FOOD SAFETY AND STANDARDS AUTHORITY OF INDIA

Inspiring Trust, Assuring Safe & Nutritious Food

Ministry of Health and Family Welfare, Government of India

GUIDANCE NOTE ON ELIMINATION OF TRANS FATTY ACIDS - MOVING TOWARDS

MOVING TOWARDS A TRANS FAT FREE INDIA

SUMMARY

Lifestyle changes have led to increased consumption of foods high in trans fatty acids (TFA; trans fats) that contribute to the increased risk of heart diseases. According to the World Health Organization (WHO), intake of trans fats results in over 5,00,000 deaths globally and nearly 60,000 deaths in India from heart disease per year.

Trans fats are formed during the industrial processes of *hydrogenation of vegetable oils*, which converts liquid oils to solid fats. The most common partially hydrogenated vegetable oils (PHVOs) in India can be - Vanaspati, Bakery Shortenings and Margarines. Industrial trans fats (ITFA) are harmful to health. Some trans fats are also present naturally in small quantities in meat and dairy products, also known as ruminant trans fats.

Considering the health hazards associated with the consumption of IP-trans fats, the Food Safety and Standards Authority of India (FSSAI) plans to eliminate it from the diet in a phased manner by 2022. FSSAI has gazetted regulations to limit industrial TFA to not more than 2% by January 2022. This regulation has also been extended to all food products (having edible oil/fat as an ingredient), limiting industrial TFA to 2% from 1st January 2022.

KEY TAKEAWAYS

1. Trans fats have no role in human body functions and are not required in the diet.
2. Trans fat consumption more than the WHO recommended levels (>1% of the energy) leads to heart attacks and deaths due to heart diseases.
3. Industrially produced trans fats like vanaspati, margarine, and bakery shortenings can be the primary source of trans fat in our diets.
4. It is possible to eliminate industrial trans fats from our diets by using newer technologies and modifying our cooking techniques.

I. Introduction

Consumption of high amounts of saturated fats and trans fats have emerged as one of the major independent risk factors for heart diseases. As per the world health organization (WHO), worldwide, more than an estimated 5,00,000 deaths per year occur annually from cardiovascular diseases due to consumption of trans fat, and in India, this number is approximately 60,000 deaths per year.

Trans fatty acids (trans fats)[1] containing fats are unhealthy as they clog the arteries, leading to cardiovascular illness/deaths.

[1] ***Trans Fatty Acids (trans fats)*** *are unsaturated fatty acids that contain at least one non-conjugated double bond in the trans configuration, i.e., the hydrogen on the doubly bonded carbon atoms is in the trans or opposite side,*

II. Types and sources of trans fats in the diet

There are two forms of trans fatty acids, namely, natural/ruminant trans fatty acids and industrially produced trans fatty acids (I TFAs):

- **Natural/ruminant trans fatty acids:** Some trans fats are found naturally in small amounts in the rumen of ruminant[2] animals and their products like meat and dairy products.
- **Industrial trans fatty acids:** Industrial trans fats either result from industrial processes such as partial hydrogenation or thermal treatments of edible oils containing unsaturated fatty acids, e.g. improper refining process of vegetable oils and during the process of overheating / repeated frying. respectively

III. Processes during which trans fatty acids are formed

- **Hydrogenation:** Vegetable oil (liquid at room temperature) is converted to solid fat by the chemical process of hydrogenation. The conversion of fat from a liquid to a solid form simultaneously generates trans fats. The solid fat thus produced has increased shelf life and is more suitable for frying, baking and other food manufacturing purposes. Trans fats are found in partially hydrogenated vegetable oils (PHVOs) and vegetable fats likevanaspati, bakery and industrial margarine, and bakery shortenings. The vegetable fats are used in formal and informal food industries to fry, bake, and bind foods.

- **Refining of vegetable oils:** Edible oils are refined to remove certain impurities that may alter the edible oil's colour, taste, and aroma. During refining, the vegetable oils are subjected to high temperature and long duration for de-odourization leading to the formation of trans fats.

- **Frying:** In deep-frying, the hot oil (150 ° C - 190 ° C or more) acts as the medium for heat transfer and contributes to the texture and flavour of the fried food. During deep-frying, the fat/oil is continuously exposed to high temperatures in the presence of air and undergoes various chemical changes along with the possibility of some trans fats formation.

IV. Why are trans fats bad for health?

Health research studies have shown various adverse effects associated with trans fats consumption.

- **Heart disease and sudden deaths due to heart attacks:** Trans fats are associated with a higher risk of heart diseases even at a low level of consumption over a prolonged period of time.

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resulting in a straighter shape as compared to the corresponding cis-fatty acids which have hydrogen atoms on the same side of the double bond, making cis-fatty acids to ben or form kinks. Because of the trans configuration of trans fatty acids are less fluid at the room temperature as compared to their cis counterpart.

[2] ***Ruminants*** *are animals (cow, cattle etc.) that can obtain nutrients from plant-based food by fermenting it in a specialized stomach prior to digestion, through microbial actions.*

- Trans fat consumption raises bad cholesterol (VLDL-c and LDL-c) and lowers good cholesterol (HDL-c), causing heart diseases. It also raises the fasting triglyceride levels leading to increased vulnerability to heart diseases.
- Trans fats promotes thickening of the arteries (atherosclerosis), diabetes, and sudden death due to heart failure.
- Trans fats causes endothelial dysfunction, which is a critical cause in the development of atherosclerosis (thickening of arteries due to plaque deposition).

– **Accumulation of fat**
  - Trans fats intake is associated with increased fat accumulation in the liver and other internal organs in the abdomen.

– **Insulin resistance and diabetes**
  - Trans fats intake increases the risk of insulin resistance leading to diabetes and other metabolic syndromes.

– **Other health concerns**
  - Trans fats consumption may lead to certain types of cancers, dementia, complicated pregnancy and compromised fetal development.

V. Regulations and notifications related to Trans Fat

a. **The Food Safety and Standards (Food Products Standards and Food Additives), Tenth Amendment Regulations, 2020,** for the reduction in trans fats, limits trans fats to not more than 3% in all fats and oils except raw edible oils by January 2021 and not more than 2% by January, 2022.

b. **The Food Safety and Standards (Prohibition and Restrictions on Sales) Second Amendment Regulations, 2021** limits the trans-fat content in all food items. According to the regulation, all food products in which edible oils and fats are used as an ingredient shall not contain industrial trans fatty acids more than 2% by mass of the total oils/fats present in the product, on and from 01st January, 2022."

c. **Food Safety and Standards (Packaging and Labelling) Regulations, 2011 (sub-regulation 2.2.2 (3))** states that, if a claim is made regarding trans fatty acids, then trans fatty acid content in gram (g) shall be declared in addition to the energy (kcal), protein (g), carbohydrate (specify the quantity of sugar) (g) and fat (g or ml) on the Nutritional Information or Nutritional Facts per 100 gm or 100 ml or per serving of the product. Also, the food, in which edible oils and fats are used as an ingredient, shall declare the quantity of trans fat on the label.

d. **The Schedule I-Nutrition Claims of the Food Safety and Standards (Advertising and Claims) Regulations, 2018** prescribe that the claim of trans fat free may be made in cases where the trans-fat is less than 0.2 g per 100 g or 100 ml of food. However, in the case of edible fats/oils, the claims of trans fat

free may be made when the trans-fat is less than 1 g per 100 g or ml of edible oils/fats.

e. A direction issued on 22nd July, 2019 states that the food establishments which uses trans-fat free fats/oil and do not have trans-fat more than 0.2g per 100g of food, in compliance with the Food Safety and Standards (Advertising and Claims) Regulations, 2018 can display **"Trans-fat free" logo** in their outlets and on their food products. The use of the said logo is voluntary.

In cases of non-compliance with the above said Regulations, recourse shall be taken as per the provisions of the FSS Act, 2006 and Rules therein.

VI. How to eliminate trans fats from diets?

A. Suggestions/Guidelines for fat/oil manufacturers for the elimination of trans fats

The use of newer technologies can help in eliminating industrial trans-fats from fats/oils. In India, several fat/oil manufacturers have switched to newer technologies to eliminate industrial trans-fats. Some of these have been described below,

- **Inter-esterification (enzymatic/ chemical inter-esterification):** Inter-esterification refers to modifying the structure and functionality of fats and oils to produce food ingredients for a range of applications, which can help in reducing the levels of saturated fatty acids (SFA) and *trans* fatty acids (TFA). In India, majority of the oils and fats manufacturers have already adopted new technologies to produce trans-free fats.

  Selection of Raw material and Blending options: Proper selection of oils and blending of saturated fat or inter-esterified or fully hydrogenated vegetable fats with liquid oils in a pre-defined ratio can be done to achieve the desired product and functionality.

- **Monitoring and modifying hydrogenation process:** The following non-selective conditions during the hydrogenation process can be modified to reduce the formation of trans fats
  - High Hydrogen gas pressure
  - High stirring speed
  - Low temperature
  - Using fresh Nickel catalysts can reduce the formation of trans fats in PHVO
  - Higher catalyst concentration (not using spent catalyst)

- **Modifying the deodorization process:** Optimum processing conditions (Low time - temperature combination) during deodorization process can limit the formation of trans fats.

- **Laboratory analysis:** FSSAI has released revised methods for the determination of trans fats in hydrogenated fats/oils

(https://fssai.gov.in/upload/uploadfiles/files/Manual_Revised_Oil_Fats_22_06_2021.pdf). Fat/oil manufacturers should ensure regular analysis of fats/oils for their trans-fat content from NABL accredited and FSSAI notified lab. A list of Labs where trans fatty acid analysis is available, is annexed.

- **Trans fat free logo:** Fat/oil manufacturers are advised to get their products tested for trans fats and if the product is free from trans fats [i.e. trans fat, is not more than 0.2g per 100g of fat/food, in compliance with the Food Safety and Standards (Advertising and Claims) Regulations, 2018], trans fat free logo may be used on the products. This will help consumers and food manufacturers identify trans-fat free fat/oil for end use. [https://fssai.gov.in/upload/advisories/2019/07/5d3b01c07b950Letter_TransFat_24_07_2019.pdf]

- **Storage and transportation:** Storage and transportation of trans-free fats at low ambient temperatures to retain the texture may be maintained, if needed.

B. Guideline/suggestions for Chefs/ Halwai's/ Bakeries/ Food manufacturers to eliminate trans fats from the food supply

- Purchase only packaged fats/oils with declared nutrition value for trans-fats content.
- Prefer to use fats/oils such as refined vegetable oils, inter-esterified vegetable oil/fat, natural fats, which are trans-fats free or have trans-fat content less than 2%.
- You may also check for a trans-fat free logo on fats/oils/food package, which implies that the trans-fat content of the product is less than 0.2g per 100g of food
- When purchasing large amounts of fats/oils or proprietary fats, ask the manufacturer/supplier for the trans-fats content.
- If possible, ask the fat/oil manufacturer to submit Certificate of Analysis (laboratory report) for trans-fats content prior to delivery of fat/oil.
- To verify if the fat/oil (raw material) supplied is free of trans-fats, prefer to get a sample, tested by a notified food laboratory for trans-fats (link - list of labs for TFA testing). When using trans-fat free fats in place of fats/oils containing trans-fat, products with similar sensory properties may be made by optimising the recipe with trans-fat free fats/oils using different process controls such as time, temperature etc.
- Trans free fats are normally softer in texture/consistency as compared to trans containing fats, hence for puff pastries and other laminated fat containing products, the baker has to suitably modify the usage conditions and process like:
    - maintaining low temperature of dough
    - Maintaining the consistency/plasticity of the dough similar to that of fat being used
    - peferably low ambient temperature conditions
- Get your food product tested for trans-fat content as per regulatory norms and also whenever some change is made in the recipe.
- **Trans fat free logo:** Food manufacturers are advised to get their product tested for trans fats and if the product is free from trans fats [i.e. trans fat, not more than 0.2g per100g of food, in compliance with the Food Safety and Standards (Advertising and Claims) Regulations, 2018], trans fat free logo may be used on the food product label/ outlet.
- Prefer to use fat/oil in moderation.
- Always maintain the record whenever fats/oils are procured for use in your product (as described below) to track the source of fat/oil.
    - Name and Type of Oils/Fats
    - Batch no.
    - Registration/License No. of Manufacturer/Marketer
    - Date of Purchase from Manufacturer/Retailer
    - Date when the fat/oil is fully consumed
- Used oil should be discarded in an environment-friendly way.

C. Guideline/suggestions for Consumers

As consumers, we should keep in mind the following points to avoid trans-fats,

- Check the nutrition information panel on the nutrition label of the fat/oil/food for its trans- fat content.
- Purchase only packaged fats/oils/foods with declared nutrition value for trans-fats content.
- Check the ingredients list on the packaged food for the ingredients like "partially hydrogenated vegetable oil", "hydrogenated vegetable oil" or "shortening" as these can be the sources of trans-fats. Reduce consumption of such products.
- Prefer to use fats/oils such as refined vegetable oils, inter-esterified vegetable oil/fat, natural fats, which are trans-fats free or have trans-fat content less than 2%.
- You may also check for a trans-fat free logo on fats/oils/food package, which implies that the trans-fat content of the product is less than 0.2g per 100g of food
- Limit the consumption of baked/processed foods like biscuits, cookies, chips, cakes, patty, fan, etc.
- Avoid repeated reheating of oil or re-use the same oil for frying.
- When eating out/ ordering food from outside, check the type of fat being used in food preparation. Ask if trans-fat free fats/oils are being used in food preparation. Foods prepared/ fried in fats/oils containing trans fats should be avoided.
- Reduce consumption of commercially fried foods like aloo chaat, French fries, samosa, bhatura, etc. prepared in trans-fat containing fats/oils and/or fried in the same oil repeatedly.

D. Guideline/suggestions for food laboratories analyzing trans fats

FSSAI has recently issued a revised method for the determination of trans fatty acids in hydrogenated vegetable oil [https://fssai.gov.in/upload/uploadfiles/files/Manual_Revised_Oil_Fats_22_06_2021.pdf]. All food analysis laboratories are required to ensure the following:

- Ensure that the laboratory has the necessary expertise and all the requisite material as specified in the revised FSSAI methodology for assessment of trans fat including the following:
    - Gas chromatograph fitted with FID
    - 100 meter column
    - Internal standards, Individual FAME standard solutions [for *C14:1,Trans Myristelaidic, C16:1, Trans Palmitelaidic, C18:1,Trans 6 Petroselenic, C18:1,TransElaidic, C18:1,Trans 11 Vaccenic, C18:2, Trans Linolelaidic, C18:2, Trans 9- Linolelaidic, C18:2, Trans 12-Linolelaidic, C18:3, Trans Linolenic, C20:1,Eicosenic Trans 11*].
- Ensure that the laboratory is following FSSAI methodology for assessment of trans fats in fats and oils.

VII. FSSAI resources

FSSAI has developed several information and educational material (videos/ posters/ booklets etc.) to help the stakeholders gain better understanding of trans fats. These are available on FSSAI and Eat Right India website.

- Eat Right India Website (URL: https://eatrightindia.gov.in/EatRightIndia/hfss.jsp)
- Heart Attack Rewind- Public Service Announcement on Trans Fat (URL: *https://eatrightindia.gov.in/hfss.jsp*)
- EAT RIGHT QUICK TIPS : TRANS-FATS REDUCTION (URL: https://fssai.gov.in/fssaivideolibrary/playEpisode?episodeId=605)
- Digital Trans Fat Free logo; (URL: https://fssai.gov.in/upload/advisories/2019/07/5d3b01c07b950Letter_TransFat_24_07_2019.pdf)
- Eat Right Toolkit handbook (Chapter 4); (URL: https://eatrightindia.gov.in/images/pdf/Eat%20Right%20Handbook_ENGLISH.pdf)
- Eat Right Flipbook/Calendar (page no. 13); (URL: https://eatrightindia.gov.in/assets/calender/English_Calender.pdf)
- Posters/Flyers (URL: https://eatrightindia.gov.in/EatRightIndia/IECMaterial.jsp#)
- Trans Fat Pledges by stakeholders (URL: https://eatrightindia.gov.in/foodbusinesses.jsp)

References

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4. REPLACE: A roadmap to make the world trans-fat free by 2023 (URL: *http://www.who.int/docs/default-source/documents/replace-transfats/replace-information-sheet.pdf?Status=Temp&sfvrsn=f6effd4f_2&ua=1*).
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Annexure

List of Laboratories where testing of Industrially Produced Trans- fats is available

1. TUV SUD South Asia Pvt Ltd, Gurugram
2. NCML, Mumbai
3. NCML, Visakhapatnam
4. NCML, Gurgaon
5. NFL Kolkata
6. NFL,Ghaziabad
7. S.K.Mitra, Kolkata
8. Eko ProEngineers Pvt,Ltd, Ghaziabad
9. Food Hygiene & Health Laboratory Pvt, Ltd, Pune, Maharashtra.
10. Vimta Labs, Ahmedabad
11. Vimta Labs, Hyderabad
12. EFRAC, Kolkata
13. Scientific Food Testing Services, Chennai
14. Qualichem Laboratories, Nagpur, Maharashtra
15. Fare Lab Pvt, Gurugram
16. Government Analysts' Laboratory Thiruvananthapuram
17. Eurofins Product Testing India Private Limited, Gurugram
18. Regional Lab Ernakulam
19. SMS Labs Services Private Limited, Chennai
20. AGSS Analytical Lab, Delhi
21. AES Laboratories (P) Ltd., Noida
22. Interfield Laboratories, Kochi.
23. Chennai Mettex Lab Pvt ltd, chennai
24. Envirocare, Lab, Mumbai
25. Anacon Laboratories Pvt Ltd, Nagpur, Maharashtra
26. Geochem Laboratories Pvt,Ltd, New Delhi
27. Choksi Laboratories Ltd Indore
28. Dr Amin Controllers Private Limited, Navi Mumbai
29. SGS India Pvt Ltd, Chennai, Manesar
30. MicroChem Silliker Pvt. Ltd. Mahape, Navi Mumbai
31. Bureau Veritas, Hyderabad
32. Bureau Veritas, Chennai
33. Intertek India Pvt Ltd, Hyderabad
34. Intertek India Pvt Ltd, Gurugram
35. FICCI Research and Analysis Centre, New Delhi

(Note: The above list of laboratories is not exhaustive and is dynamic in nature. Therefore, the latest FSSAI order regarding recognition and validity of laboratories updated from time to time may be referred)