COCONUT OIL - SCARE?

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The Coconut palm is termed the "tree of life" or the "tree of heaven" as it is closely linked with our day to day life, providing food, drink and shelter. Coconut and coconut oil have been the major source of fat in our diet since thousands of years. The per capita consumption of coconut as fresh coconut, coconut milk and coconut oil and as processed forms such as soap, cosmetic etc, is reported to be 120 nuts/year. Moreover coconut had been the preferable selection in the bakery industry of even in the United States of America as coconut oil processes some superior inherent food qualities such as longer shelf life, better taste and the stability incomparable to other commercially available vegetable oils.

While coconut oil is much praised for its dignity as an important food constituent it is also undermined as a health hazard for human beings, coconut oil and coconut being intermingled with cholesterol, saturated fatty acids and heart attacks.

This baseless propaganda movement, without adequate research evidence has first been initiated by the American Soybean Association (ASA), in combination with the so called American Heart Savers Association throwing large sums of money to undermine coconut oil as a health hazard probably for the purposes of setting world market for their products against coconut oil. Further they have moved even to obtain the state sponsorship for this purpose.

A coconut oil phobia is developing even in our country and among our housewives grouping coconut oil under the same category of animal fats falsely assuming that coconut oil contains cholesterol and harmful saturated fatty acids, excessive consumption of which have the tendency to develop heart attacks. This has invariably resulted the Sri Lankan housewife to go for 'cholesterol free' labelled expensive vegetable oils.

This false and baseless propaganda against coconut oil, motivated scientific studies both by the coconut producing countries and the user countries and the trials conducted have not only dismissed the cholesterol issue, but has also identified some beneficial qualities in coconut oil.

Chemical characteristics of coconut oil

The words fats and oils are popular. What are these fats and oils? These are also chemical compounds made up of basic elements carbon, hydrogen and oxygen, chemically combined in various proportions, and chemically termed triglycerides or lipids. When these lipids are liquids under room temperature, they are called oils.

Coconut oil is also a glyceride which is formed with the chemical combination of fatty acids and glycerol. In general the major component of coconut oil is triglyceride (89.1%). Triglyceride is formed when three molecules of fatty acids combine with one molecule of Glycerol. Apart from these, coconut oil contains very small amounts of monoglyceride (One molecule of fatty acid and one molecule of Glycerol) and Diglyceride (Two molecules of fatty acids and one molecule of Glycerol) also. In addition, coconut oil contains more glycerol when compared to other vegetable oils. Glycerol is a carbohydrate with similar composition as in simple sugar.

The fatty acids in coconut oil are to two types namely, the saturated and the unsaturated, saturated fatty acids being the major fraction of the total fatty acids (91.6%). It is accepted that coconut oil contains more saturated fatty acids when compared to other vegetable oils in the market.

Out of the different saturated fatty acids in coconut oil, around 60-70% is of lauric and myristic acids, the lauric acid content being more (48%). The fatty acid composition of commonly used vegetable oils, and animal fats in comparison with coconut oil is given in Table 1. Accordingly it is very clear that coconut oil contains more medium chain triglycerides (63.5%); that is fatty acids containing carbon atoms 6 to 12 compared with the high amount of long chain saturated fatty acids in other saturated fats.

The percentages of various fatty acid groups according to the degree of saturation and length of carbon chain in few major fats and oils are given in table 2.

The main unsaturated fatty acids in coconut oil are Oleic and Linoleic acids. The Linoleic acid is an essential fatty acid and when compared to other fats and oils, coconut oil is considered as a poor source of essential fatty acids.

The digestibility co-efficient of coconut oil when compared to butter is about 91% and therefore coconut oil is readily and easily absorbed and digested. Due to this special feature, coconut oil has less tendency in getting deposited in our system as depot fats. In addition, the latest research trials have revealed that coconut oil is a source of energy for children subjected to malnutrition, patients suffering from indigestion, burns, and other disabilities. Studies have also highlighted coconut oil as suitable to build up immune systems in human beings including those who have contacted AIDS virus and also as a non promoting fat with respect to chemical carcinogenesis.

Ischemic Heart Diseases

Much has been reported on the alarming increase in heart diseases and those who succumb to such diseases. How does one simply explain a heart attack? Any blockage in an artery that supplys blood to the heart muscle and causes irregular blood supply disturbing its rigidity results in an stress. This condition causes chest pain which is referred to as heart attack. This blockage in supplying blood to the heart involves two processes namely atherosclerosis, the thinning of the arteries that carry blood to the heart due to the fatty materials getting deposited on the walls and thrombogeneisis, the instant blood clotting inside the arteries halting in the blood supply.

Excess cholesterol in blood is one main causative factor in heart diseases, as it tends to cause thinning of the artery. It has been accepted that higher content of cholesterol and saturated fatty acids in the diet as main factors that contribute to the increased cholesterol level in blood.

Cholesterol

Although the word cholesterol sounds frightening for most of the people, cholesterol is a fatty matter essential for our body health. Cholesterol is an structural compound in myelin spathe (nerve system), cell, sub cellular membrane and in other various body tissues. Cholesterol promotes skin care and also the precursor of bile acids and sex hormones. The consumption of cholesterol rich foods such as animal fats and allied animal products supplies cholesterol to our body. In addition, cholesterol is also produced in our body especially in the liver.

Excessive consumption of food items containing saturated fats is one contributory factor in elevating the cholesterol level in our blood. The effect of the inherent characters in this regard too needs attention. As the consumption of food containing saturated fatty acids remain controversial, an up to date description of the above has been included in latter sections of this article. If cholesterol levels in our blood is above normal it should be a matter of concern. This is because the matter that gets deposited in the interior of arterial walls especially in the coronary artery making the veins thinner thus blocking the free flow of blood into the heart is cholesterol.

There exists two types of cholesterol in blood which are termed HDL and LDL. The elevation of LDL cholesterol in the blood is injurious as this cholesterol type gets deposited on the arterial walls, and hence the necessity to maintain low LDL cholesterol level is advisable for health. While cholesterol is contained only in animal fats and allied animal products, their cholesterol levels differ according to the type of fats contained in them. The cholesterol and the saturated fatty acid contents of various popular food items are given in Table 3.

Cholesterol free vegetable oils

The imported vegetable oils available in the market bear a prominent label 'Cholesterol Free' or 'no cholesterol'. There is no doubt that this label induces you to purchase the product. But what is important here for you to bear in mind is that all vegetable oils inclusive of coconut oil do not contain cholesterol (Table 3).

Misleading concepts

It is generally believed that coconut oil causes heart diseases as it contains higher amounts of saturated fatty acids. It is accepted that the saturated fatty acid content in coconut oil is as high as 91.6%. However, those who com-

pare coconut oil, with other saturated fats like animal fats are not aware of the presence of sub groups within the broad category of saturated fatty acids.

As stated above coconut oil mainly contains medium chain triglycerides (MCT's) (carbon atoms 6-12 in the chain) amounting to 63.5%, compared to the total fatty acids and 69.3% of the total saturated fatty acid. Out of all saturated fats and oils only coconut and palm kernel oil contain high level of medium chain fatty acids.

The medium chain and long chain triglycerides act clearly in two ways in digestion, absorption and the metabolism. Short and medium chain triglycerides are quickly absorbed and are digested as easily as glucose and are therefore not translocated through the blood streams but passes directly to the liver. On the other hand, long chain fatty acids are comparatively slow moving and are not easily and readily digestible, and accordingly travels with blood to the liver via a long route. Therefore there is a high tendency for long chain fatty acids to get deposited in the peripheral and fatty tissues. Energy release due to oxidation of the long chain fatty acids is also comparatively complex and slow.

Long chain triglycerides require a complex transportation facility synthesized jointly by proteins, phospholipids and cholesterol termed lipoprotein, to pass through the blood circulatory system thereby increasing the levels of cholesterol in blood in relation to the high content of long chain fatty acids in our diet. Hence it is clear that there is a high tendency for cholesterol deposition within the artery wall coverings when food containing long chain saturated fatty acids is consumed, while the contribution by coconut oil comprising mostly of saturated fatty acids with higher percentage of medium chain is clearly negligible. The results have shown that the tendency for the coconut oil to produce LDL in blood is minimal and that coconut oil consumption and blood cholesterol and the coconut oil consumption and heart diseases are not at all interrelated, considering the above facts coconut oil can be termed as a quick and safe source of energy with a high digestive capacity.

Unsaturated and Polyunsaturated Fatty acids

Imported vegetable oils often carrys labels of 'High in polyunsaturated' or "High in unsaturated fatty acids", what are these unsaturated and polyunsaturated fatty acids?

When hydrogen atoms are removed from a saturated fatty acid it gives rise to a double bond between two of its carbon atoms, which is then termed unsaturated fatty acids. When a one double bond occurs it is termed mono-unsaturate, and if these bonds exceed one they are termed Polyunsaturates.

The adverse effects by the unsaturated fatty acids in the blood cholesterol level, are clearly minimal as against damages by long chain saturated fatty acids but that is only when such unsaturated fatty acids are consumed in its natural status.

Unlike coconut oil having saturated fatty acids, other vegetable oils such as sunflower, soybean and safflower oils having unsaturated fatty acids undergo oxidative rancidity within a short period emanating a foul smell. Therefore such oils are subjected to various chemical and physical treatments for purification and to make them semi*** One such treatment is known as hydrogenation partial or total (resupply of hydrogen to remove double bonds). Margarine is one such finished product. Hydrogenation is a process by which the long chain unsaturated fatty acids in the unsaturated oils are converted into long chain saturated fatty acids. The final product by hydrogenation of vegetable oils may contain long chain saturated fatty acids which are really injurious to health as, such dietary items are capable of producing LDL cholesterol.

In addition to this, unsaturated fatty acids lead to the production of trans fatty acids during hydrogenation. The behaviour of the so produced trans fatty acids is similar to or even worse than saturated animal fats. It is reported that trans fatty acids can increase the blood cholesterol level more than the long chain saturated fatty acids.

Furthermore it has been shown that these vegetable oils even if consumed in its natural state, the excessive consumption of polyunsaturated fatty acids tend to cause various forms of cancer.

Therefore the belief that soya oil, sunflower oil etc. are beneficial and coconut oil is harmful to health is highly questionable.

Essential fatty acids

Some fatty acids cannot be synthesized within our body and therefore have to be obtained essentially through food. They are termed essential fatty acids.

The quantity of essential fatty acids in coconut oil is low (2%) when compared to other oils, and therefore coconut oil is not a rich source of essential fatty acids. This is used as evidence to discredit coconut oil. The essential fatty acids that are not obtainable from coconut oil, are however adequately supplemented by our normal mixed diet consisting of leafy vegetables, legume seeds such as green gram, gram, cowpea, dhal, soya etc. and tubers like potato, fish, gingelly, and cashew which are some of the locally available rich sources of essential fatty acids. Coconut oil forms an important and an essential part of our traditional mixed dietary pattern, and hence we should not worry over coconut oil consumption and the essential fatty acid deficiency in coconut oil.

Coconut oil consumption and health

Generally excessive consumption of any type of oil/fat could be injurious to health. But comparatively the danger is minimal in the use of oils having fatty acids with short and medium chain triglycerides and un-hydrogenated unsaturated fatty acids. Conversely there is more risk in the use of animal fats and products having long chain saturated fat and hydrogenated long chain unsaturated fatty acids. When shifting towards western dietary habits the above named fats which are injurious to health are consumed more, and this combined with other factors turnout to be causes for heart diseases. It is therefore, very surprising that there is so much of misconceptions about consumption of coconut oil.

The majority of the population in our country does not consume sufficient amounts of high cost animal fats, and therefore their fat requirements are only supplied through coconut oil in their mixed diet. Hence any advice against the use of coconut oil is fallacious.

How could we then reduce the risks of heart diseases?

1. Limit eating animal products having long chain saturated fatty acids (meat, milk products, eggs, butter, cheese, sausages etc.) and foods containing higher levels of cholesterol (egg yolk, liver, brain, beef, mutton and pork fats, prawns, crabs, butter and milk etc.) Also limit consuming foods containing other fats and oils.
2. Eat in moderation and exercise regularly.
3. See your doctor once every six months

However for active children and for those who are engaged in hard manual work, the adverse effects of oils and fats are minimal.

(The author has referred Journals 'Coconut today', 'Indian Coconut Journal', Booklets issued by the Asia Pacific Coconut Community, Information leaflets issued by the US Council for Coconut Research Information and various other scientific research papers published locally and internationally on coconut oil issue, in preparing this article).

Table 1. Percentage of fatty acids in various fats and oils

Fatty Acid	Number of Carbons in the chain	Coconut Oil	Palm Kernel Oil	Corn Oil	Soybean Oil	Peanut Oil	Sunflower Oil	Safflower Oil	Palm Oil	Butter	Tallow	Lard
Saturated												
Caproic	6	0.5	0.3	-	-	-	-	-	-	2.2	-	-
Caprylic	8	8.0	3.9	-	-	-	-	-	-	1.0	-	-
Capric	10	7.0	4.0	-	-	-	-	-	-	2.5	-	-
Lauric	12	48.0	49.6	-	-	-	0.5	-	0.3	2.9	-	-
Myristic	14	17.0	16.0	-	0.1	0.1	0.2	0.1	1.1	10.8	-	-
Palmitic	16	9.0	8.0	11.5	10.5	11.6	6.8	6.5	45.2	26.9	23.7	24.8
Stearic	18	2.0	2.4	2.2	3.2	3.1	4.7	2.4	4.7	12.1	13.0	18.7
Arachidic	20	0.1	0.1	0.2	0.2	1.5	0.4	0.2	0.2	0.2	-	-
Unsaturated												
Palmitoleic	16.1	0.1	-	-	-	-	0.1	-	-	-	-	-
Oleic	18.1	6.0	13.7	26.6	22.3	46.5	18.6	13.1	38.8	28.5	40.9	36.0
Linoleic	18.2	2.3	2.0	58.7	54.4	31.4	68.2	77.1	9.4	3.2	10	3.7
Linolenic	18.3	-	-	0.8	8.3	-	0.5	-	0.3	-	-	-
Archidonic	20.4	-	-	-	0.9	-	-	-	-	-	-	-

Source : Coconut Today Journal, Special Edition

Table 2. Percentages of sub groups of fatty acids according to their saturation and chain length in major oils and fats

Fatty acid sub group	Coconut oil	Palm Kernel oil	Palm oil	Corn oil	Soybean oil	Ground nut oil	Sunflower oil	Butter fat	Lard
Saturated medium chain fatty acids (C6-C12)	63.5	57.8	0.3	-	-	-	0.5	12.5	-
Saturated long chain fatty acids (C14-C20)	28.1	26.5	51.2	13.9	14.0	14.8	12.1	57.0	45.0
Unsaturated long chain fatty acids (C16:1 and above)	8.4	15.7	48.5	86.1	86	85.2	87.4	31.1	55.0

Table 3. Cholesterol and saturated fat content in some common foods

Food	Cholesterol (mg/100 g)	Saturated fat (g /100 g)
Eggs	500	3
Organ meats (Liver, Kidney)	>300	2
Butter	230	50
Shrimp, Crab, Lobster	110	1
Cheese	110	21
Meat (Beef, Pork, Lamb)	90-100	5-13
Poultry (No skin)	90	1
Fish	70	1
Milk (3.5 % fat)	40	7
Milk (Skim)	14	<1
Vegetable oil	0	13
Coconut oil	0	75

Source: Coconut Today Journal, Special Edition

QUOTE FROM TREE CROPS ON 'FACTS & FALLACIES ABOUT COCONUT OIL"

"The above mentioned book complied and edited by you is really interesting and equally worth reading. I can say without any degree of exaggeration that the book is informative and educative. It helps to eradicate some of the deep-mooted misconceptions about coconut oil from the minds of the Indian consumers, especially Malayalees who have been using this edible oil from time immemorial, without any ill-effects on health. Besides, we the Keralites are fully aware of the fact that most of the genuine Ayurvedic oils and medicines, which have established their proven healing and remedial power through generations, are prepared with the pure coconut oil. It is, no doubt, still used by many indigenous system of medicines."

Source : Cocomunity, Vol. XXV No. 16, (1995)