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Analysis of fat content and fatty acid profile of selected bakery products available in Jaffna district, Sri Lanka

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ABSTRACT

High consumption of trans fatty acids and saturated fatty acids is detrimental to human health. Bakery products are among the main sources of these two types of fatty acids in the diets of many people worldwide. The objective of this study was to determine the total fat content and fatty acid profiles of selected bakery products available in Jaffna markets, with a main emphasis on saturated and trans fatty acid contents. Samples such as bread (n=17), bun (n=17), cake (n=16), pastry (n=12), doughnut (n=4), and bakery fats (n=5) were analyzed. The highest fat content was observed in pastries (21.63%-39.83%) and doughnuts (31.66%-37.17%), whereas the lowest fat content was observed in breads (1.00%-3.43%). All bakery products consisted of a considerable amount of elaidic acid. Highest total saturated fatty acid content was detected in pastries (17.25 g/100 g), whereas the lowest was observed in breads (1.36 g/100 g). Highest total trans fatty acid content was detected in pastries (2.47 g/100 g), followed by doughnuts (1.54 g/100 g), cakes (1.03 g/100 g), buns (0.28 g/100 g) and breads (0.08 g/100 g). Significant variations in the fatty acid composition were observed within and between types of products. Therefore, regulations should be imposed to reduce the content of saturated and trans fatty acids in bakery products in Sri Lanka.

Keywords: bread; doughnut; saturated fatty acids; total fat; trans fatty acids

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INTRODUCTION

Non-communicable diseases (NCDs) continue to pose a formidable global health burden, responsible for nearly three-quarters (74%) of all deaths and an alarming 86% of premature mortality worldwide in 2023 (Varghese et al., 2025). Cardiovascular diseases represent the principal contributor to the global burden of NCDs, responsible for nearly 20.5 million deaths annually (Cesare et al., 2023). In Sri Lanka, ischemic heart disease accounted for 8,550 hospital-reported deaths in 2022 and 8,518 deaths in 2023 per 100,000 population (Ministry of Health Sri Lanka, 2024). One of the major modifiable behavioral risk factors for cardiovascular diseases and other NCDs is the increased consumption of unhealthy diets (WHO, 2025). Therefore, healthy food choices must be emphasized to reduce the burden of NCDs.

Lipids play a vital role in human wellbeing. There is ample evidence that diets high in saturated and trans fats increase the risk of NCDs, whereas diets rich in unsaturated fatty acids reduce that risk (Nykiel et al., 2025). In 2003, in response to evidence showing adverse health effects of trans fat, the US Food and Drug Administration (US-FDA) proposed legislation to reduce trans fat. Subsequently, following the guidelines set forth by the US-FDA, many other countries also formulated their national policies to control the TFA content in their food supply (Umayangani et al., 2025)and as a result, they have virtually eliminated the TFA from their food supply. In Sri Lanka, initial steps were taken to establish legislation on TFA levels (not exceeding 2 g/100g of total fat) in Sri Lankan foods by the WHO (Country Office Sri Lanka) and the Ministry of Health (Lanerolle & de Lanerolle, 2020). As a consequence, the Ministry of Health, in consultation with the Food Advisory Committee, made a regulation under Section 32 of the Food Act, No. 26 of 1980 (The Food (Trans-Fat) Regulations, 2022), which shall come into operation with effect from January 01, 2026. requires that the amount of trans fat per 100 g or 100 mL be declared on the label of packaged food products, and it sets a maximum limit of 2% trans fat (excluding naturally occurring trans fat in animal fat) of the total fat content in foods intended for final consumers (Ministry of Health and Mass Media, 2025).

Bakery products play a crucial role in the daily diets of most people worldwide. Despite the popularity of bakery products as a convenient food, their nutritional quality is a major concern due to their lipid composition. Bakery fats such as margarine and shortening give bakery products unique texture and flavor. Most of the bakery fats currently used in Sri Lanka are manufactured using a conventional oil structuring technique called partial hydrogenation. The solid fats manufactured through this technique contain high levels of SFAs and industrially produced TFAs (Bihola et al., 2025). SFAs and industrially produced TFAs are given much attention due to their association with increasing the risk of several human ailments such as cardiovascular diseases, cancer, and type 2 diabetes. It is also reported that a 2% increase in energy intake from trans fat is associated with a 23% increase in cardiovascular risk (Singhal et al., 2023). The World Health Organization (WHO) has recommended that intake of saturated fats be less than 10% of total energy intake and that intake of trans fats be less than 1% of total energy intake (WHO, 2023).

The use of these solid fats in bakery products may eventually result in high SFA and TFA content in the final product. Therefore, bakery products available in the country should be analyzed for their fatty acid profiles to inform consumers about the nutritional quality and safety of these products. Only a limited number of studies have been reported in Sri Lanka on the fatty acid profiles of bakery products, with special emphasis on SFA and TFA contents. In this context, this study was designed to analyze the total fat content and fatty acid profiles of five different bakery products available in the Jaffna district. Findings of this study will be useful in raising awareness among people regarding the nutritional quality of bakery products and for policymakers in the health sector.

METHODOLOGY

Chemicals and reagents

All chemicals and authentic fatty acid standards for gas chromatography used in this study were purchased from Sigma Aldrich (St Louis, MO, USA). All chemicals used were of analytical grade.

Sampling

A total of 71 samples of commonly consumed bakery products, such as bread, buns, cakes, pastries, and doughnuts, were collected from 17 bakeries in the Jaffna district using non-probability sampling. Table 1 shows the sample collection from different places. The samples were brought to the laboratory on the same day of purchase to extract the fat. Each sample was analyzed separately.

Table 1: Locations of sample collection and types of samples collected

Location	Bakery Number	Samples Collected
Point Pedro	Bakery 1	Bread, Bun, Cake, Pastry
	Bakery 2	Bread, Bun, Cake
Karaveddi	Bakery 3	Bread, Bun, Cake, Pastry, Doughnut
	Bakery 4	Bread, Bun, Cake, Pastry, Doughnut
Valvettiturai	Bakery 5	Bread, Bun, Cake
Jaffna town	Bakery 6	Bread, Bun, Cake, Pastry, Doughnut
	Bakery 7	Bread, Bun, Cake, Pastry, Doughnut
	Bakery 8	Bread, Bun, Cake, Pastry
	Bakery 9	Bread, Bun, Cake, Pastry
	Bakery 10	Bread, Bun, Cake, Pastry
Kankesanthurai	Bakery 11	Bread, Bun, Cake, Pastry
Mallakam	Bakery 12	Bread, Bun, Cake, Pastry
Chunnakam	Bakery 13	Bread, Bun, Cake, Pastry
	Bakery 14	Bread, Bun, Pastry
Chavakacheri	Bakery 15	Bread, Bun, Cake
Atchuveli	Bakery 16	Bread, Bun, Cake
Kodikamam	Bakery 17	Bread, Bun, Cake

A total of 71 samples were collected (Breads (n=17), Buns (n=17), Cakes (n=16), Pastries (n=12), doughnuts (n=4) and bakery fats (n=5)). All samples were collected between mid of March to end of May 2021.

Extraction of fat

Fat from the samples was extracted by the solvent extraction method. The samples were pre-dried in a hot-air oven (Yamato, Japan) at 50±5 °C and ground into powder using a domestic blender. Fat was extracted from powdered samples by the solvent extraction method (Goldfisch method) (VELP Scientifica SER 148, Italy) using petroleum ether. After extraction, the solvent was evaporated using a rotatory evaporator (EYELA, N-1110, Japan) at 70 °C. The total fat content was calculated on a weight basis, and the extracted fat was used for fatty acid profile analysis.

Analysis of fatty acid profile by gas chromatography

Fatty Acid Methyl Esters (FAMEs) were prepared according to the WHO method (WHO, 2020) using BF_3-methanol. Prepared FAMEs were analyzed using a gas chromatograph (Agilent Technologies 7890B, USA) equipped with a Flame Ionization Detector and a fused-silica capillary column (100 m length, 0.25 mm internal diameter, 0.20 µm film as the stationary phase). Nitrogen was used as a carrier gas at a flow rate of 20 mL/min. FAMEs were injected (1 µL) at a split ratio of 30:1. The injector and detector temperatures were 260 ^{o}C. The initial column oven temperature was maintained at 140 ^{o}C for 5 mins, then increased to 240 ^{o}C at 4 ^{o}C/min, and maintained at that temperature for 10 mins. Identification of fatty acids was performed by comparing their retention times with the FAME standard (Supelco 37-component FAME mix and a mixture of *trans* isomers of linoleic acid).

Statistical analysis

All experiments were carried out in triplicate. The data were presented as the mean ± standard deviation in Microsoft Excel 2019. Analysis of Variance (ANOVA) was conducted using the Two-

Factor Completely Randomized Design in the Statistical Analysis System (SAS), version 6.0.10. Duncan's multiple range test was used to compare the treatment means among products at P<0.05.

RESULTS AND DISCUSSION

There were significant variations in total fat and fatty acid contents within and between bakery product types. According to the results shown in Table 2, the highest percentage of fat was observed in pastry and doughnut, and the lowest fat content was observed in bread. The mean total fat content across five categories of bakery products analyzed is as follows: pastry > doughnut > cake > bun > bread.

Table 2: Total fat content in different bakery products and bakery fats (g of fat/ 100 g product)

Sample	Bread	Bun	Cake	Pastry	Doughnut	Bakery fat
1	2.38 ± 0.03^{bcd}	4.83 ± 0.18^{ij}	25.33 ± 0.10^{de}	28.57 ± 0.13^{i}	37.17 ± 0.10^{a}	84.01 ± 2.31^{b}
2	2.20 ± 0.06^{def}	7.41 ± 0.04^{d}	26.09 ± 0.35^{c}	29.93 ± 0.16^{h}	35.87 ± 0.01^{b}	69.56 ± 1.22^{c}
3	2.32 ± 0.03^{cd}	10.08 ± 0.03^{b}	17.40 ± 0.31^{j}	34.11 ± 0.04^{d}	36.24 ± 0.25^{b}	92.40 ± 3.03^{a}
4	2.51 ± 0.33^{bc}	4.96 ± 0.20^{i}	26.07 ± 0.18^{c}	32.25 ± 0.10^{f}	31.66 ± 0.31^{c}	62.40 ± 1.50^{d}
5	1.13 ± 0.07^{gh}	4.59 ± 0.04^{j}	25.13 ± 0.07^{e}	25.93 ± 0.21^{j}		44.78 ± 0.57^{e}
6	3.43 ± 0.01^{a}	6.52 ± 0.14^{f}	26.06 ± 0.25^{c}	31.72 ± 0.06^{g}		
7	3.26 ± 0.03^{a}	8.61 ± 0.13^{c}	22.48 ± 0.14^{h}	25.43 ± 0.18^{k}		
8	1.40 ± 0.03^{g}	5.42 ± 0.03^{h}	30.00 ± 0.11^{a}	35.79 ± 0.13^{c}		
9	1.22 ± 0.08^{gh}	5.77 ± 0.18^{g}	23.42 ± 0.20^{g}	39.89 ± 0.18^{a}		
10	2.02 ± 0.06^{ef}	3.30 ± 0.06^{k}	19.82 ± 0.31^{i}	21.63 ± 0.21^{l}		
11	2.25 ± 0.07^{cde}	5.00 ± 0.11^{i}	25.76 ± 0.11^{cd}	39.51 ± 0.18^{b}		
12	1.00 ± 0.08^{h}	3.37 ± 0.04^{k}	27.97 ± 0.16^{b}	33.41 ± 0.30^{e}		
13	2.38 ± 0.08^{bcd}	6.95 ± 0.07^{e}	25.80 ± 0.28^{cd}			
14	1.93 ± 0.04^{f}	7.17 ± 0.04^{de}	23.60 ± 0.11^{g}			
15	1.04 ± 0.03^{h}	3.18 ± 0.08^{k}	19.63 ± 0.18^{i}			
16	2.36 ± 0.28^{bcd}	3.26 ± 0.20^{k}	24.06 ± 0.23^{f}			
17	2.64 ± 0.20^{b}	10.91 ± 0.10^{a}				
Mean ± S.D. (Min-Max)	2.09±0.73 (1.00-3.43)	5.96±2.34 (3.18-10.91)	24.29±3.22 (17.40-30.00)	31.51±5.56 (21.63-39.83)	35.24±2.45 (31.66-37.17)	70.63±18.64 (44.78-92.40)

Means in each column followed by different superscript letters (a - l) are significantly different (P<0.05).

Fatty acids profile (mean values and ranges) of samples are shown in detail in Table 3. There were significant differences in the contents of different fatty acid types within and between the selected bakery products. Fatty acid composition is expressed as g of fatty acids per 100 g of total fat (mentioned as % hereafter).

Table 3: The mean value and minimum-maximum range of fatty acid composition of bread, bun, cake, pastry, doughnut, and bakery fat

Fatty acids	Bread	Bun	Cake	Pastry	Doughnut	Bakery fat
Caproic acid (C6:0)	0.09±0.12 (0.00-0.63)	0.07±0.27 (0.00-0.69)	-	-	0.02±0.00 (0.00-0.09)	0.07±0.00 (0.00-0.35)
Caprylic acid (C8:0)	3.05±2.14 (0.18-6.51)	2.24±1.09 (0.17-4.14)	1.99±1.46 (0.26-6.98)	0.78±0.64 (0.25-1.92)	0.70±0.27 (0.41-1.01)	1.47±1.94 (0.04-4.16)
Capric acid (C10:0)	2.30±1.72 (0.16-5.31)	1.75±0.88 (0.18-3.19)	1.60±1.14 (0.23-5.45)	0.61±0.49 (0.22-1.49)	0.56±0.24 (0.27-0.79)	1.17±1.57 (0.00-3.27)
Undecylenic acid (C11:0)	0.09±0.17 (0.00-0.71)	0.06±0.03 (0.00-0.13)	0.02±0.01 (0.00-0.06)	0.04±0.01 (0.00-0.06)	0.04±0.04 (0.00-0.10)	0.02±0.01 (0.00-0.05)
Lauric acid (C12:0)	19.53±12.65 (1.61-40.22)	13.77±6.02 (1.47-26.10)	12.65±5.15 (1.85-19.56)	5.46±4.55 (2.02-14.07)	4.83±1.93 (2.55-6.67)	10.12±12.80 (0.40-26.48)
Myristic acid (C14:0)	8.02±5.13 (1.39-16.90)	6.38±2.32 (1.15-10.79)	6.25±3.31 (0.00-17.31)	3.18±1.88 (1.78-6.89)	2.70±0.67 (1.87-3.35)	4.91±4.91 (1.22-11.44)
Palmitic acid (C16:0)	32.12±10.78 (15.61-47.34)	35.56±5.08 (24.41-46.24)	38.58±7.90 (29.31-58.65)	44.69±3.96 (36.16-48.55)	39.55±2.69 (36.17-42.37)	45.70±13.92 (29.27-61.17)
Margaric acid (C17:0)	0.01±0.00 (0.00-0.18)	-	-	-	-	-
Stearic acid (C18:0)	0.07±0.05 (0.00-0.82)	-	-	-	-	-
Total SFA	**65.28±11.75 (46.15-84.13)**	**59.83±5.77 (46.93-68.90)**	**61.09±7.39 (53.97-85.34)**	**54.76±5.28 (50.59-69.78)**	**48.40±3.63 (46.15-53.75)**	**63.46±8.51 (55.10-74.97)**
Palmitoleic acid (C16:1)	0.22±0.34 (0.00-1.14)	0.03±0.00 (0.00-0.44)	-	-	-	-
Cis-10 Heptadecenoic acid (C17:1)	0.12±0.26 (0.00-0.70)	0.01±0.00 (0.00-0.14)	-	-	0.02±0.00 (0.00-0.07)	-
Oleic acid (C18:1)	22.16±8.32 (9.43-34.56)	28.09±5.69 (20.33-44.19)	28.86±5.44 (10.67-36.77)	30.78±2.89 (22.15-33.20)	37.59±3.82 (32.88-41.37)	28.24±8.22 (16.84-38.02)

Total MUFA	**22.50±8.37 (10.19-34.85)**	**28.13±5.69 (20.33-44.19)**	**28.86±5.44 (10.67-36.77)**	**30.78±2.89 (22.15-33.20)**	**37.61±3.85 (32.88-41.44)**	**28.24±8.22 (16.84-38.02)**
Linoleic acid (C18:2)	11.72±5.15 (4.48-23.02)	10.04±2.61 (6.04-14.81)	8.58±2.58 (3.99-15.49)	6.63±1.69 (3.81-8.23)	11.91±2.20 (9.11-13.92)	5.97±1.60 (3.34-7.45)
Total PUFA	**11.72±5.15 (4.48-23.02)**	**10.04±2.61 (6.04-14.81)**	**8.58±2.58 (3.99-15.49)**	**6.63±1.69 (3.81-8.23)**	**11.91±2.20 (9.11-13.92)**	**5.97±1.60 (3.34-7.45)**
Total UFA	**34.23±11.13 (15.87-48.90)**	**38.17±6.16 (28.64-53.07)**	**37.44±6.71 (14.66-43.84)**	**37.41±3.92 (27.45-41.43)**	**49.50±3.40 (46.26-53.83)**	**34.22±9.60 (20.18-44.91)**
Elaidic acid (C18:1 *trans*)	0.17±0.00 (0.00-2.96)	1.57±1.47 (0.00-6.13)	1.18±2.06 (0.00-6.19)	7.83±1.67 (2.77-8.95)	2.10±1.27 (0.00-5.10)	2.32±1.70 (0.00-4.89)
Linolelaidic acid (C18:2 *trans* 9,12)	0.32±0.37 (0.00-1.99)	0.43±1.23 (0.00-4.51)	0.29±0.80 (0.00-2.86)	-	-	-
Total TFA	**0.49±1.26 (0.00-4.95)**	**2.00±2.36 (0.00-6.13)**	**1.47±2.28 (0.00-6.19)**	**7.83±1.67 (2.77-8.95)**	**2.10±1.27 (0.00-5.10)**	**2.32±1.70 (0.00-4.89)**

All bakery products predominantly consisted of SFAs. Some products consisted of TFAs such as elaidic acid (C18:1 *trans*) and *trans* isomers of linoleic acid. All bakery products consisted of palmitic acid as the predominant SFA. However, some (6 out of 17) bread samples showed lauric acid as the predominant fatty acid (up to 40.22±0.05%) and myristic acid as the second-most abundant (>16%) fatty acid (e.g., samples 2 and 11).

Average SFA content of breads was 65.28±11.75 g/100 g fatty acids. However, the contribution of bread as a source of SFA is very low due to its lower total fat content (2.09±0.73 g/100 g bread). Bun samples are also dominated by palmitic acid with an average of 35.56±5.08% (24.41- 46.24%). That is, bun samples consisted of more palmitic acid compared to bread samples. Lauric acid also contributes a considerable amount of SFA with an average of 13.77±6.02% (1.47- 26.10%). Average SFA was 59.83±5.77% (46.93-68.90%). Cake samples are also dominated by palmitic acid and lauric acid; however, the contribution of lauric acid to SFA content is less compared to bread and bun. Average SFA was 61.09±7.39% (53.97- 85.34%). Both pastry and doughnut samples are dominated by palmitic acid, with average values of 44.69±3.96% and 39.55±2.69%, respectively. Average SFA content in the pastry sample was 54.76±5.28% (50.59-69.78%). A serving of 100 g pastry will contribute nearly 17.25 g SFA (average fat content of pastry is 31.51±5.56 g/100 g). Average SFA in the doughnut sample was 48.40±3.63%, ranging from 46.15 to 53.75%.

In the bakery fats, palmitic acid was detected as the major SFA. Average SFA of these bakery fats was 63.46±8.51% (55.10- 74.97%). The total SFA content of samples ranged from 46.15-85.34 g/100 g of fat. The mean SFA content as expressed in g/100 g of bread, bun, cake, pastry, and doughnuts was 1.36, 3.57, 14.83, 17.25, and 17.06, respectively. Some bakery samples had palmitic acid and SFA percentages that were nearly similar to those reported for bakery fats.

Oleic acid (C18:1) was the predominant MUFA obtained in all bakery products. However, palmitoleic acid (C16:1) and *cis*-10 heptadecenoic acid (C17:1) were obtained in some bread, bun, and doughnut samples. According to the results (for a 100 g serving of the sample), the unsaturated fatty acid content across five categories of bakery products analyzed was as follows: doughnut > pastry > cake > bun > bread.

Elaidic acid (C18:1 *trans*) and linolelaidic acid (C18:2 *trans* 9,12) were detected as TFAs in the samples. However, elaidic acid (C18:1 *trans*) was the predominant TFA obtained in all categories. Some samples were not detected for any TFAs. All pastry samples contained TFAs, whereas 17.64%, 47.05%, 37.5%, 50%, and 80% of bread, bun, cake, doughnut, and bakery fats, respectively, were detected with TFAs. TFA content (in range) of bread, bun, cake pastry, and doughnuts as expressed in g/100 g of fat were 0.00-4.95, 0.00-6.13, 0.00-6.19, 2.77-8.95, and 0.00-5.10, respectively. Pastry is the only category detected with TFA in all samples. Therefore, in other samples, calculating the average TFA by considering the total number of samples analyzed may underestimate the TFA content; that is, the average TFA will be much lower than the actual value. For instance, among the 17 bread samples, only 3 contained TFA. To avoid this, we calculated the average TFA content by considering the number of samples detected with TFA in each category. Accordingly, the average TFA content per 100 g of the sample was 2.47 g for pastries, 1.54 g for doughnuts, 1.03 g for cakes, 0.28 g for buns, and 0.08 g for breads. According to the results, the TFA content (per 100 g of serving) across five categories of bakery products analyzed was as follows: pastry > doughnut > cake > bun > bread. TFA content of these bakery products ranged from 0.08 g to 2.47 g/100 g product.

Bakery fats (margarine and shortening) consisted of elaidic acid (C18:1 *trans*) as the only TFA. Average TFA was 2.32±1.70%, ranging from 0.00 to 4.89%. One bakery fat contained no TFA.

There were significant differences in total fat content among samples of each type ($P<0.05$). This could be because different bakers use different types of fat in varying amounts. A study conducted in Sri Lanka (Wasana et al., 2021) demonstrated that bakery products available in markets in the Colombo district contained total fat ranging from 4.93±0.03 to 14.22±0.1%, which is lower than the values reported in the present study.

Fatty acid percentages of bakery fats are almost similar to most bakery samples. However, some samples contained higher TFA levels than those present in the bakery fats and also the trans isomers of linoleic acid, which were not detected in any of the bakery fats. This could be due to the conversion of *cis* isomers into *trans* isomers during high-temperature processing (Mavlanov et al., 2025). Therefore, considering baking temperature and the optimal use of bakery fats would help control TFA levels in baked products.

Although most samples had palmitic acid as the predominant SFA, some had lauric or myristic acid as the predominant SFA. The presence of these medium-chain fatty acids in some samples could be due to bakery fats produced from coconut oil, which contains lauric acid and myristic acid as major SFAs (Mavlanov et al., 2025). A similar observation of high proportions of lauric acid (53.53%) and myristic acid (21.17%) was reported in coconut bread (AlJuhaimi et al., 2024).

According to WHO, the SFA consumption should be less than 10% of a person's total energy intake (WHO, 2023). According to the findings of this study, except for breads and buns, some samples from other categories may exceed the WHO critical limit (based on serving size). A previous study reported that pastry samples sold in Sri Lanka contained SFA ranging from 5.19% to 10.32% (Dassanayake et al., 2024). These values are lower than those reported for the pastry samples in the present study.

TFAs are an important group of fatty acids of special concern due to their associated adverse health effects. WHO recommends that TFA intake should be less than 1% of total energy intake (WHO, 2023). Accordingly, TFAs need to be reduced to less than 2% of total fat in oils. In other words, consumption of no more than 2.2 g of TFAs per day for an adult consuming 2000 kcal per day is recommended (WHO, 2021). About 39.39% of the samples analyzed in this study had TFA levels significantly above the critical limit. These findings indicate that a significant proportion of the samples analyzed in this study are unsafe to consume due to their TFA content. A few earlier studies conducted in different parts of Sri Lanka have reported varying results for the TFA content of bakery products. A previous study reported that bakery products available in the Colombo district contained TFAs ranging from 20.76±0.239 to 39.98±0.377%. A landscape study conducted in the country has demonstrated that bread samples collected from different parts of the country had TFA levels ranging from 0 to 1.8 g/100 g of fat (Lanerolle & de Lanerolle, 2020). These variations could be due to the type and amount of solid fat used by the bakers.

Studies reported in other countries also demonstrated varying fatty acid compositions, and some findings agree with those reported in this study. For example, bakery products in Brazil are reported to contain 0.1-6.1 g/100 g of TFA and 1.1-16.9 g/100 g of SFA, with total fat content of 7.0-33.3 g/100 g (Aued-Pimentel & Kus-Yamashita, 2021). A recent study conducted in Slovenia reported that the breads contained 0.12±0.17 TFAs, corresponding to 2 g/100 g of bread (Kušar et al., 2021), which is also similar to the values reported in the present study. A study in the Portuguese market reported TFA content of pastries as 1.96% (0.07–8.47) (Costa *et al*., 2016).A study conducted in the Spanish market reported that TFA content in pastries ranged from 0.11% to 0.30% (Zamora-Ledezma et al., 2025). However, studies have reported much higher TFA contents in bakery products than in the present study. A study from Iran reported TFA content of 0.44±0.56% in cakes (Hadian & Khaneghah, 2022). Another study conducted in the Slovenian market reported TFA levels ranging from 0.10% to 1.71% in bread (Mencin et al., 2021). Comparatively, the TFA content in the bakery products analyzed in the present study is lower than that in bakery products sold in some other countries. However, many countries have successfully reduced TFA levels in their food supply (Al-Jawaldeh et al., 2021) due to legislation on TFA content in foods. According to WHO, a total of 53 countries had best-practice policies in place to tackle industrial trans-fat in food (WHO, 2024). In Sri Lanka, even though legislation related to TFA levels in foods will be implemented in the near future, efforts should engage food manufacturers, and reformulating products to reduce or eliminate saturated and trans fats may take considerable time.

CONCLUSION

Although there was high variability in the fatty acid content of bakery products from bakeries, the present study indicates that bakery products sold in Jaffna markets contain higher levels of SFAs and TFAs than recommended levels. These findings strongly suggest the need to implement legislation on TFA content, reformulate products, or use alternative bakery fats with reduced SFA and TFA to avoid adverse effects on human health. Proper labeling and public awareness of the health effects of consuming different types of fats and bakery products will help reduce the impact on health. An estimate of dietary intake, based on a suitable technique for assessing food consumption patterns, is necessary to determine the daily consumption of SFA and TFA among Sri Lankans.

Declaration of conflict of interest

The authors declare no conflicts of interest.

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