

Review

Coconut Oil: Good or Bad for Human Health? (Asian and Philippine Perspective)

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ABSTRACT: Coconut oil is commonly used in most Asian countries such as the Philippines. However, with the introduction of the “Lipid Heart Theory”, there has been a decrease in the oil’s acceptance by consumers. This short review aims to identify the current status of coconut oil, particularly in the Philippines, in terms of its effects on human health. The health aspects considered in this review are: cardiac health, lipid profile, visceral adiposity, weight management, immunity, degenerative disease, infectious disease, skin and hair health, and oral health. Coconut oil generally confers positive effects on the health of the consumers but further studies are necessary in order to determine its long term effects.

Keywords: *coconut oil, human health, lipid heart theory, Philippines, virgin coconut oil*

INTRODUCTION

Coconut oil consists of 90% saturated fatty acids (SFA), 65% of which are medium chain SFA (MCFA) and approximately 30% are long chain SFA (LCFA).^{1,2} It is also a *trans*-fatty acid free oil.³ Various types are available in the market differing primarily in the method of oil extraction. Refined coconut oil from copra processing (e.g. dry process) is usually used for cooking while the virgin coconut oil from wet processing is used for various industries and applications.⁴

Coconut oil is an important part of the diet and culture of several Asian countries. Moreover, it also serves as part of traditional medicine in some countries.⁵ Hence, coconut oil has widespread use throughout the world. However, its health benefits are under debate.

In 1953, Ancel Keys postulated that saturated fats can cause coronary heart disease and other health risks (known as the “Lipid Heart Theory”). This led to a shift from using coconut oil (which is composed of mainly saturated fatty acids) to other alternative vegetable oils.⁶ Since then, many studies aimed to clarify the real effect of coconut oil on the various aspects of human health. The lack of proper epidemiologic data, some possibly flawed and inconsistent *in vivo* studies, and shortage in clinical trials are some of the reasons why the bad reputation of coconut oil persists.² Hence, this short literature review aims to identify the current status of coconut oil in terms of its health effects and to determine future research needs concerning the use of coconut oil.

METHODS

A total of 40 published articles (27 clinical trials and intervention studies; 13 review papers) from 1990 to 2016 were gathered from online research databases including PubMed, HERDIN, Science Direct and Cambridge CORE. Other search engines were also reviewed (i.e.: Google Scholar). The following keywords were used: “coconut oil”, “Asia”, “Philippines”, “virgin coconut oil”, “health”, “benefits”, “effects.” The selected studies were considered based on the following criteria: (1) the primary research subjects were Asian and (2) the effects of coconut oil or its constituents on health were discussed. Out of the 40 papers considered, 12 were published by Filipino authors primarily involving the Filipino population while 4 focused on Malaysians, representing the Southeast Asian region. India had the most number of publications considered in this review with a total of 16 papers. In brief, the selected papers discussed the effect of coconut oil or its constituents in the following aspects of health: cardiac health, lipid profile, visceral adiposity, weight management, immunity, degenerative disease, infectious disease, skin and hair health, and oral health.

Coconut Oil and Cardiac Health

Since the introduction of the Lipid Heart Theory, many researches using animal models and several clinical trials were conducted worldwide using coconut oil. There were opposing views as to the oil’s effect on the circulatory system particularly on the lipid profile of consumers as well as the risk of developing heart ailments. In the Asian population, several studies indicated that coconut oil consumption can be good for the heart and is not involved in the

development of atherosclerosis and coronary heart disease.^{2,3,6,7,8,9}

To support the claim that coconut oil is good for the heart, several clinical trials were conducted to determine the lipid profiles of certain populations consuming coconut oil as part of their diet. For instance, two studies found out that a decrease in the level of Low Density Lipoprotein (“bad” cholesterol) in the serum of healthy Asians was achieved by the experimental group which consumed MCFA from coconut oil as part of a standardized diet.^{10,11} This result was corroborated by the review of Hedge.¹² Moreover, consumption of coconut oil increased the level of High Density Lipoprotein (“good” cholesterol) in pre-menopausal Filipino population.¹³ However, the diet used in this study was not controlled and the consumption of coconut oil was based on recall. Meanwhile, coconut oil seemed to have no effect on lipid-related cardiovascular risk (Lipoprotein A levels, non-esterified fatty acid levels, etc.) of coronary heart disease patients.¹⁴ Since majority of the saturated fatty acids present in coconut oil is of medium-chain type (which is believed to be metabolized easily), it is not primarily involved in the synthesis and build-up of cholesterol levels in the blood serum.¹ Meanwhile, a study on the plaque composition of 71 coronary artery bypass patients consuming coconut oil found that the amount of lauric acid (which is the most abundant fatty acid in coconut oil) in the atherosclerotic plaque of the patients is significantly lower compared to the other fatty acids.¹⁵ This could indicate that serum fatty acids derived from oil consumption is not the sole basis for concluding that a certain diet may induce plaque formation.

Studies on the effect of consuming Virgin Coconut Oil (VCO) revealed an almost neutral effect on lipid profile of human subjects. For instance, Liau, *et. al.* indicated that there is a non-significant change in the total cholesterol and lipoprotein (both HDL and LDL) levels of all seven male subjects consuming 30mL/ day of VCO for four weeks.¹⁶ Meanwhile, females (13) seem to be unaffected. However, this study only tested a small population size and retained an uncontrolled dietary regime which may have significant effect on the observed results. In another study, significant decrease on mean HDL, albeit minimal in amount, and no changes in total cholesterol, triglycerides and LDL were also observed for 30 Filipino subjects.¹⁷ The observations may indicate that VCO may have a positive effect on the lipid levels in the blood. However, the relationship of gender must still be clarified. Furthermore, these findings suggest that the different types of coconut oil can have va-

rying effects on the lipid profiles of the Asian consumers. This aspect can also be of potential research significance.

Epidemiological data on the effects of coconut oil on the cardiac health of long-term consumers is available. Kumar and Sabitha, *et. al.* found that habitual or routine consumption of coconut oil (in moderate amounts), along with healthy diet, has no specific role in the risk and development of coronary heart disease in Kerala population in India.^{8,9} This population is known to consume coconut oil as part of their normal diet. Similarly, a review on the Sri Lankan consumption of coconut oil indicated that the risk of developing coronary heart disease is significantly lower in the rural areas of Sri Lanka where high consumption of coconut oil is evident.³ Data from the Philippine National Nutrition Survey of 2003 revealed a low incidence of heart disease in Bicol Region where consumption of coconut oil is highest. This was indirectly corroborated by the low mortality rate in Bicol Region in terms of heart ailments.^{2,18} Based on this data, it appears that long term use of coconut oil may have a positive effect on cardiac health.

Coconut Oil, Weight Management and Nutrition

Coconut oil is primarily composed of saturated fat. Hence, it is widely believed to accumulate as body fat leading to obesity, and consequently, heart ailments. However, majority of the saturated fat component of coconut oil is in the form of MCFA which is believed to be easily metabolized. MCFA can be directly absorbed from the intestinal tract and can be rapidly metabolized by the liver to provide usable energy.¹ Among Asians, majority of the studies and reviews indicated good effects of coconut oil in controlling weight,^{12,19} visceral adiposity^{10,16,20} and even nutrient absorption.^{3,21}

A study found that transcutaneous feeding of coconut oil in 25 preterm newborns resulted in weight gain of the experimental group over a period of seven days.¹⁹ This supports the idea that MCFA from coconut oil can be an efficient cellular food. However, the mechanism of this transcutaneous feeding was not discussed in the paper. Meanwhile, Hedge indicated that coconut oil, being a low calorie fat, can also be used to control body weight. This is supported by several studies that measured the effect of coconut oil consumption in the formation of visceral adiposity and fat deposition.¹² Liau, *et. al.* found out that the male subjects in their study significantly reduced abdominal fat and waist circumference after consumption of VCO for four weeks.¹⁶ Similarly, Aoyama, *et. al.* found out that MCFA consumption (from coconut oil) helps suppress the accumu-

lation of body fat and consequently reduce visceral adiposity, waist size and hip size in Japanese subjects with high Body Mass Index (BMI).²⁰ Similar results were reported among healthy subjects after consumption of MCFA for 12 weeks.^{10,22} However, some studies with contradictory results also exist. For example, Abella, *et. al.* found that VCO does not induce a statistically significant reduction in body fat and weight of obese and overweight Filipinos after 6 weeks of oil consumption on a 45mL/ day basis.²³ However, only 12 patients were included in this study so the results may have been an underestimation of the actual effect. Several side effects were noted among study subjects assigned to high consumption of coconut oil including gastrointestinal irritation, diarrhea, flatulence and prostration.^{17,23} Based on current data, it appears that further study is needed to determine the effect and safety of consuming coconut oil as a weight control supplement.

Amarasiri & Dissanayake indicated in their review that coconut oil may aid in absorption of minerals (Calcium and Magnesium) in the intestine.³ Furthermore, Aoyama, *et. al.* stated that diet rich in MCFA can be useful in the treatment of disorders in lipid metabolism particularly for the population with relatively high BMI.²⁰ Fortification of coconut oil with Vitamin A was also found out to help with the reduction of Vitamin A deficiency in Filipino children as compared to Vitamin A supplement alone.²¹ Meanwhile, coconut oil has a neutral effect on feeding intolerance and possibly in necrotizing enterocolitis in infants because of its minimal effect in the osmolality of breast milk.²⁴ It may therefore be favorable to consume coconut oil, in moderation, to help in the proper digestion and nutrient absorption of healthy adults but not among infants.

Coconut Oil, Immune System and Cure for Diseases

Many properties of coconut oil can be attributed to its high amount of MCFA. These MCFAs have positive effects on the overall well being of human and animal subjects particularly in enhancing the functions of immune system and fighting disease-causing agents. In some parts of Asia, coconut oil is used in conjunction with other herbal products as traditional cure for various ailments.

Numerous studies and reviews assessed the bioactivity of coconut oil against common pathogens. Broad spectrum antibacterial, antifungal and antiparasitic activity were reported in both animal and human subjects.^{3,4,5,12,25,26} In contrast, a study by Hlady, *et. al.* found that the risk of neonatal tetanus can be increased when coconut oil is applied in the vagina of pregnant women—a common practice in Pakistan.²⁷ However, this observation is not due to the inherent

property of coconut oil but rather due to the possibility of contamination of coconut oil with bacterial pathogens.

A particularly interesting property of coconut oil is its potent antiviral activity. Coconut oil can be very effective against enveloped viruses such as Influenza virus and Hepatitis C virus due to its inherent hydrophobicity and the presence of monolaurin.^{1,12} A pilot clinical trial by Dayrit supported antiviral activity of coconut oil with the observed reduction of viral load in 15 Filipino HIV patients.²⁸ It is therefore necessary to conduct more clinical research to confirm (or refute) this interesting property.

Various review studies provide evidence that coconut oil can enhance the immune function. In particular, increase in cytotoxic and helper T-cells were reported with the consumption of VCO supplemented with Zinc.^{1,26} However, the mechanism of VCO inducing this effect was not discussed in these reviews. In another review, virgin coconut oil inhibited the effects of chronic inflammation by reducing granuloma formation and alkaline phosphatase activity in the blood serum.²⁹ Meanwhile, blood thrombogenicity was found to be promoted in subjects consuming coconut oil by lowering tissue plasminogen activator antigen concentration²⁶ and increasing the platelet count.¹⁷ This finding indicates faster healing and recovery after an injury. However, contradictory results were presented by Voon, *et. al.* stating that coconut oil diet does not alter the level of thrombogenicity indices in the blood of Malaysian adults in a controlled diet.³⁹ This property needs to be clarified in future researches.

Antioxidant activity of coconut oil was also evaluated in several studies. Promising results in increasing antioxidant levels due to the presence of polyphenols, tocopherol, tocotrienol, phytosterol, phytostanol and flavonoids in coconut oil have been reported.^{12,29,30} Coconut oil, particularly VCO, is less affected by oxidation as evident by its low total oxidation (TOTOX) value after five days of use. It is therefore less prone to free radical formation (hence greater oxidative stability) even after re-use.^{3,31} This finding is significant since oil re-use is an inevitable practice in several Asian countries.

A review by Neema Johnson, *et. al.* revealed the potential of coconut oil in treating Alzheimer's disease.³² According to this review, the ketones and ketoacids produced by the metabolism of MCFA from coconut oil can serve as an alternative neuron fuel that prevents the degeneration of nerve cells. However, formal clinical studies are needed to prove this notion since the data provided by the review is

limited to case reports. Meanwhile, virgin coconut oil was found to increase the quality of life and recovery of Malaysian breast cancer patients by reducing the symptoms of fatigue, insomnia and loss of appetite, and increasing the energy and physical function of the patients consuming 20mL of VCO daily for one week.³³ This finding corroborate the previous statements regarding the coconut oil's effect on the overall immune function and recovery.

Coconut Oil and the Skin, Hair and Oral Health

Coconut oil is traditionally used in some parts of Asia as an emollient and skin moisturizer. Various studies tried to compare the effects of using coconut oil versus mineral oils in improving skin quality and treating skin diseases. Results of these studies are promising. For instance, a study by Dikhil *et al.* found out that the use of coconut oil as back emollient for chronic bedridden patients in North India can significantly reduce the risk of developing pressure ulcer.²⁵ Meanwhile, Evangelista, *et al.* found out that VCO can address the inflammation caused by Atopic Dermatitis and may also prevent bacterial infection of the skin in Filipino patients inflicted with Pediatric Atopic Dermatitis.³⁴ This was also supported by several studies that showed that VCO has components naturally known to confer antiseptic properties to the skin while maintaining epidermal integrity.^{36,40} They also found out that VCO lowers the risk of developing pruritus, erythema, dermatitis and neonatal bloodstream infections, and is well tolerated by the users. Hence, coconut oil remains to be a safe and effective alternative to mineral oils in terms of moisturizing the skin and preventing damages.

Only few studies have evaluated the efficacy of coconut oil for hair treatment. It is widely accepted that coconut oil can confer good physical characteristics to the hair in terms of smell, luster, and strength. In the study comparing different oils, Sesa oil was found out to be more effective as compared to VCO in terms of its outcomes in treating hair ailments. In fact, only about 17% of the subjects got "good" or "excellent" scores regarding the effect of VCO on their hair.³⁷

Swishing of coconut oil in the oral cavity (known as Kavala Graha or Gandoosha) is considered a part of tradition in India. In the study of Peedikayil, *et al.*, they found that coconut oil can help decrease the occurrence of plaque-related gingivitis by up to 50%.³⁸ Lauric acid, a constituent of coconut oil, can react with the alkaline components of the saliva to form soap-like compounds that aids in the cleansing of teeth and removal of plaques.

CONCLUSION

In summary, coconut oil appears to be beneficial in terms of nutrient absorption, treatment against common infections, immune function, skin health and oral health. Although majority of the studies point out the good effects of coconut oil in terms of cardiac health, weight management, hair care and even in treatment of viral infection and degenerative diseases, controlled clinical studies are needed to confirm its efficacy. Clinicians and scientists, particularly in Asia and Philippines, are encouraged to conduct clinical studies using coconut oil in these areas of human health.

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