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Prominence of Coconut Oil Consumption on Cardiovascular Disease

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ABSTRACT

Coconut oil is being heavily promoted as healthy oil, with benefits that include support of heart's health. Coconut oil has recently emerged as a heart healthy oil in addition to a balanced, nutritious diet. Coconut oil contains high levels of lauric acid that is directly absorbed by enterocytes and may prevent the fat deposition in blood vessels. In addition, flavonoids and polyphenols present in Coconut oil may be beneficial in reducing the oxidative stress involved in the etiology of various diseases, for instance, cardiovascular diseases and cancer. Cardiovascular disease (CVD) is known as the number one cause of death worldwide. It is associated with huge health care costs and loss of productivity in the population. Poor diet is an important risk factor in CVD. Diet rich in polyunsaturated fatty acids, such as virgin coconut oil (VCO), has been associated with a reduced risk of CVD to some degree, coconut oil has become a fad in the form of "super food." However, not all claims associated with coconut oil and heart health has been fully studied. There is still a necessary review of the effects of this oil in the body required from both biological and chemical perspectives. This article aimed to review the likely benefits of Coconut oil and its effects related to oxidative stress and cardiovascular related diseases.

KEYWORDS: Cardiovascular disease, Coconut oil, Virgin coconut oil, Cholesterol, Medium-chain triglycerides, polyunsaturated fatty acid.

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INTRODUCTION

Coconut oil has been important edible oil for the food industry for many years and is normally termed or classified as lauric oil, tropical oil, or a confectionery fat¹. The usual commercial product is either refined, bleached, and deodorized coconut oil or, more recently, virgin (unrefined) coconut oil². The production of coconut oil has been increasing worldwide. In 2010, 3.5 million metric tons were produced, with the major producers being the Philippines (1.7 million metric tons), Indonesia (0.7 million metric tons), and India (0.5 million metric tons). Of this total, around 2.0 million metric tons were exported, with the major exporter being the Philippines³.

One of the advantages of coconut oil is its resistance to oxidation and polymerization, which makes it stable oil for cooking. For example, it is suitable for single-use shallow frying, although it is not recommended for continuous deep-fat frying because of its low smoke point, which may lead to the production of potentially carcinogenic substances upon overheating⁴.

Cardiovascular disease (CVD), one of the major non-communicable diseases, is known as the number one cause of death worldwide. In 2012, approximately 17.5 million people died from CVD, which accounted for 31% of all worldwide deaths⁵. The economic burden of CVD has been estimated to be more than USD\$400 billion in terms of health care spending and loss of productivity⁶. One important risk factor for CVD is poor diet⁷. Although expensive therapeutic procedures can be used to treat CVD, it would be better to emphasize the importance of diet modification to prevent and reduce CVD risk which will have an impact on reducing health care cost and resources⁶, particularly in the middle and lower income countries with limited health care funding. Therefore, improving diet is one of the critical strategies for the American Heart Association to prevent CVD in the general population. High intakes of total fat and saturated fatty acid (SFA) are associated with a higher risk of CVD, while a higher consumption of polyunsaturated fatty acid can decrease the risk of CVD. Foods that are rich in polyunsaturated fatty acids include virgin coconut oil.

Over one-third of the Indian adult population is considered to be obese. Additionally, the number of Indian adults who are classified as either overweight or obese has continually increased over the past two decades. Cardiovascular disease (CVD) is the leading cause of all-cause mortality in both men and women in the India. Modifiable risk factors for CVD include being overweight or obese, sedentary lifestyle and poor diet (e.g., a diet high in saturated fat, added sugar and low in fibre). In recent years, coconut oil has emerged as the heart healthy alternative to butter. Researchers also described coconut oil with antibacterial and antifungal properties when used as a topical treatment on human skin and hair⁷.

CHEMICAL COMPOSITION AND METABOLISM OF COCONUT OIL

Coconut oil has been shown to have the potential to protect against not only heart disease but a wide variety of chronic health problems including diabetes and cancer as well as a means to prevent and even treat infectious diseases, however, knowledge about coconut oil has been kept buried in medical journals because of a general prejudice against saturated fats⁸.

Coconut oil is composed of the fatty acids, caprylic acid C-8:0 (8%), capric acid, C-10:0,(7%), lauric acid C-12:0, (49%), myristic acid C-14:0(8%), palmitic acid C-16:0 (8%), stearic acid C-18:0 (2%), oleic acid C-18:1 (6%) and 2% of C-18:2 linoleic acid⁹.

Long chain fatty acids (LCFA) are a chain length of 12 or more. The length of the carbon chains dictates the fatty acid's role in metabolism in the human body. Digestion of MCFA begins in the mouth with salivary lipases and continues with gastric juices of the stomach, without assistance from the pancreatic fat-digesting enzymes. MCFA are absorbed from the intestines into portal vein and then transported to the liver and can be utilized for metabolism usually in the form of ketone bodies. In contrast, digestion of LCFA involves pancreatic lipases. LCFA form lipoproteins in the small intestine. Thus, allowing direct entry into the bloodstream via the lymphatic system and mostly bypassing the liver. While these lipoproteins travel in the blood, the fatty components (cholesterol and saturated fatty acids- SFA) will accumulate in the tissues of the body contributing to the fat stores, thus increasing the risk of chronic diseases (hypertension, cardiovascular disease, obesity). These risks are not common among MCFA since they are not easily esterified and resist binding making them less likely to contribute to the fat storage¹⁰.

The medium chain saturated fatty acids allows lipids to be directly absorbed from the intestine and sent straight to the liver to be rapidly used for energy production and thus MCFAs do not participate in the biosynthesis and transport of cholesterol. This cardio-protective attribute of coconut oil can be taken advantage of by developing countries in West Africa that are grappling with the nutrition transition with its attendant upsurge of chronic diet-related diseases including obesity and heart disease¹¹.

NUTRITIONAL PROFILE AND METABOLISM OF DIETARY FATS — COCONUT OIL PERSPECTIVES

Fats and oils are concentrated forms of energy and the energy yield from the complete oxidation of fatty acids is about 9 kcal per gram, in comparison with about 4 kcal per gram for carbohydrates and proteins. Triglycerides are the most abundant fats found in foods. They are molecules made of fatty acids (chain-like molecules of carbon, hydrogen, and oxygen) linked in groups of three to a backbone of glycerol. When foods containing fats are consumed, the fatty acids

are separated from their glycerol backbone during the process of digestion. Fats and oils in the diet are thus available to the body as fatty acids¹².

Fatty acids differ from one another in two ways—in chain length and in the degree of saturation. With respect to degree of saturation, fatty acids can be classified as saturated (SFA), monounsaturated (MUFA) and poly-unsaturated (PUFA) fatty acids. Saturated fatty acids, or saturated fats, consist of fatty acids whose carbon chain is “saturated” with hydrogen. These fats are found primarily in foods of animal origin—meat, poultry, dairy products, and eggs—and in palm, and palm kernel oils. High intake of saturated fats is associated with increased risk of coronary artery disease¹³.

Polyunsaturated fatty acids lack two or more pairs of hydrogen atoms on their carbon chain. Safflower, sunflower, sesame, corn, and soybean oil are among the rich sources of polyunsaturated fats (which are also liquid at room temperature).

Coconut oil is made up of about 90% saturated fats and 9% unsaturated fats. However, the saturated fats in it differ from saturated fats in animal fats. Over 50% of the fats in coconut oil are medium chain fatty acids, such as lauric acid (12:0). Coconut oil is the highest natural source of lauric acid. Lauric acid and its derivative monolaurin constitute around 50% of coconut fat-derived lipid. However, unlike long chain fatty acids, these medium chain free fatty acids and monoglycerides are absorbed intact from the small intestine, and do not undergo degradation and re-etherification processes. They are directly used in the body to produce energy, and widely used in infant formulas, nutritional drinks for athletes and intravenous lipid infusions¹⁴.

EFFECTS OF COCONUT OIL ON THE PREVENTION OF CARDIOVASCULAR DISEASES

For considerable time, coconut oil has been thought to be aculpit in raising CVD/CHD risk due to its high SFA content. However, it is important to also understand that this oil contains a good amount of MCFA, which has numerous health benefits, as highlighted above. Consumption of food rich in MCFA reduces the level of body fat and the CVD/CHD risk. With these known benefits of MCFA, it became necessary to establish methods of oil production that would enhance that the effects of MCFA and thereby bring about CV benefits. However, there is limited information on the use of coconut oil and Virgin Coconut Oil for Cardiovascular benefits, which is the emphasis of this review¹⁶. It has been found that the process of production could possibly influence the content of coconut oil and there by have an impact on health outcomes. Traditionally, coconut oil is obtained from copra (ie, the dried kernel of the coconut) through a process of refining, bleaching, and

deodorizing, which results in higher levels of free fatty acid. To make this process healthier, the production process was modified, thus ushering in the era of Virgin Coconut Oil¹⁷ [VCO].

CARDIO PROTECTIVE EFFECT OF COCONUT OIL

Oils rich in saturated fats have been identified as a catalyst for promoting atherosclerosis, thereby increasing the risk for cardiovascular diseases¹⁸. A recent publication from the Global Burden of Disease presented information on the consumption of oil in various regions of the world¹⁰. It brought to light the global problem of Transfatty acid consumption beginning at a young age and further highlighted how this consumption has now become part of our lifestyle. Given these trends, it is not surprising to find a rise in cardiovascular diseases (CVD) across the globe. Fats and oils contain various proportions of both long chain and medium-chain fatty acids (LCFAs and MCFAs). Oils rich in Long Chain Fatty Acids contain varying proportions of Saturated Fatty Acids (SFA), Poly Unsaturated Fatty Acids (PUFA), and Mono Unsaturated Fatty Acids (MUFA), whereas those rich in Medium Chain Fatty Acids (MCFA) contain medium chain SFAs¹⁹.

The SFAs have been suggested to increase LDL and total cholesterol¹¹. Thus, it is essential to emphasize the “better” oils that have lower SFAs and higher PUFAs. This emphasis ushered in the era of ω -3 PUFAs beginning in the 1980s. The ω -3 and ω -6 PUFAs are essential fatty acids commonly obtained through various dietary sources²⁰.

CONCLUSION

Cardiovascular disease should be treated effectively with diet, exercise, and medications. Advise to patients seeking dietary supplementation with coconut oil, especially for primary prevention, to do so in conjunction with a low-fat, nutrient-rich diet and an exercise regimen. Coconut oil generally is a well-tolerated supplement; adverse effects include gastrointestinal discomfort and diarrhoea, likely resulting from the high fat content. Therefore, this review does not support that coconut oil is a healthy oil in terms of reducing the risk of CVD. For patients with obesity or lipid disorders the consumption of coconut oil's long-term safety and efficacy are unknown.

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