

Health Benefit of Coconut Milk

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ABSTRACT

Indonesia, India and the Philippines are the major world coconut producers. Of the three leading producers, the Philippines is the biggest supplier to world trade in the form of coconut oil. Indonesia and India use the bulk of their coconut internally, both as food nuts and as coconut oil. The main use of coconut in Indonesia is for coconut milk. Indonesians are reported as moderate coconut milk consumers, with a per capita consumption of 6.5-8.2 kilograms.

Coconut milk is an important part of the dietary in coconut producing countries like Indonesia. It is valued mainly for its characteristic nutty flavor and for its nutritional content. Coconut milk is used as an ingredient in many fish, shellfish, meat, poultry, vegetable dishes, yellow rice, delicious rice (nasi gurih), confectionaries, and baked goods.

The main component of coconut milk is coconut oil, it account for 38% by weight. Coconut oil is naturally saturated, about 92% consists of saturated fatty acids, mainly are medium chain fatty acids (MCFA). About 50 % of fatty acid in coconut oil is lauric (C₁₂), for this reason, it is called the "lauric oil".

For years, coconut oil has been the undeserving target of negative publicity generated by the North American Soy Oil Industry and consumer activist groups. The

main reason for the negative publicity campaign is money; coconut oil is a third-world commodity and it is in direct competition with hydrogenated soy oil.

Some researches shown that in fact saturated fat in coconut had no harmful effect to the human, because mainly consist of MCFA, especially lauric acid. Lauric acid is a medium chain fatty acid, found naturally in mother's milk. Lauric acid has the beneficial function of being formed into monolaurin in the body. Monolaurin is the antiviral, antibacterial, and antiprotozoal, monoglyceride used by the body to destroy lipid-coated viruses such as cytomegalovirus (CMV), HIV, herpes, and influenza.

Adults could probably take benefit from the consumption of 10 to 20 grams of lauric acid per day. Based on the per capita intake of coconut oil, the per capita daily intake of lauric acid can be approximated. The daily intake of lauric acid in India is about 16 grams, the Philippines 7.3 grams, Indonesia 4.7 grams and Singapore 2.8 grams. For Indonesians, 4.7 grams lauric acid daily intakes is still far from 10-20 grams. As a major coconut producing country, it can be increased easily by means of increasing coconut milk consumption through consuming many kind of delicious Indonesian daily foods.

Key words : coconut milk, MCFA, lauric, health benefit

INTRODUCTION

Back Ground

Indonesia is one of the major coconut producers in the world beside India and the Philippines. It is reported that Indonesian people categorized as moderate coconut milk consumers, with a per capita consumption of 6.5-8.2 kilograms (Banzon, et al. 1990).

The important constituent of coconut milk is coconut oil, viz. 27-40% (m/m), means that when we consume coconut milk we consume coconut oil about one third of it. Many Indonesian people are worry to eat food with rich in coconut milk, because they afraid of a negative effect of coconut oil on their health. This misleading information has been the target of negative publicity generated by the North American Soy Oil Industry. The main reason for this negative publicity campaign is money; coconut oil is a third-world commodity, and it is in direct competition with hydrogenated soy oil for ingredient space in North American food products. The soy oil industry has successfully promoted a faulty study on coconut oil that has systematically removed coconut oil from North American diet.

Ongoing research, has proved a virtual potency of compounds in coconut oil that could offer considerable benefits to human health. These benefits can be broken into three groups : (1) medium chain triglycerides, (2) antimicrobial fatty acids, and (3) safety. One of the most important compound of coconut oil which affected human health is lauric acid. It is not known exactly how much food made with lauric oil is needed in order to have a protective level of lauric acid in the diet. Infant probably consumes between 0.3 and 1 gram per kilogram of body weight if they are fed human milk or an enriched infant formula that contains coconut oil. This amount appear to have always been protective. Adults could probably take benefit from the consumption of 10 to 20 grams of lauric acid per day. Growing children probably need about the same amounts as adults.

Indonesians, as moderate coconut milk consumers, with a per capita consumption of 6.5-8.2 kilograms is equivalent to about 3.8 gram lauric acid consumption

per day. Meanwhile total lauric acid daily intake for Indonesian is reported as 4.7 gram, means that still far from enough, viz. 10 to 20 grams.

The objective of this review paper are : (1) to socialize the virtual potency of compounds in coconut oil as well as that of coconut milk that could offer considerable benefits to human health. and (2) to confine Indonesian people of being no hesitate in consuming foods which rich in coconut milk or coconut oil.

COCONUT AND COCONUT MILK

Coconut

The coconut palm (*Cocos nucifera*, L.) is commonly called "Tree of Life" because of the myriad uses. All parts of the palm, from the roots to the leaves and particularly its fruit, have special uses as a provider of food, beverage, animal feed and as an important raw material for various industries like the oleochemical industry. Traditionally, it requires little attention throughout its life span of over 50 years, thus the reference as "lazy man's crop". Commercial farms, however, are tended and developed for improved productivity (Agustin, 2000)

In most Asian and Pacific countries coconut grows very well. World production of coconut averaged about 51.01 billion nuts. Of this total, close to 70% is supplied by the major producers viz. Indonesia, India and the Philippines. Of the three leading producers, the Philippines is the biggest supplier to world trade in the form of coconut oil, which accounts for some 80% of her total coconut production. Indonesia and India use the bulk of their coconut internally, both as food nuts and as coconut oil (Agustin, 2000).

The fruit of coconut takes 12 months to develop from flowering to maturity. The common mature coconut weight is more than 1 kilogram and is ovoid in shape. Young coconuts are green in color and turn brown as they mature. The coconut itself is composed of an outer layer called "mesocarp" (coconut husk) which covers the hard layer called the "endocarp" (shell). Within the shell is the "endosperm" (kernel, meat) of about 1-2

cm thick. A thin brown layer called the "testa" (paring) separates the kernel from the inner surface of the shell. The cavity within the kernel has an average volume of 300 ml and contains the endosperm liquid called "coconut water". The kernel is considered as the most important part of the coconut as it is the source of various coconut products such as desiccated coconut, copra, coconut oil, coconut milk, coconut flour, protein powder, etc. (Hagenmaier, 1980)

Coconut Milk

Coconut milk is the term used to designate the liquid obtained by manual or mechanical extraction of grated coconut meat with or without water addition. Coconut milk is an important part of the dietary in coconut producing countries. It is valued mainly for its characteristic nutty flavor and for its nutritional content. In most Asian and Pacific countries where coconut abounds, coconut milk is used as an ingredient in many fish, shellfish, meat, poultry, and vegetable dishes, yellow rice, delicious rice (*nasi gurih*) and baked goods.

The highest per capita consumption of coconut milk was recorded in West Samoa and Sri Lanka, that is, 30-36 kilograms. Moderate consumers are the Thais and Indonesian, with a per capita consumption of 6.5-8.2 kilograms. Per capita consumption in the Philippines (0.3-0.6 kg) and Singapore is relatively insignificant (Banzon, et al. 1990).

In addition to domestic consumption, coconut milk in the canned, tetra pack, and dehydrated forms has earned great popularity in the world market. There is growing appreciation for this product as an ingredient in household recipes, as a component of processed foods, such as ice cream, candies, coconut smoothie, coconut oatmeal, coconut pancakes etc. (Byrnes, 2001).

Coconut milk is a milky white emulsion easily separates into two distinct phases : a heavy aqueous phase and a lighter cream phase. This separation, sometimes referred to as "creaming" is generally observed in emulsion of the oil-in-water type. Creaming occurs as rising fat globules collide, agglomerate, and, rising faster with increasing size, separate into the upper creamy layer.

This phenomenon is a manifestation of the instability of an emulsion.

Coconut milk production involves extraction of the milk from the comminuted fresh endosperm with or without added water. This method is some times referred to as the wet process, in contrast to the dry process which has the dried coconut meat as an intermediate product. Coconut milk is generally produced from mature nuts of about 12 months in age. At this stage, the meat is hard and thick with a typical composition of as follows : 50% moisture, 34% oil, 3.5% protein, 3.0% fiber, 2.2% ash, and 7.3% carbohydrates (Banzon, et al., 1990).

Traditionally, coconut milk is prepared at home by adding water to grated coconut meat, then squeezed out the milk manually or through a piece of cloth. The grater used in comminuting the coconut meat is a simple flat toothed scraper attached to a small wooden bench. Motorized coconut shredder is now available and are preferred by local grated coconut traders, who sell their grated coconut in traditional markets.

The composition of coconut milk depends largely on the amount of water used for extraction. Moisture range from 47 to 56%; fat, 27 to 40%; protein 2.8 to 4.4%; ash 0.9 to 1.2% and carbohydrates 5.0 to 16.0% (Banzon, et al., 1990). From this chemical composition, it looks that incorporating coconut milk as ingredient in a certain food, equivalent to the using of coconut oil about one third of the amount of coconut milk used.

COCONUT OIL AND ITS HEALTH BENEFITS

Coconut Oil and Its Fatty Acids

Coconut oil

Like other edible fats and oils, coconut oil is a mixture of chemical compounds called glycerides. Each glyceride is a combination of glycerol and fatty acids. One hundred grams of coconut oil (CNO) upon hydrolysis yields 85 grams of fatty acids (FA) and 25 grams of glycerol. CNO is therefore largely fatty acids. Glycerol

may be considered as a carbohydrate, and its chemical constituent is that of a simple sugar.

Fatty Acids

The fatty acids composition of CNO varies with the species and the maturity of nuts. Table 1 show the composition of 100g fatty acid from CNO. From the list of FA of coconut oil, it is seen that this oil is highly saturated. This property of CNO is of great value to manufacturers of food products. Because of this high saturation, CNO is very resistant to rancidity and, hence, CNO-containing foods have a long shelf life (Banzon et al. 1990; Peat, R. 2000). About 64% of the fatty acids in coconut oil is medium chain fatty acids (MCFA), a mixture of FA with C₆ to C₁₂ and account to 48% of them is lauric acid. Coconut oil is by far the richest commercial source of lauric acid from vegetable origin. It shares the distinction as lauric acid source only with palm kernel oil. This vegetable oil pair is thus called the "lauric oils".

Table 1. The fatty acid composition of 100g fatty acid

in CNO

Note : C₆ means a fatty acid containing 6 carbon

Carbon Number	Fatty acid chemical name	Amount, g
C ₆	Caproic	0.2-0.8
C ₈	Caprylic	5.4-9.5
C ₁₀	Capric	4.5-9.7
C ₁₂	Lauric	44.1-52.0
C ₁₄	Myristic	13.1-19.0
C ₁₆	Palmitic	7.5-10.5
C ₁₈	Stearic	1.0-3.2
C _{18:1}	Oleic	5.0-8.2
C _{18:2}	Linoleic	1,0-2.6

atoms, C_{18:1} represents a FA with 18 carbon atoms and one seat of unsaturation (one double bond)

Health Benefits

Coconut oil received a very bad reputation back in the '70s when Western scientists branded it a villain due to its high saturated fat content without considering what kind of triglycerides it contains. Beginning with this flawed study, continuing through the 1950s, intensifying in the 1980s, and again in the 1990s, the misinformation about coconut oil has been promulgated economically motivated by organization such as the American Soybean Association (ASA), the Corn Product Company and the Center for Science in the Public Interest. They are aided by the United States Food and Drug Administration (FDA), many of whose key personnel are recruited from and return to the vegetable oil industry. Their campaign, based on totally erroneous information, totally discredited coconut oil and caused its nearly complete elimination from the American diet.

Ongoing research, however, has proved a virtual powerhouse of compounds in coconut oil that could offer considerable benefits to human health. These benefits can be categorized into three groups : (1) medium chain triglycerides, (2) antimicrobial fatty acids, and (3) safety.

Medium Chain Triglycerides (MCT)

The predominant fatty acids in MCT oils are medium chain fatty acids (MCFA) and over 60% of the fats in coconut are MCFA. Important here to note the difference between coconut oil and commercial MCT oils : coconut oil contain a particular fatty acid called laurate, while commercial MCT oil preparation do not. It is primarily lauric acid that makes coconut oil of particular value to immune-compromised individuals.

Food scientists have long noted the nutritional benefits of MCFA (note : MCFA and MCT are used interchangeably). Coconut oil, or some derivative of it, is used in hospital formula to feed the very young, the critically ill, and those who have digestive problems. MCFA from coconut oil have been added to baby formula for decades. Why do they use it ? Because the MCFA in coconut oil are easily digested, absorbed, and

provide a quick source of energy necessary to promote healing. These fats provide nutritional benefits that can improve overall health of both the sick and the well, the young and the old. Unfortunately, few foods nowadays contain MCFA, the best source is coconut oil. By adding coconut milk/coconut oil to our diet we can really eat our way to better health.

Digestion and Nutrition Absorption

MCT are broken down almost immediately by enzymes in the saliva and gastric juices so that pancreatic fat-digesting enzymes are not even essential. The digestive health advantages of MCFA over long-chain fatty acids (LCFA) are due to the differences in the way our bodies metabolize these fats. Because the MCFA molecules are smaller, they require less energy and fewer enzymes to break them down for digestion. They are digested and absorbed quickly and with minimal effort.

Inside each of our cells is an organ called mitochondria, where energy needed by the cell to carry on its function is generated. Mitochondria are encased in two membranous sacs which normally require special enzymes to transport nutrients through them. MCFA are unique in that they can easily permeate both membranes of the mitochondria without the need of enzymes and thus provide the cell with a quick and efficient source of energy (Fife, B., 2003)

Metabolism and Energy

MCFA are funneled directly to the liver and converted into energy, therefore, the body gets a boost of energy. This burst of energy has a stimulating effect on the entire body. Because of these, many of the powdered sports drinks and energy bars sold at health food stores contain MCFA to provide a quick source of energy. The MCFA most often used in sports drinks and energy bars are in the form of MCT oil. They are usually indicated as "MCT" on food, supplement, and infant formula labels. Athletes and other active people looking for nutritional, non-drug methods to enhance exercise performance have begun using them.

Although many studies shown MCFA to boost energy and endurance, there are other studies which have shown little or no effect, at least when MCFA mixture are taken in a single oral dose. It appears that the best way to increase energy and endurance is to consume MCFA on a daily basis and not single time just before or during competition.

Cholesterol level

Cholesterol is a fat-like substance found in all animal and human cells. It is essential to life. The human body manufactures all the cholesterol needed, thus we can live without eat any cholesterol. Cholesterol is attached to protein package called lipoproteins, which are assembled in the liver and circulate in our bloodstream. Two of the better known types of lipoproteins are HDL (high density lipoprotein), the "good" type that carries cholesterol out of the stream; and LDL (low-density lipoprotein), the "bad" or "lousy" type that deposits cholesterol in arterial walls, where it can build up and narrow arteries. High blood cholesterol is a known risk factor for heart attack. More recently researchers have recognized that the ratio of LDL to HDL is more important than the number of itself.

Dr. Enig's studies show that a diet including CNO while having a higher level of LDL, however, it is counter balanced by a higher level of HDL. Trans fatty acids on the other hand decrease HDL and increase LDL, this is a dangerous effect.

Antimicrobial Fatty Acid

CNO contains several anti-microbial fatty acids that can directly benefit HIVers, PWAs. The first is caprylic acid (5.4-9.5%). Sold as supplement in health food store, this fatty acid has been used for decades as a remedy for intestinal yeast infections as caprylic acid kills such potential harmful fungi as candida albicans and candida tropicalis (Byrnes, 2000).

Some other fatty acids in CNO include capric (4.5-9.7%), myristic (13.1-19.0%), palmitic (7.5-10.5%), and oleic (5.0-8.2%). All of these are needed by body to carry out a range of biological functions. Capric acid

has also demonstrated significant activity against Herpes simplex-2, chlamydia, and HIV-1.

The major fatty acid in CNO, however, is lauric acid (44.1-52.0%). Lauric acid is also one of the principle fats found in human breast milk. It is generally agreed that the lauric acid in breast milk is one of the key things that protects a baby's intestine from bacterial, protozoal, viral, and fungal infections until its immune system can gain enough strength to fend for itself. Lauric acid convert into the substance monolaurin in the small intestines, a powerful, yet safe, antimicrobial substance. Research by lipid biochemists has shown monolaurin to inactivate fungi such as *Candida albicans*, and such bacteria as *Listeria*, *Staphylococcus*, and *Streptococcus*, as well as such viruses as Herpes, and HIV. Monolaurin apparently inactivates microbes by disrupting their lipid membranes.

Recognition of the antimicrobial activity of the monolaurin has been reported since 1966. The action attributed to monolaurin is that of solubilizing the lipids and phospholipids in the envelope of the virus causing the disintegration of the virus envelope, or lysing the plasma membrane (Enig, G.M., 2000). Some of the viruses inactivated by these monolaurin, in addition to HIV, are the measles virus, herpes simplex virus-1 (HSV-1), vesicular stomatitis virus (VSV), visna virus, and cytomegalovirus (CMV).

It is not known exactly how much food made with lauric acid is needed in order to have a protective level of lauric acid in the diet. Infants probably consume between 0.3 and 1 gram per kilogram of body weight if they are fed human milk or an enriched infant formula that contain CNO. This amount appears to have always been protective. Adults probably benefit from the consumption of 10 to 20 grams of lauric acid per day. Growing children probably need about the same amounts as adults.

Based on the per capita intake of CNO or coconut milk in 1985 as reported by Kaunitz in 1992, the per capita daily intake of lauric acid can be approximated. For those major producing countries such as the Philip-

pines, Indonesia, India, Sri Lanka, and consuming countries such as Singapore, the daily intakes of lauric acid were approximately 7.3 grams (Philippines), 4.7 grams (Indonesia), 12 to 20 grams (India), 14.9 grams (Sri Lanka), and 2,8 grams (Singapore) (Enig, M.G. 2000). As one of the major coconut producing country, Indonesia which is recorded as moderate coconut milk consumers, with a per capita consumption of 6.5-8.2 kilograms (equivalent to 4.7 grams lauric acid daily intake) has a good opportunity to be increased into 10-20 grams daily intake through promoting a healthy coconut milk consumption.

Safety

A major benefit in using CNO as well as coconut milk is its safety; no side effects have ever been recorded with its use. Although some health professionals might be concerned over the high saturated fat content of coconut oil (about 96%), such worries are unwarranted. United Nations surveys in 1978 show that in fact, in Sri Lanka, a coconut-eating country, the reported death from heart disease is only one out of 100,000; where as in countries with little coconut oil consumption, the figure is from 18 to 187 per 100,000. (Banzon et al., 1990)

For thousands years people in the warm climates have been using natural plant saturated oils (coconut, palm, etc) safely, but now with the shift to the consumption of industrially extracted hydrogenated seed oil, we see an increase in degenerative heart diseases, diabetes, arthritis and cancers.

The idea that saturated fats cause heart disease is totally wrong. Our bodies manufacture saturated fatty acids all the time to carry out a number of important biological functions. The same saturate that the body makes are the same ones found in food. There were experiments that shows coconut oil to elevate triglyceride and cholesterol levels, but these studies were done with hydrogenated CNO, not natural CNO (Byrnes, S. 2000).

CONCLUSIONS

The fact that coconut oil as well as coconut milk are beneficial for human health has been supported by some researches and epidemiology data, needs to socialize more intensively. Coconut oil has been the undesirable target of negative publicity generated by American Soy Oil Industry and consumer activist groups, mainly because of economic back ground. It is now time to educate the truth about coconut oil as well as coconut milk, that they are beneficial for human health, because they are MCT, antimicrobial, and safe food. As one of the major coconut producing country, Indonesia has a big opportunity to increase lauric acid daily intake from 4.7 gram per day into 10-20 gram per day by encouraging her people to consume more coconut milk as well as coconut oil in their diets

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