Coconut for Nutrition, Health and Healing

Traditional medicinal uses; Nutritive values; Myths and Misconceptions

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Coconut, true to its name "Tree of Life", has regained its traditional health uses and is now emerging as a strong, healthy heart-friendly functional food and a source of many nutritional products. Nature loving , health conscious people afraid of transgenic oils will certainly appreciate coconut oil which is Nature's gift to Mankind.

Coconut, *Cocos nucifera* L., popularly known as Kalpavriksha, supports the livelihood security of people in the coconut growing areas of the world and provides food, nutrition, health, eco- friendly environment, income and wealth from time immemorial. There is both scientific and abundant anecdotal evidence for coconut's significant nutritional, health and healing benefits, including increased energy, weight loss through metabolism of excess body fat, natural antibiotic activity, LDL-Cholesterol reduction and insulin stabilization. The Pacific Islanders' health and beauty were attributed to the coconut since ancient times as coconut formed a major part of their diet in these regions. In India, coconut and coconut oil have been in use for more than four thousand years contributing to health and nutrition. Ancient literature in India and elsewhere portray the historical traditional use of coconuts and coconut products for more vigorous health. During World War II, tender coconut water was used as intravenous injection substitute for saline water. Coconut right from the root tip to the growing bud and from inflorescence to nuts, as well as husk and fibers are used in the traditional medicine in Asian Pacific countries.

Coconut in Traditional Medicinal Uses

Some of the traditional medicinal uses of coconut are listed below. Chewing of young roots or leaves for Diarrhea in Admiralty Islands, decoction of husk fiber to treat diarrhea and arthritis in Brazil, use of water extract of endosperm with *Citrus aurantium* juice for soaking the affected parts of fractures and sprains , endosperm for asthenia, coconut oil mixed with crushed *Phyllanthus virgatus* for ear infections and taking the extracts of different parts of palm orally for filariasis in Cook Islands, taking hot water extract of the plant orally by women for sterility in Ecuador, use of coconut oil for hair loss and tender coconut water for kidney problems in Fiji, taking coconut milk orally for diarrhea in Ghana, taking hot water extract of dried fruit orally as a febrifuge and sudorific and for renal inflammation and external application for wounds, ulcers, bruises, sores, skin infections, mucosa, dermatitis, inflammations,

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abscesses and furuncles in Guatemala, taking the decoction of dried pericarp orally for amenorrhea and external application of oil for burns in Haiti, water extract of fruit for asthma in Hawaii, taking the infusion of the inflorescence orally every morning for 3 days, coinciding with the menstrual cycle for leukorrhea and problems associated with the menstrual cycle, taking a dose of 50 g daily of a mixture of *Cocos nucifera* fruit and *Ficus-benghalensis* latex for three months to increase sexual potency in men and taking coconut fruit orally as a remedy for tapeworms in India, applying coconut oil externally to treat wounds and injuries by ethnic group of Ngada, using shell as incense and taking hot water extract of the root orally for fever, bloody diarrhea, and dysentery, taking milk orally by adults for poisoning, taking fruit milk orally by women as a contraceptive, using fruit juice to diminish libido or fertility and taking seed oil with lemon juice and various tree roots orally as an abortifacient and applying fruit ointment externally for swollen legs as well as chewing fresh flowers, with *Borassus flbellifer,* for gonorrhea in Indonesia are some of the traditional uses of coconut.

The ripe but unopened

Table - 1 Traditional Medicinal Uses of Coconut in different Countries

Country	Coconut part used	Diseases/ diorder	Author
Admiralty Islands.	young root or leaves	diarrhea	Holdsworth, D. and B. Wamoi. 1982
Brazil	Decoction of the husk fiber	diarrhea and arthritis	Esquenazi D.,et.al. 2002
Cook Islands.	Water extract of grated endosperm	fractures and sprains	Whistler, W. A. 1985 Dan Hanh Khoi, et.al. 1984
Ecuador	Hot water extract of the plant	Female sterility	Gonzalez, F. and M. Silva., 1987
Fiji	OilWater	Hair loss, earacheKidney problems	Singh, Y. N.,1986
Ghana	Coconut milk	diarrhea	Yartey, et al., 1993
Guatemala	Hot water extract of the dried fruit	Renal inflammation, scrofula, wound, ulcers, bruises, sores, skin infections, mucosa, dermatitis, inflammations, abscesses & furuncles	Caceres, et al., 1987
Haiti	Decoction of dried pericarp Essential oil	Amenorrheaburns	Weniger, et al., 1986
Hawaii	Water extract of the fruit	Asthma	Hope, et al., 1993
India	Inflorescence infusion.Cocos nucifera fruit & ficus-benghalensis latex. Fruit.	Leucorrhea & menstrual cycle problems. Sexual potency in men.Tapeworm.	Bhandary, et al., 1995. Lal, S. D. and B. K. Yadav., 1983.Caius, J. F. and K. S. Mhaskar, 1923.
Indonesia	Coconut oil.Shell.Hot water extract of root. Milk.Fruit juice.Seed oil with lemon juice and tree roots. Fruit ointment. Fresh flower.	WoundIncense.Fever, bloody diarrhea & dysentery, against poisoning, female contraceptive. Diminish libido or fertility. Abortifacient. Swollen legs. Gonorrhea.	Sachs, et al., 2002.Sangat-Roemantyo, et al., 1990.Hirschhorn, et al., 1983.Brondegaard, 1973.De Laszlo, H. and P. S. Henshaw, 1954. Devereux, 1976.Hirschhorn, 1983.
Jamaica	Hot water extract of dried shell. Hot water extract of roots. Extract of different parts.	Diabetes.Tonic.Diabetes.	Morrison, E. Y. S. A. and M. West, 1982.Asprey, G. F., and P. Thornton, 1955.Morrison, E., and U. W. I. Jamaica, 1994.
Marquesas Islands.	Fruit juice.	Menstrual disorder.	Suggs, 1966.
Mexico	Fresh milk.	Miscarriage	Cosminsky, 1982
Mozambique	Fruits.	Relief of tumors in men.	Amico, 1977
Papua New Guinea.	Root of young coconut. Fruit milk.	Stomach ache. Abortifacient.	Holdsworth, 1992. Haddon, 1908.
Peru	Hot water extract of fresh fruit.	Blennorrhagia, asthma, diuretic, tenifuge, galactagogue.	Ramirez, et al., 1988
Thailand	Hot water extract of fresh fruit juice.	Cardiotonic, neurotonic	Wasuwat, 1967
Tonga	Infusion of fresh kernel of coconut. Cocos nucifera.Infusion of fresh kernel.	Treat retention of blood clot in the uterus. Treat severe bleeding.Dysuria.	Singh, et al., 1984
Trinidad	Hot water extract of root.	Amenorrhea.	Wong, 1976
Vanuatu	Hot water extract of fruit.Juice of crushed root.	Induce abortion.Restores strength.	Deacon, 1934.Bourdy, G. and A. Walter, 1992
West Indies	Hot water extract of root.Hot water extract of mesocarp.	Amenorrhea.Female dysmenorrheal, amenorrhea, menorrhagia.	Ayensu, 1978.

inflorescence has many medicinal uses. It is cooling and effective in dysentery, hemophilia, diabetes and leucorrhoea. It is also an ingredient in a decoction used to treat syphilis. For women, especially after childbirth, a home preparation of inflorescence, rice flour and jaggery cooked in coconut oil and/or ghee serves as a rejuvenative tonic.

Tender coconut water has favorable influence on mitochondria activities and provides some protection against the free radical medicated damage during myocardial infarction. It is rich in ascorbic acid that improves sperm motility and protects against endogenous oxidative DNA damage in sperm .Consumption of tender coconut water has a beneficial effect on spermatogenesis, sperm count, motility and fertility.

Fresh inflorescence sap or sweet toddy is unctuous and cooling in effect. It is rejuvenative and on daily use for long periods it improves memory. It is recommended by the traditional medical systems for anaemia, tuberculosis, bronchial suffocation and piles. It also helps to prevent internal blood clotting and is also diuretic.

Apart from oil, coconut kernel contains 7.8% dietary fiber which beneficially influences serum cholesterol. Coconut flour which is the residue after taking milk from coconut meat has high value as an ingredient for health foods. Although the protein content of coconut kernel is only around 4-4.5%, it is richer in essential amino acid lysine than that found in rice or other cereals. It also provides the cardioprotective amino acid arginine.

Fresh coconut milk obtained from coconut kernel has soothing and cooling effects on the body and is a good appetizer. The coconut milk is refregent, nutrient, diuretic, laxative and anthelmintic. The milk is used as external application for babies before bath for better complexion.

Taking hot water extract of the dried shell orally for diabetes, hot water extract of the root, with seven other plants, wine, and rum as a tonic and extract of different parts orally for diabetes in Jamaica , use of fruit juice mixed with *Cordia subcordata* and other plants for general menstrual disorders in Marquesas Islands, applying plaster made of fresh coconut milk mixed with egg white externally to prevent miscarriage in Mexico, eating fruit by men as an aphrodisiac and using for relief of tumors in Mozambique, chewing fresh root for stomach ache and orally taking coconut milk with other medicinal plants as an abortifacient in Papua New Guinea, taking orally the extract of fresh fruit for blennorrhagia and asthma and also as diuretic, tenifuge and galactagogue in Peru, taking hot water extract of fresh juice orally as cardio-tonic, and neuron-tonic in Thailand , use of fresh coconut kernel and *Eucodia hortensis* to stimulate blood clots in uterus after delivery in Tonga, taking hot water extract of roots orally for amenorrhea in Trinidad, use of hot water extract of fruit to induce abortion and juice of crushed roots after delivery for restoring strength in Vanuatu and use of hot water extract of root for amenorrhea, hot water extract of mesocarp for female dysmenorrhea, amenorrhea and menorrhgia in West Indies.

According to Ayurvedic Classics, tender coconut water is wholesome for heart and relieves burning sensations. It is also useful in diseases due to vitiation of blood and bile together. The usefulness of tender coconut kernel along with water is also indicated in diseases like leucorrhoea and dysuria, and rapidly quenches and satisfies extreme thirst.

In Kerala, India, the semi ripe kernel of Chowghat Orange Dwarf (COD) nut is scraped and put in coconut oil and boiled till the water content is completely removed. The oil after cooling is applied against oral ulcer and its continued use is considered as an efficacious remedy for healing the disease tissue. The ripe kernel is unctuous in property and increases body strength and purifies the urinary system.

In some parts of the Philippines coconut kernel is used as a contraceptive. The smoke arising from a piece of kernel placed on a heated stone is allowed to penetrate the uterus of a mother who has just given birth by squatting over. The smoke and heat emanating from the stone and kernel piece stimulate the uterus to contract to its normal size effecting a delay in conception. This delay, however, lasts only until the mother's menses starts.

Among the Yakan tribe on the Basilan Island of the Philippines newly born babies are given the first bath using coconut milk for immunity and protection against affliction of scabies. In households fresh coconut milk is applied on the

Chemical Constituents of Coconut

Chemical constituent	Coconut Part	Author
Acetoin:	Endosperm	Kinderlerer, J. L., and B. Kellard. 1987
Alanine, phenyl	Leaf	Yeoh, et al., 1986
Alanine:	Endosperm	Atakeuchi, 1961
Aluminium inorganic	Leaf	Lancaster, L. A. and B. Rajadurai, 1974
Amyrin, alpha	Seed oil	Mourafe, et al., 1975
Amyrin, beta	Seed Oil	Mourafe, et al., 1975
Arginine:	Endosperm	Atakeuchi, 1961
Aspartic acid:	Endosperm	Atakeuchi, 1961
Butane-2-3-diol	Endosperm	Kinderlerer, J. L., and B. Kellard.1987
Butane-2-3-dione:	Endosperm	Kinderlerer, J. L., and B. Kellard.1987
Butyric acid, 2-methyl, methyl ester:	Fruit	Stalcup, et al., 1993
Butyroin:	Fruit	Stalcup, et al., 1993
Campesterol:	Seed oil	Mourafe, et al., 1975
Caproic acid:	Endosperm	Kinderlerer, J. L., and B. Kellard.1987
Catechins:	Husk	Kirszberg, et al., 2003
Cocamide diethanoloamide:	Seed oil	Fowler, 1998
Cocamidopropyl betaine:	Seed oil	Pinola, et al., 1993
Cocos II protein:	Pollen	Jaggi, et al., 1989
Cocos IIa protein:	Pollen	Jaggi, et al., 1989
Cocos VI protein	Pollen	Jaggi, et al., 1989
Cocos VII protein:	Pollen	Jaggi, et al., 1989
Cycloartenol, 24-methylene:	Seed oil	Mourafe, et al., 1975
Cycloartenol	Seed oil	Mourafe, et al., 1975
Decalactone, ÀÛGÜ	Endosperm	Kinderlerer, J. L., and B. Kellard.1987
Decanoic acid:Docosane, *N*:	EndospermSeed oil	Kinderlerer, J. L., and B. Kellard.1987; Mourafe, et al., 1975
Dodecalactone ÀÛGÜ	Endosperm	Kinderlerer, J. L., and B. Kellard.1987
Dotriacontane, *N*:	Seed oil	Mourafe, et al., 1975
Eicosane, *N*:	Seed oil	Mourafe, et al., 1975
Ethyl lactate:	Fruit	Stalcup, et al., 1993
Fructose	Milk 2.22%, Root	Dan Hanh Khoi, et al., 1984; Bopaiah, et al., 1987
Galactitol	Endosperm	Saittagaroon, S., S. Kawakishi, and M. Namiki, 1985
Gentisic acid:	Leaf	Griffiths, 1959
Glucose:	Milk 1.97%, Root	Dan Hanh Khoi, et al., 1984; Bopaiah, et al., 1987
Glutamic acid:	Endosperm, Leaf	Atakeuchi, 1961; Yeoh, et al., 1986
Glycine	Endosperm, Leaf	Atakeuchi, 1961; Yeoh, et al., 1986
Heneicosane, *N*:	Seed oil	Mourafe, et al., 1975
Heptacosane, *N*:	Seed oil	Mourafe, et al., 1975
Heptadecane, *N*:	Seed oil	Mourafe, et al., 1975
Heptan-2-ol	Fruit	Stalcup, et al., 1993
Hexacosane, *N*:	Seed oil	Mourafe, et al., 1975
Histidine	Leaf	
Lactose	Root	Bopaiah, et al., 1987
Lauric acid:	Endosperm	Kinderlerer, J. L., and B. Kellard.1987
Leucine, iso:	Endosperm, Leaf	Atakeuchi, 1961; Yeoh, et al., 1986
Leucine	Leaf	Yeoh, et al., 1986
Ligustrazine	Endosperm	Kinderlerer, J. L., and B. Kellard.1987
Limonene	Fruit	Stalcup, et al., 1993
Linamarase	Endosperm	Jansz, et al., 1974
Lysine	Endosperm, Leaf	Atakeuchi, 1961; Yeoh, et al., 1986
Menthol	Fruit	Stalcup, et al., 1993
Methionine	Endosperm, Leaf	Atakeuchi, 1961; Yeoh, et al., 1986
Myristic acid:	Seed oil	Bibicheva, et al., 1987
Nonacosane, *N*:	Seed oil	Mourafe, et al., 1975
Nonadecane, *N*:	Seed oil	Mourafe, et al., 1975
Octacosane, *N*:	Seed oil	Mourafe, et al., 1975
Octalactone, *N*:	Endosperm	Kinderlerer, J. L., and B. Kellard.1987

Octanoic acid:	Endosperm	Kinderlerer, J. L., and B. Kellard.1987
Pentacosane, *N*:	Seed oil	Mourafe, et al., 1975
Phaseic acid, dihydro:	Sap	Hoad, G. V. and P. Gaskin, 1980
Phaseic acid, hydroxy:	Sap	Hoad, G. V. and P. Gaskin, 1980
Proline, hydroxy:	Endosperm	Atakeuchi, 1961
Proline	Leaf	Yeoh, et al., 1986
Purin-6-one, 2-(3-methyl-but-2-enyl-amino):	Milk	Letham, 1982
Pyrasine, 2-3-5-trimethyl:	Endosperm	Kinderlerer, J. L., and B. Kellard.1987
Raffinose:	Root	Bopaiah, et al., 1987
Serine:	Endosperm, Leaf	Atakeuchi, 1961; Yeoh, et al., 1986
Sitosterol, ÀÛEÜ	Seed oil	Mourafe, et al., 1975
Sorbitol:	Endosperm	Saittagaroon, et al., 1985
Squalene:	Seed oil	Mourafe, et al., 1975
Stigmasterol	Seed oil	Mourafe, et al., 1975
Succinic acid:	Root	Bopaiah, et al., 1987
Sucrose:	Milk 0.43%	Dan Hanh Khoi, et al., 1984
Tannin (*Cocos nucifera*):	Plant	Wall, et al., 1969
Terpineol, ÀÛDÜ	Fruit	Stalcup, et al., 1993
Tetracosane, *N*:	Seed oil	Mourafe, et al., 1975
Threonine:	Leaf	Yeoh, et al., 1986
Tocopherol, ÀÛDÜ	Seed oil	Mannan, A. and K. Ahmad, 1966
Triacontane, *N*:	Seed oil	Mourafe, et al., 1975
Triclosane, *N*:	Seed oil	Mourafe, et al., 1975
Tyrosine:	Leaf	Yeoh,
Valine	Endosperm, Leaf	Atakeuchi, 1961; Yeoh, et al., 1986

Pharmacological Activities of Coconut

Pharmacological activities	Coconut/Coconut Products	Author
Acquired immunodeficiency syndrome activity	Coconut oil and **"monolaurin"**	Locniskar, et al., 1991;
Allergenic activity.	Dried fruit juice,	Ketusinh,1954
Aminopeptidase activity influence.	Coconut oil	Arechaga, et al., 2002
Analgesic activity.	Leaf Extract in ethnol 50%	Ketusinh,1954;
Anti-ancylostomiasis activity.	Milk and meat of nut	Caius, and Mhaskar.1923
Antibacterial activity	Ethanol (50%) extracts of the leaf, dried fruit, husk fiber, coconut oil	Dhawan, et al., 1977; Caceres, et al., 1987; Esquenazi, et al., 2002; Puertollano, et al., 2003
Anti-ancylostomiasis activity.	Coconut cake, hydrogenated oil	Nalini, et al., 2004; Quilliot, 2001
Anticonvulsant activity.	Ethanol (50%) extract of the leaf	Dhawan, et al., 1977
Antidiarrheal activity.	Water extract of coconut water	Neto, 1993
Antifungal activity.	Ethanol (50%) extract of the leaf, coconut oil, dried shell, husk fiber	Dhawan, et al., 1977; Jain, & Agrawal, 1992; Venkataraman, et al., 1980; Esquenazi, et al., 2002
Antihypercholesterolemic activity.	Coconut oil	Satchithanandam,et al., 1993; Ng, et al, 1991; Kishida, et al., 2003; Rao, & Lokesh, 2003; Sethupathy,2002
Anti-inflammatory activity.	Ethanol (50%) extract of the leaf	Dhawan, et al., 1977
Antilipidemic activity.	Triglycerides structured lipids from coconut oil	Rao & Lokesh, 2003 (140)
Anti-nociceptive activity.	Husk fiber	Alviano, et al., 2004
Antioxidant activity.	Husk fiber, coconut juice	Alviano, et al., 2004; Mantena, et al., 2003
Antiparasitic activity.	Polyphenolic-rich extract of the husk fiber	Mendonca, et al., 2004
Antiproteinemic effect	Coconut oil	Bouziane, & Belleville, 1994; Van Lith, et al., 1992; M'Fouara, et al., 1992
Antiviral activity.	Husk fiber	Karmakar, & Chatterjee, 1994
Anti-yeast activity.	Dried fruit, ethanol (50%) extract of the leaf	Caceres, et al., 1987; Dhawan, et al., 1977
Apo B synthesis.	Coconut oil	Gruffat-Mouty, et al., 2001; Schwab, et al., 2000
Arrhythmogenic effect.	Fruit juice,	Ketusinh,1954;
Atherosclerotic influence	Coconut oil	Kritchevsky, et al., 1982; Olsson, et al., 1988; Mangiapane, et al., 1999
Blood pressure effect.	Fruit juice, coconut oil	Ketusinh,1954; Langley-Evans, et al., 1996

Butyryl cholinesterase activity.	Coconut oil	Van Lith, et al., 1992;
Carcinogenic activity.	Coconut oil	National Toxicology Program, 2001
Cardiovascular effect.	Coconut oil	Kumar, 1997; Isensee, & Jacob, 1994; Eder, & Kirchgessner, 1994; Jenkins, & Medeiros, 1993; Awad, & Chattopadhyay, 1983
Cholestatic liver disease.	Medium-chain fat from the oil	Deems, & Friedman, 1988
Cholesterol metabolism.	Coconut oil	Jackson, et al., 1990; Schouten, et al., 1984; Prior, et al., 1981; Ringseis, & Eder, 2004; Alexaki, et al., 2004
Cholesterolemic effect.	Coconut oil	Kawano, et al., 2002
Coagglutination activity.	Coconut oil	Muller, et al., 2003
Cytotoxic activity.	Coconut oil, coir fiber, fiber husk	Salerno, & Smith, 1991; Saxena, et al., 1982; Mendonca-Filho, et al., 2004; Kirszberg, et al., 2003; Wallace, et al., 2000
Denture stomatitis.	Coconut oil	Barnabe, et al., 2004
Desensitization effect.	Saline extract of the dried pollen	Karmakar, and Chatterjee, 1994
Dietary macronutrient distribution influence	Coconut oil	Simon, et al., 2002
Diuretic activity	Decoction of the dried fruit, fruit juice, Ethanol (50%) extract of the leaf	Caceres, et al., 1987; Ketusinh, 1954; Dhawan, et al., 1977
Epstein–Barr virus activation	Coconut oil	Ito, et al., 1983
Erythrocytic effect.	Hydrogenated coconut oil	Maccoll, et al., 1996
Estrogenic effect.	Coconut oil	Booth, et al., 1960
Exocrine pancreatic secretion	Coconut oil	Hedemann, et al., 2001; Gabert, et al., 1996
Fat digestibility.	Coconut fat	Vissia, and Beynen, 2000
Fatty acid composition influence.	Coconut oil	Garcia-Fuentes, et al., 2002; Mohamed, et al., 2002; Roche, & Clark, 1994; Alam, & Shi, 1997
Fatty acid metabolism.	Coconut oil	Graulet, et al., 2000; Piot. Et al., 1999; Eder, & Kirchgessner, 1995
Food intake suppression.	Coconut oil	Bellissimo, & Anderson, 2003
Gastrin inhibition.	Coconut oil	Frank-Peterside, 2000
Gastrointestinal effect.	Coconut oil	Kalra, et al., 2002
Genotoxic activity.	Coconut oil	National Toxicology Program, 2001
Genotype and diet effect.	Coconut oil	Cleary, et al., 1999; Kim, & Berdanier, 1998
Glucose metabolism.	Coconut oil	Kim, et al., 1990; Zulet, et al., 1999; Lal, et al., 1997;Pan, & Berdanier, 1991
Glucose-6-phosphate dehydrogenase activity.	Coconut oil	Otton, et al., 1998
Glycemic index.	coconut flour, coconut oil	Trinidad, et al., 2003; Rocca, et al., 2001
Hair damage prevention.	coconut oil	Rele, and Mohile, 2003
Hemostatic effect.	Coconut water,	Pummer, et al., 2001
Hemotoxic activity.	Fruit juice,	Ketusinh,1954;
Hepatic activity.	Hydrogenated oil,	De Schrijver, and Privett, 1983.
Hepatic lipid peroxidation.	coconut oil	Ferre, et al., 2001
Hepatic mitochondrial effect.	coconut oil	Gil–Villarino, et al., 1997
Hydrogen peroxide release inhibition.	coconut oil	Joe and Lokesh, 1994
Hyperalphalipoproteinemic activity.	coconut oil	Quig and Zilversmit, 1989
Hypercholesterolemic activity.	coconut oil	Meijer, et al., 1991; Nicolosi, et al., 1981; Srinivasan &Pugalendi, 2000; Muller, et al., 2003
Hyperlipidemic activity.	palm wine, coconut oil	Lal, et al., 1998; Thomas, et al., 2002
Hyperthermic effect.	coconut oil	Bibby and Grimble, 1990.
Hypertriglyceridemic activity.	cococnut oil, kernal fiber	Dhawan, et al., 1977; Ketusinh, 1954; Morrison & West, 1982Sindurani & Rajamohan, 2000
Hypocholesterolemic activity.	protein,kernel fiber	Salil & Rajamohan, 2001; Sindhurani & Rajamohan, 1998
Hypoglycemic activity.	extract of leaf , coconut oil & shell extrct	Ketusinh, 1954; Feng, et al., 1962
Hypolipidemic activity.	coconut protein	Dhawan, et al., 1977
Hypotensive activity.	Fruit juice,	Prieto, et al., 1996
Hypothermic activity.	ethanal extract of leaf	Wan & Grimble, 1987
Ileal oleic acid uptake.	Hydrogenated oil,	Prieto, et al., 1996
Immune function.	Coconut oil,	Wan & Grimble, 1987
Insulin secretion stimulation.	Coconut oil,	Perret, et al., 1983
Intestinal brush border membrane.	Coconut oil,	Kaur, et al., 1996

Intestinal esterase activity.	Oil	Van Lith, et al., 1992
Intestinal neoplasia.	Oil	Thorling, et al., 1994
Intestinal transport.	Coconut water	Camargo & Fagundes Neto, 1994
Intravenous hydration.	coconut wayer	Campbell-Falck, et al., 2000; Saat, et al., 2002; Fagundes Neto,et al., 1993
Iron bioavailability.	Oil,	Pabon, & Lonnerdal, 2001
Jejunal oleic acid uptake.	Hydrogenated oil,	Prieto, et al., 1996
Juvenile hormone activity.	dried stem	Gopakumar, et al., 1977
Lauric acid incorporation.	Lauric acid	Bugaut, 1989
Lipid metabolism.	Oil,	Cox, et al., 1995
Lipid peroxide formation stimulation.	Seed oil,	Nardini, et al., 1993
Lipogenetic effect.	Kernel protein,	Padmakumaran, et al., 1999
Lipoprotein composition.	Oil,	Castillo, et al., 1996; Lin, et al., 1995
Lipoprotein lipase activity.	Oil,	Piot, et al., 2000
Liver function effect.	Palm wine	Lal, et al., 1998
Membrane fluidity and composition.	Coconut oil,	Clamp, et al., 1997
Myocardial infarction.	Coconut oil,	Remla, et al., 1991
Nasal absorption.	coconut fatty acid	Dan Hanh Khoi, et al., 1984
Nephrotoxic activity.	Fruit juice,	Ketusinh, 1954
Neutrophil functions.	Oil,	Lopes, et al., 1999
Ophthalmic absorption.	coconut fatty acid	Ahsan, et al., 2003
Ornithine decarboxylase activity.	oil	Locniskar, et al., 1991; Berton, et al., 1996
Oxidative DNA damages.	Oil,	Loft, et al., 1998
Oxygen radical inhibition.	Seed oil,	Joe and Lokesh, 1994
Oxytocinase inhibition.	Coconut oil,	Segarra, et al., 2002
Pheromone (sex attractant).	extract of stem	Keiser, et al.,
Pheromone (signaling).	extract of stem	Keiser, et al.,
Phospholipidemic effect.	Oil,	Kawano, et al., 2002
Plasma fatty acids.	Oil,	Garcia-Fuentes, et al., 2002; Svahn, et al., 2002; Calleja, et al., 2000; Svahn, et al., 2000; Cox, et al., 1998; Trautwein, et al., 1997
Platelets aggregation stimulation.	fruitjuice	Vas Dias, et al., 1982
Proinflammatory mediator production.	coconut oil	Wallace, et al., 2000
Prostaglandin outflow.	coconut oil	Huang, et al., 1989
Protective effect of vitamin A.	coconut oil	Fichter and Mitchell, 1997
Pyretic activity.	Fruit juice,	Ketusinh, 1954
Repellent activity.	coconut oil creams & lotions	Sylla, et al., 2003
Respiratory stimulant effect.	Fruit juice,	Ketusinh, 1954
Semen coagulation.	ethanal extract of leaf	Dhawan, et al., 1977
Semen cryopreservation.	coconut water	Cardoso Rde, et al., 2003
Sensitization (skin).	Fruit juice & husk fiber	Ketusinh, 1954; Alviano, et al., 2004
Shock prevention.	coconut oil	Lim–Navarro, et al., 1994
Sickness behavior.	Hydrogenated oil,	Kozak, et al., 1997
Spasmogenic activity.	etanal extract of leaf & stem	Feng, et al., 1962
Spermicidal effect.	ethanal extract of leaf and oil	Dhawan, et al., 1977; Buch, et al., 1988
Subcellular membrane-bound enzymesactivity.	coconut oil	Srinivasarao, et al., 1997
Superoxide production inhibition	Seed oil,	Joe and Lokesh, 1994
Tachycardiac activity.	Fruit juice,	Ketusinh, 1954
Toxicity assessment.	leaf, stem& husk fiber exracts	Dhawan, et al., 1977; Feng, et al., 1962; Alviano, et al., 2004
Tricarboxylate carrier influence.	coconut oil	Schouten, et al., 1984
Tumor prevention.	kernel f iber & coconut iol	Manoj, et al., 2001; Nalini, et al., 1997; Tappia & Grimble, 1994;Craig-Schmidt, et al., 1993; Togni, et al., 2003
Tumor-promoting effect.	coconut oil	Locniskar, et al., 1991; Lo, et al., 1994; Berton, et al., 1996;Hopkins, et al., 1979
Uncoupling protein expression	coconut oil	Portillo, et al., 1998
Vascular permeability increased.	fixed oil	Locniskar, et al., 1991

Source:Ross,I.A. Medicinal Plants of the World vol. 3.Chemical constituents,Traditional and modern medicinal uses:3. *Cocos nucifera,L :117 - 154.Humana Press,Inc. Totowa, NJ*

head to stimulate growth of hair. Massaging the scalp with coconut milk is effective and cures dandruff. In cases of constipation, a daily dose of one or two tablespoonful of fresh coconut milk is taken until colon blockage is relieved. A popular household remedy against chest diseases is a preparation consisting of coconut milk, black pepper, dry ginger and *Ocimum* leaves boiled down to a thick consistency and administered in small doses. Among the Yakans of the Philippines coconut milk is added to ground papaya fruit and is administered to tuberculosis patients. In Srilanka, skinned papaya fruit is cooked in coconut milk and ground into a paste. This is then applied and bandaged over stiffened joints in order to loosen them as well as to tenderize the joints in orthopedic treatment.

In the Nicobar Islands, the tribal people use coconut kernel in medicinal preparations. Coconut kernel is pounded with the leaves of *Gnetum guemon* Linn, an evergreen shrub, and smeared on the belly by women to cure severe pain caused due to gynecological disorders. Similarly, coconut kernel crushed with the top young leaves of the same herb and also of *Cycas rumphil* Miq., an evergreen palm-like tree, is eaten by the Nicobarese women who suffer from lactation problems.

Chemical Constituents and Pharmacological Activities of Coconut

In coconut more than 82 chemical constituents and more than 125 pharmacological activities have been identified and utilized for curing, managing and overcoming diseases and disorders of human beings as well as providing nutrition.

Coconut oil is a rich source of lauric acid (48.2%) as well as Medium Chain Fatty Acids and hence exhibits antimicrobial, antiviral, antibacterial, antifungal and antiprotozoal properties. Coconut oil (CNO) is categorized as a saturated fat because 92% of fatty acids present in it are saturated. But the fatty acid composition of CNO is distinctly different from that of other saturated fats like animal fats. The unique composition of CNO is that nearly 70% of its saturated fatty acids are short and medium chain whereas animal fat, with a slight exemption of butter, composed exclusively of long chain fatty acids (LCFAs). The metabolism and end products of short chain and medium chain fatty acids (SMCFs) in the body are entirely different from those of LCFAs. Approximately 15% of the fatty acids in CNO have hypocholesterolemic effects. The lauric fatty acids (C12:0) are metabolized through pathways intermediate to medium chain fatty acids and long chain fatty acids and are transported to the liver in the portal vein, while the product of hydrolysis of long chain fatty acids reach liver via lymphatic and systemic circulation. Medium chain fatty acids are more rapidly oxidized, nearly approaching a carbohydrate like fuel, and appear to be less conducive to fat deposition when compared to long chain fatty acids (C14.0). Large amount of triglycerides derived from coconut oil were used by most of the examiners. Coconut oil fatty acids have lot of biological and therapeutic effects.

While coconut and its oil have been in use for thousands of years, and also accepted as the best oil for margarines in USA, in 1957 it faced a tremendous setback because of the false propaganda made by the soya bean lobby in the west that coconut oil has high saturated fat which is not good for health, develops heart problems, weight increase, etc. However, the research done have since provided ample evidence to prove that coconut oil is heart-friendly oil. Coconut oil is a ready source of dietary energy, prevents pathogenic diseases ,improves cardio vascular health , reduces the risk of cancer, reduces the HIV / AIDS virus load in the body, reduces incidence of degenerative disease and coconut oil is used for skin and hair health and its derivatives are used in curative measure.

Drs. Blackburn, Babayan, Kintanar and Wan have compiled, evaluated and presented to the United States Congress, a review on coconut oil. They found that coconut oil has been misrepresented in its role of producing cholesterol and ASCVD and that coconut oil has important medical role to play in nutrition, metabolism and health care. They had indicated that if properly formulated and utilized, coconut oil may be the preferred vegetable oil in over diet and special hospital foods used for promoting patients recovery.

Now the West is looking for this lauric oil which has 48 percent lauric acid and the medium chain fatty acid (MCFA) is different from long chain fatty acids and therefore is good for

health. The easy digestibility of coconut oil has increased the usage of coconut oil in infant foods.

Coconut products like tender coconut water, spray dried powder are emerging as sports drink ,health drink and wellness drink, coconut milk, milk powder coconut oil, virgin coconut oil, desiccated coconuts, coconut dietary fiber are emerging as functional foods, children foods and health foods.

Coconut, true to its name "Tree of Life", has regained its traditional health uses and now emerging as a strong, healthy heart-friendly functional food and a source of many nutritional products. Nature loving, health conscious people afraid of transgenic oils will certainly appreciate coconut oil which is Nature's gift to Mankind.

Suggested readings

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14. Rethinam, P. and K. Sivaraman 2009. Poly culture in Coconut for Humid Tropics and Coastal Plains. Published by NRIF, New Delhi.

Monounsaturated fats could reduce disease risk

A new study published in the *American Journal of Clinical Nutrition*, says consuming a diet rich in monounsaturated fats could lower the risk of metabolic syndrome even without weight loss. Metabolic syndrome is a condition that encompasses a number of risk factors for overweight and obesity, such as large waistline, hypertension, high blood pressure, and low levels of HDL (high-density lipoprotein) cholesterol - so called 'good' cholesterol. This study adds further weight to the idea that monounsaturated fat can help reduce LDL (bad) cholesterol while diets high in saturated fat are linked to higher rates of tissue inflammation. Inflammation related to obesity is known to contribute to the development of a range of disorders, including type-2 diabetes, heart disease, insulin resistance, and fatty liver disease. Dutch researchers selected 20 'moderately overweight' subjects for the study on the basis of a body mass index (BMI) of 25 or over, or a waist circumference of at least 80 cm for women and 94cm for men. All subjects consumed a diet rich in saturated fat for a two-week 'run-in period' and then 10 continued on this diet for a further eight weeks, while the other 10 received a diet rich in monounsaturated fats, mainly in the form of refined olive oil. The diets were similar in terms of total fats, protein, carbohydrates and dietary fiber, but the saturated fat diet contained 19 percent saturated fatty acids (SFAs) and 11 percent monounsaturated fatty acids (MUFAs), while the monounsaturated fat diet contained 11 percent SFAs and 20 percent MUFAs. The researchers monitored weight and adjusted energy intake in order to prevent weight changes. Results showed that the MUFA diet led to reduced total and LDL cholesterol, but did not affect insulin sensitivity, although researchers hypothesized that the intervention period may have been too short to observe changes in insulin sensitivity. However, they noted that it was difficult to distinguish whether the beneficial effects of the MUFA diet were due to higher levels of monounsaturated fat or lower levels of saturated fat. They wrote it could be a combination of both.

Courtesy: The Cocommunity