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### “Coconut (*Cocos Nucifera*) Oil as A heart protective diet.”

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#### ABSTRACT:

Cardiovascular diseases represent an increasing share of global disease burden. Heredity, hypertension, diabetes, hypercholesterolemia, smoking, improper diet and stressful lifestyles are the factors responsible for heart diseases. In Ayurveda, Cardiovascular problems dealt under *Hrudroga*. Ayurveda stressed on prevention. *Sushruta* states *Hrudya Karma* (heart protective function) of coconut. People traditionally consuming coconut oil as part of their ordinary diet as a very low incidence of heart disease as compared to other oils.

Coconut oil is derived from coconuts (*Cocos nucifera* of *Arecaceae* family). Coconut oil called as “functional food” (provide health benefits over and beyond basic nutrients). Coconut oil contains free caprylic acid in addition to glycerides of Lauric, myristic, palmitic and stearic acids. Coconut oil is beneficial in hair and skin care, stress relief, maintaining cholesterol levels,

weight loss, increased immunity, proper digestion and metabolism, heart diseases, hypertension, diabetes and cancer. These benefits can be attributed to the presence of lauric acid. Coconut oil mostly contains medium-chain fatty acids which are directly converted into energy in the liver. Hence, bypasses the blood circulation and prevents accumulation in coronary arteries reducing chances of heart diseases. This review describes facts and phenomena related to its use as heart protective diet.

**KEYWORDS:** Coconut oil, Heart disease, Lauric acid, *Hrudya*, Saturated fat

#### INTRODUCTION:

Global Burden of Cardio Vascular Disease increasing day by day. The choice of life style, obesity, diabetes mellitus and hypertension are causative factors of cardio vascular diseases. According to WHO, 17.3 million deaths

occurred in 2008 due to cardio vascular diseases and is projected to rise to about 23.3 million by the year 2030.<sup>[1]</sup> Over 80% of cardiovascular disease deaths take place in low- and middle-income countries.

Heart disease, stroke, and atherosclerosis account for nearly half of all the deaths in the United States. Statistically, one out of every two people will die from one of these cardiovascular conditions. In recent times, attention has been focused on *Ayurveda* for natural plant-derived materials in the prevention and management of cardiovascular diseases. In *Ayurveda*, Cardiovascular problems dealt under *Hrudroga*. *Sushruta* states *Hrudya Karma* (heart protective function) of coconut. As mentioned in its classical literature, modern era, focuses on various natural cardio protective medicines that are obtained from phytoconstituents of plant sources. Coconut oil derivative of coconut contains free caprylic acid in addition to glycerides of Lauric, myristic, palmitic and stearic acids. It contains about 50% lauric acid, which helps in actively preventing various heart problems like high cholesterol levels and high blood pressure. Simply by using coconut oil in daily diet in place of other oils, a remarkable degree of protection from heart disease and stroke can be achieved.

In countries where people eat a lot of coconut products cardiovascular disease is much less frequent. In Sri Lanka, for example where coconut oil has been the primary dietary fat, the death rate from heart disease has been among the lowest in the world. In recent years, however, coconut oil consumption in Sri Lanka has declined, being replaced

my polyunsaturated oils and margarines. Consequently, heart disease rates have risen. In areas of India such as Kerala, where coconut oil has been largely replaced by other vegetable oils, cardiovascular disease is on the rise. This suggests coconut oil as heart protective diet.

### AIM AND OBJECTIVES:

1. To study cardiovascular diseases and its *Ayurvedic* perspectives.
2. To conduct a study of coconut (*Cocos nucifera*), as an herbal drug
3. To study function of coconut oil as heart protective diet.

### MATERIAL AND METHOD:

Only textual materials have been used for this study, from which various references have been collected. Main *Ayurvedic* texts used in this study are *Charak Samhita*, *Sushrut Samhita*, *AshtangSangraha*, *AshtangHridaya* and *Nighantus*. Modern texts and related *Ayurvedic* texts, websites, articles have also been searched.

### LITERATURE REVIEW:

#### Heart disease or cardiovascular diseases:

Cardiovascular disease (CVD) is a group of diseases affecting the heart and blood vessels. CVD include hypertension, stroke, peripheral vascular diseases, coronary artery disease and cardiac failure. CVD has multiple risk factors which include hypertension, dyslipidemia, smoking, obesity, diabetes mellitus, stress, sedentary life style and dietary habits. Most common cause of CVD is atherosclerosis. Atherosclerosis

is attributable to endothelial dysfunction that causes vascular inflammation which promotes plaque formation.<sup>[2]</sup> Hypercholesterolemia promotes accumulation of low-density lipoprotein (LDL) particles in the intima. Sequestration within the intima separates lipoproteins from some plasma antioxidants and favors oxidative modification. Such modified lipoprotein particles may trigger a local inflammatory response that signals subsequent steps in lesion formation. The augmented expression of various adhesion molecules for leukocytes recruits monocytes to the site of a nascent arterial lesion.<sup>[2]</sup>

In recent years, traditional medicine using medicinal plants for treating and preventing various diseases including cardiovascular diseases has gained much attention. Coconut oil has potential role in reducing cardiovascular disease risk factors includes atherosclerosis by controlling lipid levels, hypertension. Simply by using coconut oil in daily diet in place of other oils, a remarkable degree of protection from heart disease and stroke can be achieved.

### Heart disease and Ayurveda:

The *Hrudaya* (heart), itself being a muscular organ, derives its nutrition from *Rasa*, *Rakta* and *Oja*. *Hrudaya* is the *Sthana* (place) *Vyanavayu*, *Sadhaka Pitta*, *Avalambaka Kapha*. Functioning of *Hrudaya* is controlled by *Vyanavayu*. *Sadhaka Pitta* which can be correlated with intracellular enzymes in the cells of the *Hrudaya* helps to digest and utilize the *Poshakatattva* (nutritive substances). *Avalambaka Kapha* gives strength to heart muscles. Any of the physiological

entities i. e. *Rasa*, *Rakta*, *Mamsa*, *Oja*, *Pranavayu*, *Vyana-Vayu*, *Sadhaka Pitta* and *Avalambaka Kapha* when affected can disturb the function of the *Hrudaya* and cause disease of *Hrudaya*. In *Ayurveda*, the term for heart disease is '*Hridroga*'. It is classified as arising from disturbed *Vata*, *Pitta*, *Kapha*, or due to all three *Doshas* and *Krumij* (organisms).

Other Probable correlation of Types of *Hrudroga* with Cardiovascular Diseases:

- *Vata* - cardiovascular disease can be correlated to Valvular Cardiovascular Disease, Cardiac arrhythmias, Angina pectoris, Constrictive pericarditis, Aneurysm and dilation of heart and aorta
- *Pitta* - cardiovascular disease can be correlated to Myocardial infarction, Endocarditis including valvulitis, Myocarditis and pericarditis of all varieties.
- *Kapha* - cardiovascular disease can be correlated to Metabolic disorders like glycogen storage of heart, tumors of the heart.
- *Krimi* - cardiovascular disease: This type of cardiovascular disease is due to parasite, viral or bacterial infections such as: Infective Endocarditis.

### DRUG REVIEW:

#### Coconut oil:

Coconut oil is an edible oil extracted from the kernel or meat of matured coconuts harvested from the coconut palm (*Cocos nucifera*). Throughout the tropical world, it has provided the primary source of fat in the diets of millions of people for generations. It has

various applications in food, medicine, and industry. Coconut oil is very heat-stable, which makes it suited to methods of cooking at high temperatures like frying. Ripened fruit yield 60-71% oil.

#### Coconut palm<sup>[3,4]</sup>:

- Latin name - *Cocos nusifera*, Linn.
- Natural Order - *Palmae*
- Classical Names: *Narikela*, *dridhaphala*, *kurchasheersaka*, *tunga*, *skamdaphala*. *Trinaraja*, *Sdaphala*, *dakshinatyaka*.
- **Eng**- Coconut palm;
- **Hindi** – *Nariyal*, *Narel*;
- **Beng**. – *Dab*, *Narikel*;
- **Guj.**-*nariel*, *nariear*;
- **Kan.**-*Tengu*, *Tengina*;
- **Mal.**-*Tennu*, *thenga*; **Mar.**-*naral*, *mad*;
- **Punj.**- *narel*, *khopa*;
- **Tam.**-*tenkai*-*maram*, *tennaimaram*;
- **Tel.**- *kobbari*, *tenkaya-chettu*;
- **Arab.**-*fadhirdah*, *shajratun-narjil*;
- **Burm.**-*ong*, *ung*;
- **Pers.**- *darakhte-nargil*

#### Botanical Description:

Tree, 12-24 m high, Leaves 1.8-4.5 m long; leaflets 60-90 cm long, linear lanceolate, coriaceous. Spadix 1.2-1.8 m long, stout, androgynous, simply paniced. Fruits 20-30 cm long, 3-gonously obovoid or subglobose, green or yellowish.

#### Distribution:

It is cultivated throughout the hot damp region of India, particularly in coastal region of Orissa, Bengal, Gujrat,

Maharashtra, Karnataka, Kerala, Tamil Naadu & Andhra Pradesh, possibly indigenous in the Cocos islands and Andamans.

Parts used – flowers, root, fruit, oil and ash. The fruit contain shell, juice and kernel.

#### Ayurvedic properties:

- *Rasa* – *Madhura*
- *Guna*-*Guru*, *Snigdha*
- *Veerya* – *Sheeta*
- *Vipaka* – *Madhura*
- *Doshaghanata* – *Pittashamaka*
- *Rogaghnata* – *Vatapittajavikara*, *Masurika*, *Charmaroga*, *Vrana*, *Kushtha*, *Trishna*, *Daha*, *Amblapitta*, *Vatavikara*, *Paittikashoola*, *Parinamashoola*, *Amashayakashobha* *Avam Kshata*, *Raktapitta*, *Hikka*, *Mootrakarichchhra*, *Mootragatavarnavikara*, *Vishamajwara* (*Jala*); *Gulmagulma*, *Shleshmikaschoola* (*Kshar*); *Atisara*, *Raktatisara*, *Raktapitta*, *Bahumootrata* (*Flower*); *Kastartava*, *Samanyadaurbalya*, *Krishata*, *Klaibya* (*Fruitpulp*); *Medoroga*, *Kshayaroga* (*Oil*)

#### Karma-

*Varnya*, *Dahashamaka*, *Pittashamaka*, *Anulomana*, *Shoolaprashamana*, *Hikkanigrahana*, *Mootrajanana*, *Raktapittaprashamana*, *Jawaragahna* (Coconut Water); *Keshya*, *Kushthaghna*, *Vranaropana*, *Karshana*, *Jwaraghna* (Coconut Water); *Keshya*, *Kushthaghna*, *Vranaropana*, *Karshana* (*Oil*); *Bhedana* (*Kshara*); *Vajikara*,

*Artavajanana* (Ripe Fruit Pulp); *Brinhana*, *Balya*, *Jwaraghna* (Tender Fruit Pulp)

**Doses**-fruit-10-20g; oil-10-20 drops; *kshara* (alkaline extract)- 1-3g

#### Uses-

The root is anthelmintic. The fruit is sweet, cooling; oleaginous, indigestible; fattening, tonic, laxative, aphrodisiac, cardiogenic; useful in leprosy, thirst, biliousness, diseases of the blood, burning sensation, tuberculosis; causes *Kapha* and intestinal worms. The flower is cooling; useful in diabetes, dysentery, leprosy, urinary discharge; constipating. The dried fruit improves taste; aphrodisiac, fattening, constipating. The milk is cooling, oleaginous; appetizer; aphrodisiac, laxative; useful in bronchitis, biliousness, "*Kapha*" and *Vata*, tumors. The fermented juice is oleaginous, intoxicating, aphrodisiac, anthelmintic; causes biliousness. The oil is indigestible, aphrodisiac, fattening; useful in urinary complaints, asthma, bronchitis, consumption, ulcers.

It is used in burning sensation in human body, constipation, diarrhea, emaciation, heart disease, *spermatorrhea* and *urinogenital* diseases. The water produced by tender coconut provides sources of glucose supply in acute dehydration. *Narikela* is reputed *Keshya* (hair promoting or hair beneficiary) herbal agent. It is used in medicine, cosmetic and traditions including household hair care. Oil is edible and also employed as a cooking media for culinary and other domestic dietary needs.

#### Formulation:

*Narikela khanda*, *narikelalavana*, *narikelamrita*

#### Pharmacological activities:

Antiviral, CNS depressant, antibacterial, anticancer, antifungal, hypolipidemic, diuretic, antibiotic, immunologic, anticonvulsant, antitubercular.

#### Chemical Constituents:

Enzyme, investing, oxidase and catalase. Fresh kernel contains nitrogenous substances, fat, lignin, ash, palm sugar (glucose and cane sugar) and inorganic substances. The milk in the coconut contains sugar (mannitol), gum, albumen, tartaric acid and mineral water. Ashes of leaves contain a good deal of potash. Coconut oil contains lauric, myristic, fatty acids and mixed glycosides', such as *caprylolauromyristin*, *dilauromyristin*, *laurodimyristin*, *dimyristopalmitin* and *dipalmitostearin*, *undecanoic* and *tridecanoic*. It also contains Vitamin A and B.

#### *Hrudya karma of coconut oil:*

*Sushruta* states *Hrudya Karma* of coconut<sup>[5]</sup>. It strengthens the heart and gives protection to it. *Dhatu Poshana* depends on *Rasarakta Samvahan* (blood circulation) which is ultimate function of *Hrudaya*. One of the uses of coconut oil is *Poshanam Kshinadhatunam* (construction of body tissues).<sup>[6]</sup> So it is useful in protection of heart. Coconut oil is useful in *Medoroga* which may be cause of heart disease. As above explained, most of heart diseases are caused due to vitiation of *Vata*, *Pitta*, and *Rakta*.



Coconut shows *Vata-Pittaghna*, *Rakta Doshaghna* properties.

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**The Health Benefits of medium chain fatty acids in coconut oil on Cholesterol:**<sup>[7]</sup>

Nearly 55 % of the fatty acids in coconut oil are lauric acid (12 carbon atoms) and 20% myristic acid (14 carbon atoms), both medium chain fatty acids. Medium chain fatty acids found in coconut oil are absorbed by the gastrointestinal tract (GI tract) with ease; they do not require any pancreatic enzymes to break them down. It means less work for pancreas. Next, medium chain fatty acids are transported to the portal blood stream, directly to the liver, where they go directly into mitochondria independent of the carnitine palmitoyl transferase, and are immediately oxidized for energy. Medium chain fatty acids from coconut oil do not get packaged into lipoproteins, and do not get transported to a variety of tissues and are not stored as body fat, they go directly to the liver and are metabolized for energy. The bottom line is that medium chain fatty acids from coconut oil produces almost exclusively energy, whereas, long chain fatty acids found in all other dietary fats, are stored as body fat which are accumulated as cholesterol in blood vessels (and some energy).

**Anti-infective properties of coconut oil:**

Almost 50% of the fatty acids in coconut oil is the 12-carbon Lauric Acid. When coconut oil is enzymatically digested, it also forms a monoglyceride called monolaurin. Both lauric acid and monolaurin can kill harmful pathogens like bacteria, viruses and fungi.<sup>[8]</sup> This

helps to prevent infections responsible for causing heart diseases.

**DISCUSSION:**

There are strong evidences to state that the risk of coronary artery disease (CAD) is related with elevated levels of serum cholesterol, which in turn is correlated with an increased intake of saturated fats. A fear complex has been created among the general public that consumption of coconut oil results in elevated cholesterol levels. This myth is primarily due to the high content of saturated fats in coconut oil. It is known that saturated fatty acids will generally increase, while unsaturated fatty acids will tend to lower the cholesterol levels in blood. Thus, people started to take these vegetable oils with reduced usage of coconut oil. Within the last 50 years, per capita consumption of coconut oil in Kerala has been reduced to one-third<sup>[9]</sup>. But during the same period in the same population, the incidence of myocardial infarction has increased to three folds. This fact alone is enough to disprove the anti-propaganda against coconut oil.

In short, coconut oil is the most easily digestible and absorbed class of fats and does not circulate in the blood stream and is not deposited. In reality, coconut oil is beneficial for the heart. This benefit attributes to presence of lauric acid, which helps in actively preventing various heart problems like high cholesterol levels and high blood pressure.

**CONCLUSION:**

From above all discussion, it is concluded that coconut oil can be consumed as a heart protective diet.

Although coconut oil is a saturated fat, shows lots of benefits on reducing risk factors for cardio vascular diseases. These benefits can be attributed to the presence of lauric acid, medium-chain fatty acids which are directly converted into energy in the liver. Hence bypasses the blood circulation and prevents accumulation in coronary arteries reducing chances of heart diseases. The population traditionally consuming coconut oil as part of their ordinary diet have a very low incidence of heart disease as compared to other oils. So simply by using coconut oil in daily diet in place of other oils, a remarkable degree of protection from heart disease and stroke can be achieved.

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