

## Research Article

## ESTIMATION OF STEROLS CONTENT IN EDIBLE OIL AND GHEE SAMPLES

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The present investigation was carried out for the estimation of sterols in marketed edible oil and ghee samples. Seven samples of oils and Ghees were subjected for sterol estimation. The samples include Liberty Chanda (vanaspati ghee), Gemini (vanaspati ghee), Suryafit (sunflower oil), Liberty Tower (groundnut oil), Ruchies Nutri gold (groundnut oil), Parachute (coconut oil), and Nihar (coconut oil). The determination was done by measuring the absorbance on UV spectrophotometer using Liberman – burchard reaction. The sterol contents of Liberty Chanda and Gemini Vanaspati ghee determined as 27 mg/gm and 61 mg/gm respectively, while for Suryafit, Liberty Tower, Ruchi's Nutri gold, Parachute and Nihar Naturals oils found as 144 mg/gm, 52 mg/gm, 63 mg/gm, 26 mg/gm and 25 mg/gm. Sunflower oil contains more amount of sterols and coconut oil have less in comparisons.

**Keywords:** Atherosclerosis, Cholesterol, Phytosterol, edible oil and vanaspati ghee.**INTRODUCTION**

The heart diseases are increasing day by day and the heart attack is a major cause of death world over. There are several reasons for heart diseases but one of the most important reasons is hypercholesterolemia. The blood stream carries cholesterol in particles called lipoproteins. But too much circulating cholesterol injures arteries especially coronary arteries. This leads to accumulation of cholesterol-laden "plaques" in vessel linings, a condition called as Atherosclerosis. The word "cholesterol" may quickly be associated with chronic heart disease & other heart problems. However cholesterol also has essential functions in the body such as providing essential components of membrane and serving as a precursor of bile acids, steroid hormones and vitamin D. Public, Patients and doctors are better informed about the risk associated with the elevated level of cholesterol, benefits of life style changes and medical measures aimed at lowering cholesterol<sup>1</sup>.

The results from all clinical trials show that a one percent reduction in total cholesterol causes a two percent reduction in heart attack<sup>2</sup>. Reduction of blood cholesterol by the administration of the drugs or by the modification of diet decreases the risk of coronary artery diseases. Thus, it is useful to identify and limit foods that are rich in cholesterol. The present investigation was carried out to identify and limit those sample of edible fats that are rich in cholesterol. Normally intake of cholesterol in diet is not very high. It is necessary to limit the intake to less than 300mgs in a day<sup>3</sup>. But much bigger source of cholesterol is body itself. About 1 mg of cholesterol daily synthesized in the body and all the 27 carbon atoms of cholesterol are synthesized from acetyl-coA<sup>4</sup>. Intake of certain fats such as saturated fats, which solidifies in winter, such as coconut oil, Palm oil and hydrogenated

oils (Vanaspati) raise the cholesterol level. On the other hand, taking vegetable oils known as polyunsaturated fats like safflower oil, mustard oil, sunflower oil lower the cholesterol. This is also done by taking monosaturated fats like olive oil.

As the plant sterol lower down the level of cholesterol in blood thus, the level of phytosterol was also estimated in different edible oil and ghee sample. Both plant sterols and plant stanols are effective in lowering plasma total and low density lipoprotein (LDL) cholesterol and this occurs by inhibiting the absorption of cholesterol from the small intestine.<sup>5</sup> The term "Phytosterols" covers plant sterols and plant stanols. Plant sterols are naturally occurring substances present in the diet principally as minor components of vegetable oils. Plant stanols, occurring in nature at a lower level, are hydrogenation compounds of the respective plant sterols. Plant sterols/stanols may be consumed every day, but the amounts are often not great enough to have significant cholesterol-lowering effects. An elevated level of blood cholesterol is one of the well established risk factors for coronary heart disease.<sup>6</sup>

Phytosterols are cholesterol-like molecules absorbed only in trace amounts but inhibit the absorption of intestinal cholesterol including recirculating endogenous biliary cholesterol, a key step in cholesterol elimination. Natural dietary intake varies from about 167-437 mg/day.

The present investigation was carried out for the estimation of sterols in edible oil and ghee samples using UV- spectrophotometer by Liberman – Burchard method. In this reaction the Acetic anhydride in the Liberman – Burchard reagent is reacted with the sterol in the sample. Which gives a Green colour, whose absorbance can be determined by UV-visible spectrophotometer.



## MATERIALS AND METHODS

### Chemicals:

Cholesterol (Bombay Research Lab, Poona), Liberman-Burchard reagent (Acetic anhydride & Sulphuric acid), Chloroform

### Instrument:

UV – Visible Spectrophotometer 2450 (Shimadzu), Version no: - 2.21, Working mode: Photometry at  $\lambda^{\max}$  640 nm

### Standard cholesterol solution:

10 mg of standard cholesterol dissolved in 10 ml chloroform, shaken well.

### Liberman- Burchard reagent:

0.5 ml of sulfuric acid dissolved in 10 ml of acetic anhydride. Covered and kept in ice bucket.

### Sample Collection and preparation:

Different samples of edible oil and ghee were purchased from local market at Nashik & Dindori. The samples include Liberty Chanda (vanaspati ghee), Gemini (vanaspati ghee), Suryafit (sunflower oil), Liberty Tower (groundnut oil), Ruchies Nutri gold (groundnut oil),

Parachute (coconut oil), and Nihar (coconut oil), labelled as manufacturer A,B,C,D,E,F and G respectively.

Samples were weighed to 1 gm, dissolved in chloroform to 10 ml and further diluted to 10 times (10,000 ppm). 3ml of diluted sample solution were mixed with 2ml of Liberman-Burchard reagent and 2 ml of chloroform. The tubes were covered with black carbon paper and kept in ice bucket in dark place for 15 min.

Liberman-Burchard reagent react with the sterol to produced characteristic green colour, their absorbance were determined on spectrophotometer at 640 nm.

### Standard cholesterol procedure:

Pipette out standard cholesterol solution as 0.5, 1.0, 1.5, 2.0, 2.5 ml in five test tubes whereas tube 6 was kept blank and marked as S1, S2, S3, S4, S5 and S6. Then, 2 ml of the Liberman-Burchard reagent was added to all six tubes and final volume was made equal in each test tube by adding chloroform as shown in **Table no. 1**. The test tubes were covered with carbon black paper and kept in dark for 15 minutes in ice bucket. Then taken base line on spectrophotometer with blank (S6) at  $\lambda^{\max}$  640nm. The absorbances of all standards (six tubes) were determined on spectrophotometer and standard graph was plotted.

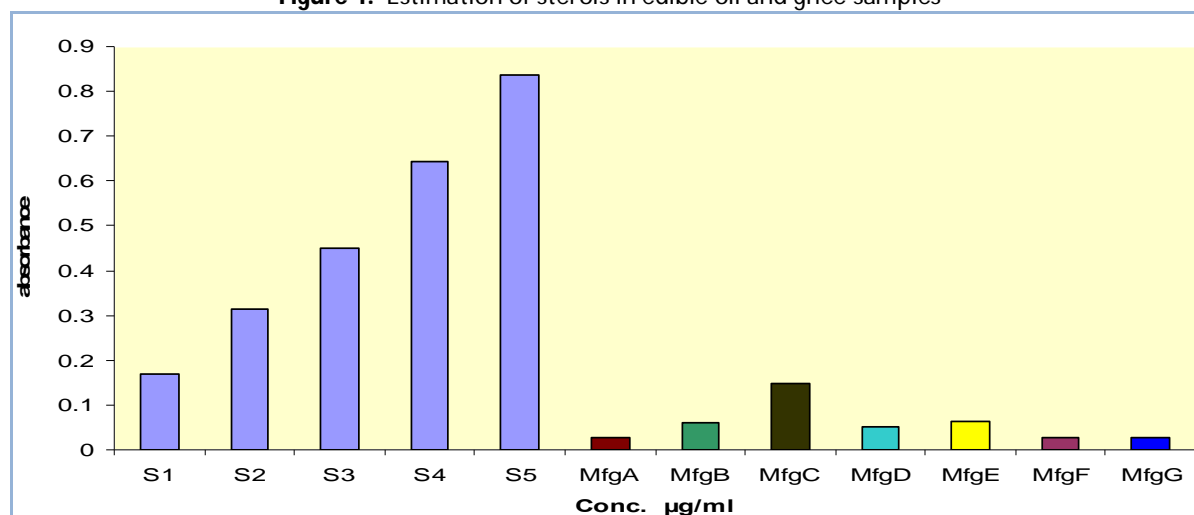
**Table 1:** Estimation of sterols in edible oils and ghee samples.

	Standard				Sample					% content of sterol
	I	II	III	Avg±S.D. (n=3)	I	II	III	Avg±S.D. (n=3)		
<b>S1</b>	0.1647	0.1937	0.145	0.1678±0.02	MfgA	0.0294	0.0268	0.0277	0.0279 ± 0.001	27mg/gm
<b>S2</b>	0.3346	0.3461	0.266	0.3156±0.26	MfgB	0.0759	0.0559	0.0528	0.0615 ± 0.062	61mg/gm
<b>S3</b>	0.4739	0.4432	0.434	0.4503±0.02	MfgC	0.1462	0.1551	0.1395	0.1469 ± 0.007	144 mg/gm
<b>S4</b>	0.5946	0.7152	0.623	0.6442±0.06	MfgD	0.0517	0.0535	0.0530	0.0527± 0.0009	52mg/gm
<b>S5</b>	0.7840	0.9261	0.796	0.8353±0.07	MfgE	0.0628	0.0617	0.0654	0.0633 ± 0.001	63mg/gm
					MfgF	0.0284	0.0236	0.0268	0.0262 ± 0.002	26mg/gm
					MfgG	0.0347	0.0210	0.0218	0.0258 ± 0.007	25mg/gm

S.D. = standard deviation

Mfg.A = Liberty Chanda (vanaspati ghee), MfgB = Gemini (vanaspati ghee), Mfg c = Suryafit (sunflower oil), Mfg D = Liberty Tower (groundnut oil), Mfg E= Ruchies Nutri gold (groundnut oil), Mfg F= Parachute (coconut oil), Mfg G= Nihar (coconut oil).

**Figure 1:** Estimation of sterols in edible oil and ghee samples



## RESULTS AND DISCUSSION

The sterol contents of Liberty Chanda and Gemini Vanaspati ghee determined as 27 mg/gm and 61 mg/gm respectively, while for Suryafit, Liberty Tower, Ruchi's Nutri gold, Parachute and Nihar Naturals oils found as 144 mg/gm, 52 mg/gm, 63 mg/gm, 26 mg/gm and 25 mg/gm Sunflower oil contains more amount of sterols and coconut oil have less in comparisons.

The present investigation is an overview of how food choices can affect one's cholesterol level. Every animal cell, both human and nonhuman, contains cholesterol. There is no need to consume cholesterol in diet, Blood cholesterol levels are affected by many factors. Population groups with an average cholesterol level of 150 mg/dl or less are largely free of atherosclerosis. For cholesterol level above 150mg, the risk of heart disease increases.<sup>7</sup> Cholesterol in food increases the level of LDLs.<sup>8</sup> One study show that people who adopt a vegetarian diet reduce their fat intake by 26% and achieve a significant drop in cholesterol levels in just six weeks.<sup>9</sup> Beside the very low level of fat eaten in a typical vegetarian diet, vegetables proteins also helps decrease risk of heart attack.

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