



Exploring the Sources and Intake of iTFA in Local Processed Foods KARACHI, SINDH | 2024



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EXECUTIVE SUMMARY

Industrially produced trans fatty acids (iTFA) pose significant health risks, including coronary heart disease, stroke, diabetes, Alzheimer's disease, cancer, and infertility. These trans fats are commonly found in partially hydrogenated vegetable oils and certain processed foods.

To investigate the prevalence of these harmful substances in foods served at higher education institutes, a small-scale study collected samples of the five most consumed food items from various cafeterias at the University of Karachi. The food items included *paratha*, *biryani*, *gol gappa*, French fries and *samosa*. The collected samples underwent analysis to determine the iTFA content in them.

Gas chromatography analysis revealed varying levels of trans fats across the food products sampled, with *paratha* containing the highest trans fat content and *biryani* the lowest. Additionally, samples of *samosa* and *paratha* showed higher levels of free fatty acids, which are used to enhance taste.

Addressing the burden of iTFAs in Pakistani dietary sources requires a comprehensive national strategy. This strategy should focus on implementing mandatory government-led regulations that limit iTFA content to less than 2% of the total fat across all foods. Other necessary measures include amending food labeling laws to ensure consumers are aware of associated health risks and launching public awareness campaigns. Joint research projects, engagement with government and professional bodies, advocacy campaigns, and policy development are other crucial steps in this endeavor.

INTRODUCTION

Industrially produced trans fatty acids constitute a global health concern, contributing to an estimated 540,000 deaths annually. The World Health Organization (WHO) recommends limiting iTFA intake to less than 1% of the total daily energy or <2% of the total fat in all fats, oils, and food products. In Pakistan, the high consumption of iTFA can be traced back to a shift in fat consumption patterns, from traditional, expensive dairy-based *desi ghee* to more affordable partially hydrogenated vegetable *ghee*. This transition has become ingrained in the daily diet due to the evolution of vegetable fats, mimicking *desi ghee's* qualities. Additionally, the prevalence of indigenous fried foods, margarine and commercial bakery products and bakery shortenings are also associated with the country's high iTFA intake.

Over the past decade, several countries have successfully eliminated iTFAs from their food supplies through systematic policy actions and monitoring programs.

The WHO's REPLACE package, issued in May 2018, provides a roadmap for countries to implement actions toward reducing and eliminating industrially produced iTFA, outlining six strategic action areas for a comprehensive intervention.



Implementing WHO recommendations requires examining regulatory frameworks, reviewing iTFA content in foods, and enacting policy changes. Collaboration between researchers, government bodies, and advocacy groups is essential, although challenges such as coordination issues, limited awareness of regulations, and diverse dietary practices must be addressed.

Eliminating industrially produced iTFA in Pakistan is feasible through two WHO-recommended policy options: banning partially hydrogenated fats and limiting iTFA content to <2% of total fat in all food products.

Addressing iTFA prevalence in Pakistan is crucial for mitigating the burden of non-communicable diseases (NCDs), including cardiovascular diseases and diabetes, and promoting public health. Coordinated efforts aligned with WHO recommendations are essential for implementing comprehensive strategies to address TFA prevalence and improving public health outcomes in Pakistan.



METHODOLOGY

This study aimed to assess the levels of industrially produced trans fatty acids in fast-food samples collected from various canteens at the University of Karachi.

Sample preparation involved homogenization and refrigeration, followed by chemical analysis for moisture, ash, protein, fat, and carbohydrates according to the Association of Official Agricultural Chemists (AOAC) methods.

Moisture content was determined by heating samples in aluminum dishes at 130°C, while ash content was analyzed through dry ashing in a muffle furnace. Protein content was assessed using the Kjeldahl method, involving digestion, distillation, and titration. Fat content was determined through Soxhlet extraction using hexane as a solvent, followed by evaporation. Carbohydrate content was measured using the phenol-sulfuric acid method. Gas chromatography analysis was performed to determine the fatty acid composition of the samples. This involved using a capillary column on a gas chromatograph equipped with a flame ionization detector.

The study aimed to provide comprehensive data on iTFA levels in fast-food samples, facilitating further research and potential policy interventions to reduce iTFA consumption and improve public health.

Limitations: The information on free fatty acids and peroxide values limits a comprehensive assessment of fat quality and freshness in some products.

RESULTS

Table 1 provides a comprehensive overview of the nutritional composition of various food items, showcasing key parameters such as moisture content, ash content, fat content, protein content, total carbohydrate content, and energy value.

The data are presented in percentage values, reflecting the proportion of each nutrient within the respective food samples. The samples include popular foods such as *biryani*, *gol gappa*, *French fries*, *samosa*, and *paratha*.

Sample	Moisture %	Ash %	Fat %	Protein %	Total Carbohydrates %	Energy (Kcal)
Biryani	65.8	1.8	10.9	15.3	5.7	181.4
Gol gappa	5.4	1.2	36.0	10.5	45.9	549.6
French fries	37.1	2.0	28.8	5.0	26.1	539.5
Samosa	22.2	2.6	25.7	4.2	44.3	425.3
Paratha	20.5	1.0	7.8	9.0	60.7	349.2

Table 2 shows the trans fat and quality assessment of the five food samples collected from different cafeterias and canteen of the University of Karachi. Gas chromatography analysis showed that *paratha* contained the highest trans fat among all other samples whereas, the *biryani* sample contained the lowest trans fat.

Products	Trans-fat		Quality Parameters	
	Percent/100g total fatty acids	Percent/100g sample	Free fatty acids %	Peroxide value meqO ₂ /Kg
Potato chips	0.40	0.07	0.3	20.5
Samosa	1.0	0.19	>0.6	19.5
Gol gappy	0.63	0.16	0.5	28.2
Paratha	7.94	0.97	>0.6	24.6
Biryani	0.65	0.02	0.5	25.4

High trans fat content in *paratha* indicates that palm oil is being used abundantly as raw material. Free fatty acids, which can impact taste and quality, are found to be higher in both *samosa* and *paratha*.

Peroxide values in the table indicate oxidative rancidity of edible oil. The *gol gappa* sample showed the highest peroxide value while *samosa* showed the lowest peroxide value.

CONCLUSION & RECOMMENDATIONS

This study provides valuable insights into the nutritional composition of popular food items such as *biryani*, *gol gappa*, *French fries*, *samosa*, and *paratha*. The analysis reveals significant variations in moisture, ash, fat, protein, total carbohydrates, and energy content across these food samples. Notably, *gol gappa* stands out with the highest fat content and energy value, while *paratha* has the lowest fat content and energy value among the samples. However, the presence of trans fats, in *paratha* was found to be the highest among all the collected food samples. This underscores the importance of understanding and monitoring dietary fat intake for maintaining health and well-being

Overall, this study aids individuals in making informed dietary choices by providing essential nutritional information on commonly consumed foods.

Further, study can be extended to evaluate the quality and standards of ingredients used in different food products. Thereby understanding the source and contribution of trans-fat in food products. Furthermore, this report can be discussed with food authorities to ensure the quality and standards to ensure the health of young students, they have strong immune system but frequently exposure and intake may cause several chronic diseases leading to cancer.

Based on the findings of the study on iTFAs and the nutritional composition of various food items, here are some recommendations to address the health risks associated with iTFA consumption and improve food quality:



Regulatory Measures

Implement regulations to limit the use of partially hydrogenated oils (PHOs), which are a major source of trans fats, in food production. This could involve setting maximum limits on iTFA content in all foods, in line with the standards set by the WHO, i.e., less than 2 gm trans fat in every 100 gm of fat across all food products.



Amendment of Food Labelling Laws

Revise food labeling laws to ensure the inclusion of trans fat content on nutrition labels. Clear labeling can help consumers make informed choices and avoid products high in trans fats.



Promotion of Healthier Fat Choices

Encourage the use of healthier fats in food preparation, such as unsaturated fats like olive oil, avocado oil, or canola oil, which can help reduce the intake of trans fats.



Legislative Action

Advocate for policies aimed at reducing trans-fat consumption, such as banning or restricting the use of partially hydrogenated oils in food production, similar to measures taken in other countries to limit high in trans fat content in food.



Awareness Campaigns

Launch public awareness campaigns to educate consumers about the health risks associated with trans fats and promote healthier eating habits. These campaigns can include information on reading food labels and choosing healthier alternatives.



Quality Assessment of Food Products

Implement regular quality assessments of food products to monitor trans fat levels, as well as other quality parameters such as free fatty acids and peroxide values, to ensure food freshness and safety.



Encourage of Fresh and Whole Foods

Encourage the consumption of fresh and minimally processed foods, which are less likely to contain trans fats compared to highly processed products.

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