2.07	1.30	2.90	0.05	3.50	0.08	12.49	1.27	35.64	0.76	13.38	0.31	0.04	0.05
	Average	2.53 ±0.29	1.71 ±0.21	1.09 ±0.12	2.41 ±0.27	0.05 ±0.01	2.94 ±0.31	0.08 ±0.01	10.55 ±1.10	1.14 ±0.10	35.29 ±2.81	0.68 ±0.08	12.61 ±1.22	0.25 ±0.04	0.03 ±0.01	0.04 ±0.01
Butter-cream	1	2.68	1.76	1.09	2.40	0.04	2.99	0.07	10.56	1.06	31.14	0.63	11.33	0.25	0.03	0.06
	2	3.11	1.93	1.2	2.52	0.03	2.97	0.07	11.11	1.10	31.02	0.73	13.87	0.23	0.04	0.04
	3	2.46	1.75	1.08	2.36	0.03	2.77	0.06	10.42	0.97	29.83	0.65	11.96	0.26	0.03	0.05
	4	2.74	1.99	1.29	2.79	0.03	3.51	0.08	11.81	1.14	34.38	0.72	12.93	0.38	0.08	0.07
	5	2.12	1.50	0.96	2.17	0.04	2.69	0.07	9.82	1.06	35.74	0.70	13.86	0.24	0.04	0.04
	6	2.31	1.53	0.97	2.26	0.05	2.96	0.07	10.61	1.12	29.09	0.83	17.97	0.26	0.07	0.08
	7	0.77	0.59	0.48	1.02	0.02	1.70	0.03	5.08	0.56	38.04	0.45	13.10	0.23	0.02	0.04
	8	1.88	0.7	0.49	1.06	0.02	1.56	0.03	5.40	0.57	28.27	0.44	20.32	0.28	0.02	0.03
	9	1.52	0.84	0.61	1.32	0.02	1.95	0.04	6.57	0.65	22.49	0.46	15.77	0.34	0.02	0.04
	10	2.71	1.91	1.25	2.73	0.04	3.61	0.09	12.5	1.18	36.05	0.70	12.36	0.25	0.03	0.06
	11	1.03	0.42	0.39	0.73	0.01	1.78	0.02	3.60	0.32	35.14	0.27	8.82	1.82	0.02	0.13
	12	1.04	0.32	0.31	0.53	0.01	1.38	0.01	3.08	0.33	42.25	0.39	15.85	0.74	0.03	0.11
	13	1.92	1.46	0.91	1.98	0.02	2.38	0.06	9.46	1.10	34.97	0.86	20.3	0.21	0.04	0.06
	Average	2.02 ±0.72	1.28 ±0.59	0.85 ±0.33	1.84 ±0.76	0.03 ±0.01	2.48 ±0.71	0.05 ±0.02	8.46 ±3.13	0.86 ±0.31	32.95 ±4.83	0.6 ±0.17	14.5 ±3.3	0.42 ±0.42	0.04 ±0.02	0.06 ±0.03
	General Average	2.18 ±0.67	1.42 ±0.56	0.92 ±0.31	2.02 ±0.72	0.03 ±0.02	2.63 ±0.67	0.06 ±0.02	9.12 ±2.90	0.95 ±0.30	33.69 ±4.51	0.63 ±0.16	13.90 ±3.01	0.37 ±0.37	0.04 ±0.02	0.05 ±0.03

Conclusion

Dairy products such as cream and butter-cream are commonly consumed and appeal to the majority of consumers. They also contain important fatty acids, which have been demonstrated to have biological effects on human health. When the current study's findings are considered, it can be stated that cream samples contain more saturated fatty acids than butter-cream samples. The average polyunsaturated fatty acid content of butter-cream samples is quite higher than the average PUFA content of cream samples, but the cholesterol content of butter-cream samples is found higher than the cholesterol contents of cream samples.

References

1. Kovacs A, Dulicse R, Varga L, Szigeti J, Herpai Z (2004) Relatıonshıp between cholesterol and fat contents of commercial dairy products. Acta Alimentaria 33(4): 387-395.
2. (2003) Anon, Cream and buttercream rescript. General Directorate for Food and Control, Ankara, Turkey.
3. Düşünceli R (2012) Evaluation of dairy waste. 3rd Milk and Dairy Student Congress, Aksaray, Turkey.
4. Mallia S, Piccinali P, Badertscher R, Escher F, Schlichtherle HC, et al. (2008) Determination of storage stability of butter enriched with unsaturated fatty acids/conjugated linoleic acids (UFA/CLA) using instrumental and sensory methods. International Dairy J 18(10-11): 983-993.
5. Collomb M, Sieber R, Butikofer U (2004) CLA isomers in milk fat from cows fed diets with high levels of unsaturated fatty acids. Lipids 39(4): 355-364.
6. Collomb M, Sollberger H, Butikofer U, Sieber R, Stoll W, et al. (2004) Impact of a basal diet of hay and fodder beet supplemented with rapeseed, linseed and sunflower seed on the fatty acid composition of milk fat. International Dairy J 14(6): 549-559.
7. Ghazaleh AAA, Schingoethe DJ, Hippen AR, Kalscheur KF, Whitlock L (2002) Fatty acid profiles of milk and rumen digesta from cows fed fish oil, extruded soybeans or their blend. J Dairy Sci 85(9): 2266-2276.
8. Jones EL, Shingfield KJ, Kohen C, Jones AK, Lupoli B, et al. (2005) Chemical, physical, and sensory properties of dairy products enriched with conjugated linoleic acid. J of Dairy Science 88(8): 2923-2937.
9. Collomb M, Schmid A, Sieber R, Wechsler D, Ryhänen EL (2006) Review: Conjugated linoleic acids in milk fat: Variation and physiological effect. International Dairy J 16(11): 1347-1361.
10. Seçkin AK, Gürsoy O, Kınık Ö, Akbulut N (2005) Conjugated linoleic acid (CLA) concentration, fatty acid composition and cholesterol content of some Turkish dairy products. LWT-Food Science and Technology 38(8): 900-915.
11. Pearce J (1996) Effects of milk and fermented dairy products on the blood cholesterol content and profile of mammals in relation to coronary heart disease. Int Dairy J 6(7): 661-672.
12. Ravnskov U (2001) Cholesterol and all-cause mortality in Honolulu. Lancet 358(9296): 1907.
13. Ravnskov U (1995) Quotation bias in reviews of the diet-heart idea. J Clin Epidemiol 48(5): 713-719.
14. Wiseman MJ (1997) Fat and fatty acids in relation to cardiovascular disease: An overview. Brit J Nutr 78(1): S3-S4.
15. Osmari EK, Cecato U, Macedo FAF, Souza NE (2011) Nutritional quality indices of milk fat from goats on diets supplemented with different roughages. Small Ruminant Research 98(1-3): 128-132.
16. Ulbricht TLV, Southgate DAT (1991) Coronary heart-disease: 7 dietary factors. Lancet 338(8773): 985-992.
17. (2001) SAS, Software for statistical analysis, Licensed to Purdue University, America.
18. (2015) Anon, Manual of methods of analysis of foods. Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi, India, p. 191.
19. Renner E (1993) Milchpractikum. Justus-Liebig-Universität, Giessen, Germany.
20. Fletouris DJ, Botsoglou NA, Psomas IE, Mantis AI (1998) Rapid determination of cholesterol in milk and milk products by direct saponification and capillary gas chromatography. J Dairy Sci 81(11): 2833-2840.
21. Grundy SM (1997) What is the desirable ratio of saturated, polyunsaturated, and monounsaturated fatty acids in the diet? Am J Clin Nutr 66(4 Suppl): 988S-990S.
22. Kolaric L, Simko P (2022) Determination of cholesterol content in butter by HPLC: Up-to-date optimization, and in-house validation using reference materials. Foods 9(10): 1378.
23. Pasdar Y, Bahrami G, Alghasi S, Darbandi M, Azandaryani AH, et al. (2016) Trans fatty acids contents among selected foods in western iran. Int J Health Life Sci 2(1): 32-41.
24. Piironen V, Toivo J, Lampi AM (2002) New data for cholesterol contents in meat, fish, milk, eggs and their products consumed in finland. J of Food Composition and Analysis 15(6): 705-713.
25. Derewiaka D, Sosinska E, Obiedzinski M, Krogulec A, Czaplicki S (2011) Determination of the adulteration of butter. European Journal of Lipid Science and Technology 113(8): 1005-1011.
26. Gonçalves MFD, Baggio SR (2012) Evaluation of quality of butter from different provenance. Food Science and Technology 32(3): 629-635.
27. Capuano E, Gravink R, Eenling RB, Van RSM (2015) Fatty acid and triglycerides profiling of retail organic, conventional and pasture milk: Implications for health and authenticity. International Dairy Journal 42: 58-63.
28. Pustjens AM, Eenling RB, Koot A H, Rozijn M, Van Ruth SM (2017) Characterization of retail conventional, organic, and grass full-fat butters by their fat contents, free fatty acid contents, and triglyceride and fatty acid profiling. Foods 6(4): 26.
29. Kolarič L, Šimko P (2020) Determination of cholesterol content in butter by HPLC: Up-to-Date optimization, and in-house Validation using reference materials. Foods 9(10): 1378.
30. Teixeira MFB, Silva SPM, Lopes MFPD, Bessa RJB, Prates JAM, et al. (2022) Production of low-cholesterol butter with Lacticaseibacillus paracasei immobilized in calcium-alginate beads. Food Chem 393: 133419.
31. Garaffo MA, Agius RV, Nengas Y, Lembo E, Rando R, et al. (2011) Fatty acids profile, Atherogenic (IA) and Thrombogenic (IT) health lipid indices, of raw roe of blue fin tuna (Thunnus thynnus L.) and their salted product Bottarga. Food and Nutrition Sciences 2: 736-743.
32. Naydenova N, Kaishev I, Iliev T, Mihaylova G (2014) Fatty acids profile, atherogenic and thrombogenic health indices of white brined cheese made from buffalo milk. Agrıcultural Scıence and Technology 6(3): 352-355.
33. Turan H, Sönmez G, Kaya Y (2007) Fatty acid profile and proximate composition of the thornback ray (Raja clavata L. 1758) from the sinop coast in the black sea. Journal Fisheries Sciences 1(2): 97-103.
34. Wieczorek AJR, Rant AR, Rant W, Kuczynska B, Czauderna M (2015) Characterization of the milk lipid fraction in non-dairy sheep breeds. Arch Anim Breed 58: 395-401.