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Food and hunger are the basic needs and instincts of every living being. By 2050, farming communities have to feed more mouths. Traditional and local crops gain importance and greatly emphasized by farm scientists these days. The food habits are modulated among various sections

of society and consumption of high value protein foods is on the increase, with improvement in standard of living status.

Poor diets are more contributing to ill health and affecting the GDP also. Hence, safe and nutritious food is a right to all human beings. Is your food safe? Is it good for your health? Is it nutritious? Is it adequate? Do you waste your food? Several questions have to be answered while



discussing on food and each one of them points to the responsibility of each one of us, beyond doubt!

Balanced diet

A balanced diet is one which provides all the nutrients in required amounts and proper proportions. It can easily be achieved through a blend of the four basic food groups. The quantities of foods needed to meet the nutrient requirements vary with age, gender, physiological status and physical activity. A balanced diet should provide around 50-60% of total calories from carbohydrates, preferably from complex carbohydrates, about 10-15% from proteins and 20-30% from both visible and invisible fat.

In addition, a balanced diet should provide other non-nutrients such as dietary fibre, antioxidants and phytochemicals which bestow positive health benefits. Antioxidants such as vitamins C and E, beta-carotene, riboflavin and selenium protect the human body from free radical damage. Other phytochemicals such as polyphenols, flavones, etc., also afford protection against oxidant damage.

WHAT ARE FOOD GROUPS?

Foods are conventionally grouped as:

- ☐ Cereals, millets and pulses
- ☐ Vegetables and fruits
- ☐ Milk and milk products, egg, meat and fish
- ☐ Oils & fats and nuts & oilseeds.

They can be classified as energy rich foods, body building foods and protective foods.

BENEFITS OF COCONUT

Coconut is a food to eat and a beverage to drink. It is a crop which gives milk, honey, sugar and oil. The coconut is nature's Super Market in your homestead, a nutraceutical and a HEALTH nourisher. Raw coconut is rich in medium-chain triglycerides, a type of dietary fat that may encourage weight loss. According to an article published in the June 2006 edition of the Ceylon Medical Journal, medium-chain triglycerides convert into monoglycerides and medium-chain

free fatty acids during digestion yielding two substances our body uses immediately for energy rather than storing as fat. In addition to their metabolism-boosting properties, medium-chain triglycerides may curb hunger more effectively than other forms of fat, leading to a lower calorie intake over time. As a result, the specific fats in raw coconut may promote a healthy body weight and help you shed unwanted pounds.

Raw coconut is rich in dietary fibre, with one cup of shredded meat yielding 7 grams, according to the USDA National Nutrient Database. As the April 2009 issue of "Nutrition Reviews" explains, diets rich in fibre can boost health by normalizing bowel movements, reducing risk of hemorrhoids, preventing blood sugar swings, lowering blood pressure, providing long-lasting satiation that discourages overeating, protecting against diabetes and even boost your immune system. In addition, the fibre in raw coconut may improve your cholesterol levels by reducing the amount of low-density lipoprotein (LDL) cholesterol in bloodstream.

NUTRITIONAL HIGHLIGHTS

Coconuts are highly nutritious and rich in fibre, vitamins C, E, B1, B3, B5 and B6 and minerals including iron, selenium, sodium, calcium, magnesium and phosphorous. Unlike cow's milk, coconut milk is lactose free so can be used as a milk substitute by those with lactose intolerance. It is a popular choice with vegans and makes a great base for smoothies, milkshakes or as a dairy alternative in baking.

Coconuts contain significant amounts of fat, but unlike other nuts, they provide fat that is mostly in the form of medium chain saturated fatty acids (MCFAs) in particular, lauric acid. Lauric acid is converted in the body into a highly beneficial compound called monolaurin, an antiviral and antibacterial that destroys a wide variety of disease causing organisms. It is therefore now thought that consumption of coconut milk may help protect the body from infections and viruses.

Different products of coconut include tender coconut water, raw kernel, copra, coconut cake, coconut oil, coconut toddy, coconut shell and wood based products (coconut leaves, coir pith etc). In the traditional coconut growing areas, all parts of coconut are used in some way or another, in the daily life of the people. The coconut kernel and

tender coconut water have numerous medicinal properties such as antibacterial, antifungal, antiviral, antiparasitic, antidermatophytic, antibronchitis, febrifugal, antigingivitic, antioxidant, hypoglycemic, hepatoprotective and immunostimulant. Coconut water and coconut kernel contain many nutrients and microminerals essential to human health, and hence it is used as food by the people in the globe, mainly in the tropical countries. Coconut is the unique source of various natural products for the development of medicines against various diseases and also for the development of industrial products. Therefore, the coconut palm is exalted as 'Kalpavriksha' (the all giving tree) in Indian classics (DebMandal and Mandal, 2011).

For thousands of years, coconut products have held a respected and valuable place in Indian folk medicine. In Ayurvedic medicine, coconut oil, milk, cream and water are all used to treat hair loss, burns and heart problems. The use of coconut for food, and its applications in the Ayurvedic medicine in India were documented in Sanskrit 4000 years ago. Records show that in the United States, coconut oil was one of the major sources of dietary fats, aside from dairy and animal fats, prior to the advent of the American edible oil (soybean and corn) industry in the mid 1940s (Dayrit, 2005). Virgin Coconut Oil (VCO) is completely non-toxic to humans, and is referred to as the "drugstore in a bottle". Coconut water is produced by a five-month old nut that during World War II, was used in emergencies, and put directly into a patient's veins. From ancient times the coconut is used as a very effective remedy for intestinal worms of all kinds. Boiled toddy, known as jaggery, with lime makes a good cement. Nutmeat of immature coconuts is eaten or extracted for cream is used on various foods (DebMandal and Mandal, 2011).

MEDICINAL VALUES

As an electrolyte

It is highly rich in inorganic ions such as K (290 mg %), Na (42 mg %), CA (44 mg %), Mg (10 mg %), P (9.2 mg %) etc (9). The concentration of these electrolytes in tender coconut water (TCW) generates an osmotic pressure similar to that observed in blood (9) and does not affect plasma coagulation. The high amount of K in TCW is reported to lower the blood pressure.

Antidote effect

TCW is found to eliminate poisons in case of mineral poisoning and ameliorate drug induced over dosage toxicity. The TCW aids the quick absorption of drug and makes their peak concentration in the blood easier by its electrolytic effect, which is similar to fructose coupled faster absorption into the cells and body.

Antioxidant effect

A free amino acid, L-arginine (30 mg/dL), is present in TCW which significantly reduce the free radical generation. TCW also contain vitamin C (15 mg/100mL) that significantly reduce lipid peroxidation when introduced in rat. VCO is capable of increasing antioxidant enzymes when supplemented with diets in rats

Cardio-protective effect

Coconut is composed of the fatty acids caprylic acid (8%), lauric acid C-12:0 (49%), myristic acid (18%), palmitic acid (8%), stearic acid (2%), oleic acid (6%) and linoleic acid (2%). It is abundantly (65%) endowed with MCFAs, which allows them to be directly absorbed from the

intestine and sent straight to the liver to be rapidly metabolized for energy production and thus MCFAs do not participate in the biosynthesis and transport of cholesterol. Coconut water has cardioprotective effects in myocardial infarction due to rich content of mineral ions, especially potassium.

Antiatherosclerotic effect

Chlamydia pneumoniae, is suspected of playing a role in atherosclerosis by provoking an inflammatory process that result in the oxidation of lipoproteins with induction of cytokines and production of proteolytic enzymes, a typical phenomena in atherosclerosis. Some of the pathogenic gram-negative bacteria with an appropriate chelator have

been reported to be inactivated or killed by lauric acid and monolaurin as well as capric acid and monocaprin. Monolaurin is not formed in the body unless there is a source of lauric acid in the diet, and coconut is a rich source of monolaurin.

Hypolipidemic effect

VCO is capable of reducing lipid peroxidation content. The hypolipidemic effect of coconut protein is due to the high content of L-arginine.

Anticholelcytic effect

It is urinary antiseptic and is effective in the treatment of kidney and urethral stones. Monoctanoin (from caprylic acid) is a digestion product of medium chain triglycerides, is a cholesterol solvent that has been used for the dissolution of retained cholesterol gallstones following cholecystectomy. Complete gallstone dissolution has occurred in approximately 50%-75% of patients receiving monoctanoin; although mechanical stone removal is still considered to be the treatment of choice for retained gallstones, monoctanoin use appears promising for stone dissolution in patients in whom mechanical removal has been unsuccessful or is impossible.



COCONUT OIL- THE HEALTHY OIL

Comparison of fatty acid content in different vegetable oils (%weight)

Fatty acid	No. of carbon atoms	Coconut oil	Palmolein	Soybean oil	Safflower oil
Caproic acid	C6	0.5	-	-	-
Caprylic acid	C8	8.0	-	-	-
Capric acid	C10	6.4	-	-	-
Lauric acid	C12	48.5	0.3	-	-
Myristic acid	C14	17.6	1.1	0.1	0.1
Palmitic acid	C16	8.4	45.1	11.0	6.5
Stearic acid	C18	5.2	4.7	4.0	2.4
Oleic acid	C18:1	6.1	38.8	23.4	13.1
Linoleic acid	C18:2	1.5	9.4	53.2	77.7
Linolenic acid	C18:3	-	0.3	7.8	-
Arachidic acid	C20	-	0.2	0.3	0.2

(Source: Manushyaposhanathil Velichenna, CDB, 1991)

Antibacterial activity

TCW has numerous medicinal properties, including good drink for cholera patients because of its saline and albumen content; checking urinary infection, and diarrhea. The most abundant and potent MCFA in coconut is lauric acid, which comprises nearly 50% of coconut's fat content. MCFA can be effective against bacteria that can lead to stomach ulcers, sinusitis, dental cavities, food poisoning, and urinary tract infections. Lauric acid, which is also present in mother's milk, helps to protect a delicate nursing baby from harmful pathogens. Thus, like many other important medicinal plants having antibacterial property, *C. nucifera* is excellent against different pathogenic bacteria causing several life-threatening infection to humans.

Anticaries activity

Decoction obtained from coconut tree roots are used as mouthwash and gargle. In vivo assays demonstrated that *C. nucifera* extract had low toxicity and did not induce dermic or ocular reactions. Thus, considering its low toxicity, husk fiber extracts of *C. nucifera* have potential in the treatment of oral diseases. Coconut flour has antimicrobial properties due to its high lauric acid content that has been used as medicaments for some oral infections such as mouth sores.

Antidermatophytic activity

The traditional use of coconut oil as a lotion in many parts of the world is well founded. Coconut oil was shown to have



antiseptic effects and is used as an efficient, safe skin moisturizer.

Antiviral effect

Coconut oil is very effective against a variety of viruses and TCW was found to have relieving and soothing effect during ailments such as chicken pox etc.

Antifungal effect

The antimicrobial spectrum of monolaurin is broad including fungal species such as *Aspergillus* sp., *Penicillium* sp., *Cladosporium* sp., *Fusarium* sp., *Alternaria* sp., *C. albicans*, *Fonsecaea pedrosoi* and *Cryptococcus* sp.

Antiprotozoal effect

In traditional Mexican medicine, *C. nucifera* has been used to treat trichomoniasis .

Antidiabetic effect

The coconut kernel protein has potent anti-diabetic activity through reversal of glycogen levels, activities of carbohydrate metabolizing enzymes and the pancreatic damage to the normal levels

due to its effect on pancreatic β -cell regeneration by means of arginine.

VIRGIN COCONUT OIL

Virgin coconut oil (VCO) is the oil resulting from the fresh and mature kernel of the coconut through mechanical and natural means, either with the use of heat or fermentation or centrifugation, provided that, it does not lead to alteration or transformation of the oil (APCC, 2003). VCO has many advantages, which include the health benefits from the retained vitamins and antioxidants, the antimicrobial and antiviral activity due to lauric acid components and through its easy digestibility. Apart from the above, VCO and coconut oil have been traditionally used to enhance the beauty and promote the growth of tresses, refine and moisturizes skin conditions as well as being used in treatments for minor illnesses such as diarrhoea and skin inflammation. Nevin and Rajamohan (2010) found that wound healing rate was increased in skin of rats treated with VCO. Lans (2007) reported that coconut was also used as an



BIOCHEMICAL AND MINERAL COMPOSITION OF FRESHLY COLLECTED COCONUT SAP (PER 100 ML)

Biochemical parameters	Range	Average
pH	6.57–7.50	7.18
Total sugar (g)	10.08–16.50	15.18
Reducing sugar (g)	0.439–0.647	0.554
Amino acids (g)	0.123–0.338	0.245
Protein (g)	0.150–0.177	0.165
Sodium (mg)	69.4–117.5	90.6
Potassium (mg)	146.1–182.4	168.4
Phosphorus (mg)	2.0–6.4	3.9
Manganese (mg)	0.009–0.014	0.012
Copper (mg)	0.028–0.035	0.031
Zinc (mg)	0.018–0.026	0.020
Iron (mg)	0.049–0.058	0.053
Phenolics (mg)	4.80–5.40	5.10
Antioxidant activity (mM TE)	0.299–0.355	0.321

(Source: Augustine and Hebbar, 2014)

VITAMIN CONTENT IN FRESHLY COLLECTED COCONUT SAP

Vitamin	Value (mg/100 ml)
Thiamine	77.00
Riboflavin	12.20
Pyridoxal	38.40
Pantothenic acid	5.20
Nicotinic acid	40.60
Biotin	0.17
Folic acid	0.24
Inositol	127.70
Choline	9.00
Vitamin B12	Trace
Vitamin C	17.5

(Source: Philippine Coconut Authority – Plant and Tissue Analysis Laboratory, Coconuts Today, November 2004)

‘ethnomedicine’ to treat gastrointestinal problems and minor cuts, injuries and swelling. The lauric acid, a medium chain fatty acid component in VCO showed potential use in anti-obesity treatment (Stonge and Jones, 2002; Assunção et al., 2009) as it increases energy expenditure, directly absorbed and burnt as energy in the liver, resulting in weight loss (Manikantan et al., 2015).

VCO extracted from fresh coconut kernel possess similar fatty acid composition to that of

Copra Oil (CO), a product of dried kernel. Although CO forms the predominant dietary constituent in south India, VCO is being promoted for healthy life due to its constituent antioxidant molecules. Narayanankutty et al. (2015) reported that the replacement of CO with VCO in high fructose diet markedly improved the glucose metabolism and dyslipidemia. The animals fed VCO diet had only 17 % increase in blood glucose level compared to CO fed animals (46 %).





The blood glucose levels and glucose tolerance rate in VCO fed group is found similar to that of reference diet fed animals. However, it is significantly reduced in CO fed group. This indicates that VCO could prevent the development of insulin resistance and hyperglycemia in animals. Possible reason behind these effects may be attributed to their increased polyphenol contents such as caffeic acid, ferulic acid and catechins (Marina et al. 2008), which are known to possess high antidiabetic and

insulin sensitizing effects (Ramar et al. 2012; Srinivasan et al. 2014). Wein et al. (2009) has reported that medium chain fatty acids has beneficial effect on glycemic conditions. In view of these it is likely that along with polyphenols, medium chain fatty acids in VCO might have a cumulative effect in glycemic conditions.

NEERA

Coconut inflorescence sap or neera is one of the important drinks, being traditionally tapped from coconut spadix and consumed largely by rural population. It is the phloem sap, rich in sugars, protein, minerals, antioxidants, vitamins, etc. utilized by the plant for the growth and development of tender or mature coconut.

Neera contains high amount of glutamic acid which is the amino acid used by the body to build proteins. It is high in inositol which is beneficial for the treatment of eye abnormalities, eczema etc. The most significant characteristic of the product is its low Glycemic index (GI is 35), an indicator of the extent of sugar absorbed into the blood. It is an abundant source of minerals, 17 amino acids, Vitamin C, broad-spectrum B vitamins and has a nearly neutral pH. The pH value of neera is in the range of 3.9-4.7 and has high specific gravity (1.058-1.077). Palm jaggery, a byproduct extracted from neera possesses high medicinal properties and is widely used in Ayurvedic preparations. Palm sugar, with its low GI, is expected to cater to the needs of diabetic patients (An MM Active Publication, Nature's Gift, 2015).

An array of products is reported from coconut for consumption, industrial use and as nutraceuticals. Food products from coconut water, kernel, coconut sap, coconut haustoria are available in the market and a list of tasty nutritious dishes prepared in our kitchens. Studies and experiences of generations reassured that coconut is the natural source of health and nutrition rich food, provides natural beverages which are body building and healthy and our traditional food crop which we have to rejuvenate and start bringing back to our diet. It is nature's gift for our multipurpose daily requirements and learn about the goodness of this 'Kalpavriksha' to nurture and love it.