



## ANALYSIS OF BRANDED VANSPATI GHEE

Dr. Meena Mehta

Department of food Science &amp; Nutrition, Dr. B.M. Nanavati College of Home Science, 338 R.A. Kidwai Marg, Matunga, Mumbai 400 019 INDIA

## ABSTRACT

Vanaspati is South Asian slang for Vanaspati ghee or Margarine, fully or partially hydrogenated vegetable cooking oil, often used as a cheaper substitute for ghee and butter. In India, vanaspati ghee is usually made from palm oil. Vanaspati ghee is very high in trans fats, which may compose up to 50% of Vanaspati. Twelve brands of hydrogenated vegetable oil or vanaspati was tested and found that all brands were made from palm oil. Samples were collected from the local market and analyzed for its edible oil parameters and fatty acid composition. The investigation was interpreted and scientific comments were drawn with respect to its consumption and impacts on health.

**KEYWORDS** : Analysis Vanaspati ghee, Impact on Health

## INTRODUCTION

Hydrogenated oil, also called trans-fat or vanaspati, is added to food primarily because they have a very long shelf-life and don't melt easily. Vanaspati means any refined edible vegetable oil or oils subjected to a process of hydrogenation in any form. Hydrogenated oil, is made by bubbling hydrogen through oil at a very high temperature. Vanaspati ghee is popularly known as DALDA ghee in the illiterate and socioeconomic class consumers<sup>1</sup>. Almost all brands of Dalda is prepared from Palm oil which is cost effective. Dalda was an adulterated form of desi ghee, and harmful for health. Dalda had competition from "clear oils" or refined vegetable oils such as groundnut (Postman), mustard, safflower (Saffola), sunflower (Sundrop) and palm oil (Palmolein), among others. These were considered a healthier option to vanaspati ghee.

In the modern Indian markets vanaspati is being used as vegetable oil that has been hydrogenated and hardened. Vanaspati ghee is a cheaper substitute for the clarified butter that is made from milk. The ingredients in cookies, biscuits and a host of other processed food products, a very harmless-looking ingredient, hydrogenated oil. The palm oil, remains completely liquid at room temperature. It is highly heat resistant, and resists the formation of breakdown products during frying and increases the shelf life of products. Semi-solid palm oil is used as a fat in bakery products, whereas liquid palm oil is widely used oil for frying. The buttery aroma of ghee fills up the entire kitchen. Most households now prepare their dishes with the commercially available vanaspati ghee instead of the desi ghee. Vanaspati ghee is preferred because of its low cost and longer shelf life.

The desi ghee contains saturated fat and is high in cholesterol; vanaspati ghee contains trans fats that can have more adverse effects on body<sup>2</sup>. Dalda is losing its hold over Indian kitchens. To understand this reversal, an investigation was carried out with proper market survey and composition of the different brands of the vanaspati ghee.

## MATERIAL &amp; METHODOLOGY

A adequate market survey was conducted with respect to the consumption pattern of the vanaspati ghee. Different suburban areas of the Mumbai city were selected where socioeconomic class of people reside. The samples were collected from the local retailers and vendors who supply the vanaspati ghee. Each samples were examined for their physical characteristics and analyzed for their chemical composition like free fatty acids, melting point, iodine value and saponification value and non-saponifiable material<sup>3</sup>. The detailed analysis of fatty acid composition and Vitamin A, D was carried out using HPLC technique. The results were summarized and scientifically interpreted. Also brief comments were made on the contents of these values on their impacts on the human health.

## RESULTS AND DISCUSSION

Initial survey was conducted amongst the socio-economic class families in order to understand consumption pattern and awareness about the quality of the vanaspati ghee. The data reveals that 70% families were not aware about the quality of nutrients and side effect of the vanaspati ghee. There was a confusion related to Shuddh desi ghee and pure ghee. Dalda was a common name for all the hydrogenated oil. According to house wives any solid oil is Dalda ghee. Most of the Marvadi families consume vanaspati ghee in their daily cooking, However, few families consume pure desi ghee for preparation of their daily food. Most of the Maharastrian families consume Dalda ghee in certain food preparation while Gujarati families consume Dalda ghee in certain sweet dish preparation. Surprisingly, these families did not know about the nutrients and fatty acid composition of the Dalda ghee. The consumption of Dalda was mainly due to cost effectiveness and myths that ghee is better for health<sup>4</sup>.

In order to bring awareness amongst these families, a proximate analysis of various brands of vanaspati ghee was carried out. The results in encompassed in the Table 1 and Table 2.

## Vanaspati Provides Energy

The Energy value is the amount of calories which body obtains from the foods. Anchal (899.91kcal/100g) was found with higher energy value, however Rasoi (899.40kcal/100g) was found with the lowest. *Vanaspati ghee is high in calories.* One tablespoon of vanaspati ghee contains 122.4 calories as compared to 85.6 calories in desi ghee.

## Good and Bad Fat Acid Found in Vanaspati

**Saturated Fat:** Saturated fats are inherent fats in ghee, butter and vanaspati etc. An average person should limit his saturated fat daily intake to not more than 8-10 percent as these are generally bad category of fat for consumption<sup>5,6</sup>. Dalda (49.34g/100g) was found with the lowest saturated fat content followed by Rath (50.20g/100g). Rasoi (64.13g/100g) was found with the highest saturated fat followed by Anchal (56.56g/100g). Eating an excess of saturated fat increases the level of bad cholesterol (low density lipoproteins - LDL) in the blood. It is generally acknowledged that high levels of LDL is a reason for greater risk of heart disease.

## Good and Bad Fat Acid Found in Vanaspati

**Saturated Fat:** Saturated fats are inherent fats in ghee, butter and vanaspati etc. An average person should limit his saturated fat daily intake to not more than 8-10 percent as these are generally bad category of fat for consumption. Dalda (49.34g/100g) was found with the lowest saturated fat content followed by Rath (50.20g/100g). Rasoi (64.13g/100g) was found with the highest saturated fat followed by Anchal (56.56g/100g). Eating an excess of saturated fat increases the level of bad cholesterol (low density lipoproteins - LDL) in the blood. It is generally acknowledged that high level of LDL is a reason for greater risk of heart disease.

**Table 1 Proximate analysis of branded vanaspati**

Sample	M.P. °C	Iodine value	Saponification value	Unsaponifiable Matter	Vitamin A IU/g
Nature Fresh	40	61	193	2.00	20.55
Sunflower	42	63	196	1.98	17.54
Dalda	41	60	196	1.98	19.56
Madhuram	41	65	190	2.00	15.34
Kamani	42	64	202	1.60	16.62
Gagan	42	66	200	1.76	20.52
Rocket	43	62	194	1.65	19.74
Godrej	39	60	190	2.00	12.87
Rasoi	39	67	189	2.00	11.43
Rath	41	65	191	1.36	13.95
Shaktibhog	39	66	186	1.39	17.39
Anchal	41	65	189	1.45	15.87

**Table 2 Fatty Acid analysis of branded vanaspati**

Sample	SFA/ 100g	MUFA/ 100g	PUFA/ 100g	FFA/ 100g	TFA/ 100g
Nature Fresh	50.54	39.87	--	0.24	17/41
Sunflower	51.20	44.76	-	0.28	18.99
Dalda	49.34	47.18	6.71	0.26	5.14
Madhuram	58.76	46.39	-	0.39	17.77
Kamani	54.21	39.23	-	0.35	16.12
Gagan	55.98	38.73	4.87	0.33	6.80
Rocket	52.74	39.76	-	0.35	18.19
Godrej	57.95	41.87	-	0.24	18.85
Rasoi	64.13	35.86	-	0.27	19.88
Rath	50.20	49.80	-	0.22	16.64
Shaktibhog	51.16	48.84	5.33	0.26	26.83
Anchal	56.56	38.50	5.34	0.27	8.27

**Unsaturated Fatty Acids:** There are two types of good unsaturated fatty acids, MUFA and PUFA. As per the Heart Association of America, an individual should consume PUFA up to 10% and MUFA 15% of total calories of the daily intake. MUFA lowers the level of bad cholesterol (LDL) in the blood and raises the good cholesterol (HDL). PUFA reduces both the good and the bad cholesterol<sup>7</sup>. In our tests we considered these as higher the better in vanaspati. Rath (49.80g/100g) was found with the highest MUFA content followed by Shaktibhog (48.84g/100g). Rasoi (35.86g/100g) was found with lowest MUFA content among all followed by Anchal (38.50g/100g) and Gagan (38.73g/100g). Only Dalda, Gagan, Anchal and Shaktibhog were found with PUFA content, rest all brands did not have PUFA hence got lower weightage in this test. Dalda (6.71g/100g) was found with the highest PUFA content among all.

**Free Fatty Acids** as Oleic Acid: The edible oils permitted for manufacturing Vanaspati contain certain percentage of free fatty acids (FFA). These free fatty acids are expected to be lower in vanaspati. Nature Fresh (0.05%) was found with lowest percent of free fatty acids, whereas Madhuban (0.39%) was found with the highest free fatty acids percent.

**Trans Fatty acids** are unsaturated fatty acids produced when unsaturated oils are converted to semi solid by a process called hydrogenation. Dalda (5.14g/100g) was found with the lowest trans fat followed by Gagan (6.80g/100g). Shaktibhog (26.83g/100g) was found with highest trans-fat content followed by Rath (16.64g/100g). These are unsaturated Fats, but resemble saturated fats in many ways. Just like saturated fats, they also raise the level of 'bad' cholesterol in our blood. It is expected to be as low as possible in vanaspati. The dangers and toxicity of trans-fat is being recognized in the west and the food companies are forced to avoid them due to public awareness. Due to the potentially serious health condition that could result from its consumption, the United States Food and Drug Administration (FDA) have mandated that nutritional labeling should list trans-fat. In 2008<sup>8,9</sup>, the State of

California became the first state in the United States to enact a law to ban all trans-fat from restaurants. In India, awareness on trans-fat seems to be very low and that needs to change.

**Vitamin A:** Vitamin A is essential for good health—notably for eyes and skin, immune function, reproduction, and bone growth. As per the Indian Standard, vitamin A should be minimum 25.0 IU/g in vanaspati at manufacturing stage. Nature Fresh (20.55 IU/g) was found with highest vitamin A content followed by Gagan (20.52 IU/g) and Dalda (20.09 IU/g). Rasoi (11.43IU/g) was found with lowest vitamin A content among all.

**Vitamin D:** Vitamin D is a group of fat-soluble secosteroids. In humans vitamin D is unique both because it functions as a pro-hormone and the body can synthesize it (as vitamin D3) when sun exposure is adequate. Vitamin D prevents rickets. Unfortunately, Vitamin D was not detected in any of the brands.

#### Vanaspati free from nickel as catalyst

To convert vegetable edible oils into vanaspati, nickel is used as a catalyst in the hydrogenation process. Nickel should be absent in the finished product. Traces of nickel might be found in vanaspati, as an impurity, which can be hazardous for health. As per the Indian Standard, It should not be more than 1.5mg/kg in vanaspati. All brands were found free from the presence of Nickel<sup>10</sup>.

#### Effects of Hydrogenated oil on Human Body

Though trans-fats provide several business advantages to food manufacturers, it is found to have extremely negative effects on human body.

#### Higher risk of heart disease

Trans fats pose a greater likelihood of heart disease than saturated fats. While saturated fats raise the total levels of cholesterol, vanaspati ghee reduces the good cholesterol levels (HDL) along with increasing the total cholesterol levels. Trans-fat has been found to have strong link to heart disease<sup>11</sup>. Trans-fat raises the bad cholesterol (low-density lipoprotein or LDL) level and reduces the good cholesterol (low-density lipoprotein or HDL) level in the blood resulting in plaque buildup in the artery walls leading to heart-attacks. The research study concluded that there is evidence that high trans-fat consumption has a significant risk for coronary heart diseases.

#### Increased Risk of Diabetes

Consumption of trans-fat has been linked to diabetes. A study found that trans-fatty acids increased the risk while PUFA reduces the risk of type-2 diabetes in women. By substituting non-hydrogenated PUFA reduced the risk of type-2 diabetes significantly. Trans fats found in animal products pose a greater risk of diabetes. These fats cause insulin resistance and drive type 2 diabetes.<sup>12</sup>

#### Links to Breast Cancer

Consumption of trans-fat has been linked to breast cancer. The study indicates that women consuming trans-fat are at greater risk of breast cancer. The study found that women with highest blood levels of trans-fat had twice the risk of breast cancer compared with that of women with the lowest level. Trans-fat is so toxic that even bacteria and microorganisms do not want to go near them. Food cooked using trans-fat may stay unspoiled virtually forever –.

#### CONCLUSION

- Dalda was found with lesser amount of saturated fat, while Rasoi had higher saturated fat.
- Dalda had the lowest and Shaktibhog the highest amount of Transfat.
- Rath was found rich in MUFA content
- None of the brands contained adulteration of Argemone oil, Castor oil, Mineral oil or any other adulterants or impurities.
- Rath scored highest in sensory properties like color, appearance, flavor and Taste.

- All the vanaspati brands were manufactured from PALM/ PALMOLEIN OILS, as declared by them.
- Remember to check the nutrition facts label on packaged food items for their trans-fat content.

#### ACKNOWLEDGEMENT

Author thanks Ms. Swati Chavan who was the student a helping hand during the progress of work.

#### REFERENCES

1. Blaser B, Industrial Oil and Fat Products, *Angewandte Chemie*. 65:96.(1953)
2. US co Cargill buys Wipro's Sunflower Vanaspati brand.. *The Times of India*. 11, (2012)
3. AOAC. *The Official Methods of Analysis*, 17. (2000)
4. E L. *Laboratory Methods for Sensory Evaluation*, 1637. (1977)
5. Rossel J. *Analysis of Fats and Oils*, 1-90. New York, USA (1986)
6. Renton, A. Grease is the word. *The Guardian*. 9, (2007).
7. Smouse TH. Factors affecting oil quality and stability in methods to assess oil quality and stability of oils and fat containing food. 17-36. (1996)
8. Che Man YB and TCP. Effects of natural and synthetic antioxidants on changes in refined, bleached, and deodorized palm olein during deep-fat frying of potato chips, *Journal of the American Oil Chemists' Society*.;76:331-339. (1999)
9. Albert JD,. Fatty acids: structure, occurrence, nomenclature, biosynthesis and properties, *Trans Fatty Acids*. 1-24.(2008)
10. Susu AA and Ogunye AF. Nickel-Catalyzed Hydrogenation of Soybean Oil. *Journal of the American Oil Chemists' Society*, 58: 657-661 (1981).
11. Sun, Q., Ma, J., Campos, H., Hankinson, S. Manson, J., Stampfer, M., Rexrode, K., Willett, W., Hu, F. Coronary Heart Disease. *American Heart Association*. 3, (2007)
12. Salmerón, J., Hu, F., Manson, J., Stampfer, M., Colditz, G., Rimm, E., and Willett, W. (Jun, 2001). Dietary fat intake and risk of type 2 diabetes in women. *The American Journal of Clinical Nutrition*. 6, (2001)