INTRODUCTION: Roghan-e-Narjeel (coconut oil) also known as coconut butter, is an edible oil extracted from dried Maghiz-e-Narjeel (coconut kernels) which contains about 60-65% of the oil and derived from coconut (Cocosnucifera L.) tree. Coconut oil is one of the primary sources of energy in tropical countries like India, Srilanka, Philippines, and Indonesia. There are commonly four varieties of coconut oil available in the market. Firstly pure coconut oil is extracted from dried coconut kernels (copra) by compression in a mill either by bullock or by power. It is crude, unrefined and without any additives. It has multiple uses such as edible oil, massaging oil, hair oil, cosmetic usage, medicinal and industrial purpose. Secondly is refined coconut oil obtained by mechanically and chemically refining, bleaching and deodorizing the crude coconut oil to make it thin, colorless, odorless and without any type of particle (like protein) suspended in it, for getting only pure saturated fats. Thirdly is virgin coconut oil (VCO) derived from coconut milk extracted from freshly shredded coconut meat and not from copra by processes like fermentation, centrifugal separation and enzymatic action. It is laden with medium chain triglyceride (MCT). It has remarkable anti-oxidants and anti-microbial properties. This is the most respected and trusted variety. Lastly is organic coconut oil that has extracted from coconut palms prepared only on organic manure without involving any chemical, synthetic fertilizers or insecticides in its extraction or processing. This is another well respected variety. This form mainly used in cosmetic area.

Physico-chemical Properties: It has a long shelf life. The oil has the natural sweet taste of coconut. Coconut oil is insoluble in water. At temperature...
above its melting point it is completely miscible with most of the non-hydroxylic solvents such as light petroleum, benzene, carbon tetrachloride etc. In alcohol, coconut oil is more soluble than most common fats and oils. Among the most stable of all vegetable oil, coconut oil is slow to oxidize and thus resistant to rancidity. Unrefined coconut oil melts at 20-25°C and smokes at 170°C (350°F), while refined coconut oil has a higher smoke point of 232°C (450°F). Coconut oil is a triglyceride consisting 92% saturated fatty acids, most of them (about 70%) are lower chain saturated fatty acids known as medium chain fatty acids (MCFAs), 6% monounsaturated fatty acids and 2% polyunsaturated fatty acids. Out of its saturated fatty acids, 45-56% coconut oil is primarily lauric acid, 16.8% myristic acid and 8.2% palmitic acid. It’s only monounsaturated fatty acid is oleic acid while it’s only polyunsaturated fatty acid is linoleic acid. Physico-chemical Characteristics of unrefined, refined and virgin Coconut Oil are described in Table 1.

<table>
<thead>
<tr>
<th>Physico-chemical Characteristics</th>
<th>Virgin coconut oil from wet coconut</th>
<th>Unrefined coconut oil from copra</th>
<th>Refined coconut oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Colourless</td>
<td>Slight brownish</td>
<td>Colourless</td>
</tr>
<tr>
<td>Odour</td>
<td>Coconut smell</td>
<td>Coconut smell</td>
<td>Odourless</td>
</tr>
<tr>
<td>Melting point °C</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Moisture %</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Iodine value (cg 12/gm.)</td>
<td>12-15</td>
<td>12-15</td>
<td>10-12</td>
</tr>
<tr>
<td>Peroxide value (meq.02/kg.)</td>
<td>0-1</td>
<td>0-1</td>
<td>0-1</td>
</tr>
<tr>
<td>Saponification value (mg KOH/g)</td>
<td>245-255</td>
<td>245-255</td>
<td>250-255</td>
</tr>
<tr>
<td>Phospholipids (%)</td>
<td>0.1</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Unsaponifiable matter (%)</td>
<td>--</td>
<td>0.42</td>
<td>0.19</td>
</tr>
<tr>
<td>Tocopherols (mg/Kg)</td>
<td>150-200</td>
<td>150-200</td>
<td>4-100</td>
</tr>
<tr>
<td>Phytoesterols (mg/Kg)</td>
<td>--</td>
<td>400-1200</td>
<td>--</td>
</tr>
<tr>
<td>Total phenolics (mg/Kg)</td>
<td>640</td>
<td>618</td>
<td>20</td>
</tr>
<tr>
<td>Fatty Acid Composition Relative (%)</td>
<td>92.0</td>
<td>92.0</td>
<td>92.0</td>
</tr>
<tr>
<td>Saturates</td>
<td>92.0</td>
<td>92.0</td>
<td>92.0</td>
</tr>
<tr>
<td>Monounsaturates</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Polyunsaturates</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

The fatty acid composition of the oil is: α-tocopherol, 5; and β-tocopherol, 6ppm: it also contains α-, β and γ-tocotrienol, 5, 1 and 19 ppm, respectively. The fatty acid composition of the oil is: caproic, <1: caprylic, 5-9; capric, 6-10; lauric, 44-52; myristic, 13-19; palmitic, 8-11; stearic, 1-3; oleic, 5-8; and linoleic, <3%. Several derivatives have been obtained from these fatty acids and their uses are given in Table 2.

<table>
<thead>
<tr>
<th>Derivative</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl caproate</td>
<td>Synthetic flavours</td>
</tr>
<tr>
<td>Amyl caproate</td>
<td>Synthetic flavours</td>
</tr>
<tr>
<td>Allylcaprae</td>
<td>Synthetic flavours</td>
</tr>
<tr>
<td>Ethyl caprylate</td>
<td>Perfumery intermediate</td>
</tr>
<tr>
<td>Amyl caprylate</td>
<td>Perfumery intermediate</td>
</tr>
<tr>
<td>Butyl caprylate</td>
<td>Perfumery intermediate</td>
</tr>
<tr>
<td>Barium caprylate / caprate</td>
<td>Stabilizer for PVC</td>
</tr>
<tr>
<td>Allyl</td>
<td>Sweet banana / pineapple odour</td>
</tr>
<tr>
<td>Amyl caprate</td>
<td>Arrachcognacodour</td>
</tr>
<tr>
<td>Amylase caprate</td>
<td>Dip type coatin for food products</td>
</tr>
<tr>
<td>Butyl caprate</td>
<td>Apricot odour</td>
</tr>
<tr>
<td>Caprylicaprate</td>
<td>Chemical pruning activity on plants</td>
</tr>
<tr>
<td>Lauryl alcohol</td>
<td>Detergent base</td>
</tr>
<tr>
<td>Sodium lauryl sulphate</td>
<td>Cosmetics and toiletries</td>
</tr>
<tr>
<td>Sodium lauryl ether sulphate</td>
<td>Shampoo</td>
</tr>
<tr>
<td>Iso propyl myristate</td>
<td>Cosmetics</td>
</tr>
</tbody>
</table>
Temperament (Mizaj):  
Hot 2° & Wet 2°

Therapeutic Dosage (Miqdar-e-Khurak):  
2-3 Tola

Method of Uses (Tarkeeb-e-Istemalat):  
Roghane-Narjeel (coconut oil) is used for oral administration (Brah-e-Dahn) as well as topical application in the form of a paste (Zamad) and ointment (Marham) 6, 7, 8.

Pharmacological Actions (Af’aaal)  
Dafe-e-Da-us-sadaf (Anti-psoriatic) 9  
Dafe-e-Kharish (Anti-pruritic) 9  
Qatil-e-Kirm-e-Shikam (Antihelminthic) 8  
Muqavvi-e-Bah ( Aphrodisiac)  
Muqavvi-e-Qalb (Cardiac Tonic) 5, 10  
Muqavvi-e-Man’at (Immunomodulator) 1, 10  
Musakkin (Sedative) 7  
Murattib (Moisturizer) 9  
Mundamil-e-Qurooh (Wounds Healer) 9  
Nafey-e-Shaheeqa (Pertussis Reliever) 8  
Anti-microbial activity 1, 11  
Anti-bacterial activity 1, 11  
Anti-viral activity 1, 11  
Anti-fungal activity 1, 11  
Anti-protozoal activity 1, 11  
Anti-septic activity 9

Therapeutic Uses (Mahall-e-Istemalat):  
Roghane-Narjeel (Coconut Oil) is specially suggested in the treatment of Da-us-sadaf (Psoriasis), Nar-e-Farsi (Eczema), Hekah (Pruritis), Quba (Ring worm), Namla (Herpes), Busoor-e-Labniyya (Pimples) and Busoor-e-Jild (Skin Rashes) 7, 8, 9. It is also used in Amraz-e-Qalb (Heart Diseases), Amraz-e-Sha’ar (Hair Diseases) like hair’s falling, graying and lusturelessness. It is also used in Ziabitus (Diabetes), Deedan-e-Am’aa (Intestinal worms) particularly in Habb-ul-Qara (Tape Worm) and Aujaaye Baridah (cold pains) 7, 10.

Scientific Studies:  
Few scientific studies are illustrated below regarding Roghan-e-Narjeel (coconut oil).

Anti-oxidant Activity:  
Newin et al (2005) studied VCO is capable of increasing antioxidant enzymes when supplemented with diets in rats 12.

Kapila et al (2009) compared the antioxidant activities of coconut oil extracted under hot and cold conditions. The coconut oil extracted under hot conditions (HECO) contained more phenolic substances than the coconut oil extracted under cold conditions (CECO). However, high temperatures used in the hot extraction of coconut oil favor the incorporation of more thermally stable phenolic antioxidants into coconut oil. Therefore, the consumption of HECO may result in improvement of antioxidant related health benefits compared with the consumption of CECO 13.

Anti-hyperlipidemic Activity:  
Newinet al (2007) showed the VCO lowered total cholesterol, triglycerides, phospholipids, low density lipoprotein (LDL), very low density lipoprotein (VLDL) and increased high density lipoprotein (HDL) 14.

Vess by (1994) reported the monounsaturated fatty acids such as oleic acid are as effective in reducing serum total and low density lipoprotein cholesterol levels as polyunsaturated fatty acids such as linoleic acid 5.

In1989 Mendis et al reported undesirable lipid changes when young adult Sri Lankan males were changed from their normal diets by the substitution of corn oil for their customary coconut oil. Although the total serum cholesterol decreased 18.7 per cent from 179.6 to 146.0 mg/dl and the LDL cholesterol decreased 23.8 per cent from 131.6 to 100.3 mg/dl, the HDL cholesterol decreased 41.4 per cent from 43.4 to 25.4 mg/dl (putting the HDL values below the acceptable lower limit) and the LDL/ HDL ratio increased 30 per cent from 3.0 to 3.9 15.
hypercholesterolemics lowers serum cholesterol from 450 mg/dl to 367 mg/dl. This is hardly a cholesterol raising effect 15.

Hostmark et al (1980) compared the effects of diets containing 10% coconut fat and 10% sunflower oil on lipoprotein distribution in male wistar rats. Coconut oil feeding produced significantly lower levels (p = <0.05) of pre-beta lipoproteins (VLDL) and significantly higher (p = <0.01) alpha-lipoproteins (HDL) relative to sunflower oil 15.

**Anti-viral Activity:**
Hierholzer and Kabara (1982) showed virucidal effects of monolaurin (a disease-fighting fatty acid derivative produced when the lauric acid in coconut oil is used by the body) on enveloped RNA and DNA viruses was done in conjunction with the Center for Disease Control of the US Public Health Service with selected prototypes or recognized representative strains of enveloped human viruses. The envelope of these viruses is a lipid membrane 15.

Kabara (1978) and others have reported that certain medium-chain fatty acids such as lauric acid and their derivatives like mono-glycerides (monolaurin) can have adverse effects on various micro-organisms including bacteria, yeast, fungi, and enveloped viruses that are inactivated by disrupting the lipid membranes of the organisms (Isaacs and Thornar 1991; Isaacs et al 1992).

Some of the viruses inactivated by these lipids, in addition to HIV, are the measles 1), vesicular stomatitis virus (VSV), isna virus, and cytomegalovirus (CMV) 15.

**Anti-microbial Activity:**
It is reported by Kabara (1972) that in vitro Lauri Acid and Capric Acid were active against all gram-positive and gram-negative organisms and Candida. Minimum Inhibitory Concentration ranges for lauric acid were 0.062–2.249 micromoles/ml, and were 1.45 and 5.8 micromoles/ml for capric acid 16. Oyiet al (2010) reported that VCO in water emulsions killed S. aureus was by 6 hrs, Ps. Eruginosa by 48 hrs. Candida or A. niger by 7 days in vitro 16.

**Healing Activity:**
Nevin et al (2010) reported that VCO-treated wounds healed much faster due to higher collagen and anti-oxidant enzymes activities. It was also observed histopathologically, that there is increase in fibroblast proliferation and neovascularization in VCO-treated wounds 17.

**Moisturizing activity:**
Agero et al (2004) reported that Coconut oil is as effective and safe as mineral oil when used as a moisturizer in xerosis (dry & rough skin). A randomized double-blind controlled clinical trial was conducted on mild to moderate xerosis in 34 patients with negative patch-test reactions to the test products. These patients were randomized to apply either coconut oil or mineral oil on the legs twice a day for 2 weeks. Quantitative outcome parameters for effectiveness were measured at baseline and on each visit with a Corneometer CM825 to measure skin hydration and a Sebumeter SM 810 to measure skin lipids. Both oils showed effectiveness through significant improvement in skin hydration and increase in skin surface lipid levels. Subjective grading of xerosis by the investigators and visual analogue scales used by the patients showed a general trend toward better (though not statistically evident) improvement with coconut oil than with mineral oil, therefore Coconut oil is superior to mineral oil in dry skin 18.

**Immunomodulator Activity:**
Winarsi et al (2008) reported that the VCO enriched with zinc increased Tc cells, Th cells, IL-2, but maintained the number of neutrophils and NK cells, while the IgG level changed from equivocal to negative in candidiasis patient 19.

**Anti-diabetic Activity:**
It is reported by Girotti et al (1984) that virgin coconut oil (VCO) has been shown to possess insulin tropic effects shown in isolated perfused mouse islet with hypolipidemic effects 20. Further studies by Siddalingaswamy et al (2011) on diabetic rat with force fed with 2ml alcoholic extracts of commercial coconut oil (CCO), CEVCO and HEVCO for 21 days. The results indicated HEVCO reduced blood glucose and lipids viz. total cholesterol (TC), triglycerides (TG), High density lipoproteins (HDL), Low and Very Low Density
Lipoprotein (LDL+ VLDL) and thiobarbytyric acid reactive substances (TBARS) increased the antioxidant status by elevating activities of antioxidant enzymes such as superoxide dismutase (SOD), catalase, glutathione peroxidase (GSH-Px), glutathione (GSH) concentration and decreased lipid peroxidation in liver than CEVCO. These beneficial effects may be due to increased polyphenolic and other antioxidants content present in HEVCO.

Kabra et al (2012) reported that Cocosncifera flower extract (CNFE) and coconut oil (CO) at a dose of 300 mg/kg body weight for 15 days, suppressed the elevated blood glucose and lipid levels in alloxan induce diabetic rats. These findings indicated that the Cocosncifera flower extract and coconut oil possess antihyperlipidemic effect in addition to anti-diabetic activity. The hypoglycemic activity of coconut oil seen in this study could be due to the fatty acids present in the oil. It is reported by Maedler et al (2003) that monosaturated fatty acids improved β-cell secretory function by preventing β-cell apoptosis, decrease β-cell proliferation and impairment of β-cell function.

Anti-obesity Property:
Liau et al (2011) reported that VCO is safe and effective in reducing visceral adiposity in obese, though healthy men. An open label pilot study was conducted over 20 obese but healthy volunteers with intake of VCO for four weeks. Result has been concluded that only waist circumference was significantly reduced with a mean reduction of 2.86cm or 0.97% from initial measurement (p=0.02). Waste reduction was seen in only males (p<0.05). Another study by Assuncao et al (2009) showed that dietary coconut oil elevates High Density Lipoprotein (HDL) levels and reduces abdominal obesity in women. This randomized double-blind clinical trial involved 40 obese women, aged 20-40 years, presenting waist circumference (WC)>88cm (abdominal obesity). Groups received daily dietary supplements comprising 30 ml of either soybean oil (Group S; n=20) or coconut oil (Group C; n=20) over a 12-week periods. After 12-week, group C presented a higher level of HDL (48.7+/− 2.4 vs. 45+/− 5.6; P=0.01) and a lower LDL: HDL ratio 2.41+/− 0.8 vs. 3.1+/− 0.8; P=0.04). Reductions in BMI were observed in both groups but only group C exhibited a reduction in WC (P=0.005).

Anti-cancer Activity:
Lim-Syliancio (1987) published a 50-year literature review showing the anti-cancer effects of coconut oil. Cohen et al (1986) showed that coconut oil was by far more protective than unsaturated oils in chemically induced cancers of the colon and breast, for example 32% of corn oil eaters got colon cancer whereas only 3% of coconut oil eaters got the cancer. Animals fed unsaturated oils had more tumors. This shows the thyroid-suppressive and hence, immuno-suppressive effect of unsaturated oils.

Antithrombotic Property:
VCO has significant antithrombotic effect over copra oil. A coconut oil based diet high saturated fatty acid diet lowers postparendial t-PA(tissue plasminogen activator) antigen concentration, and this may favorably affect the fibrinolytic system and the Lp-a (lipoprotein-a) concentration compared with the high mono polyunsaturated fatty acid diet. The proportions of dietary saturated fatty acids more than the percentage of saturated fat energy seem to have a beneficial influence Lp-a (lipoprotein-a) levels.

CONCLUSION: Coconut oil has many health benefits, which includes hair care, skin care, stress relief, cholesterol level maintenance, weight loss and boosted immune system. These benefits of oil can be attributed to the presence of lauric acid, capric acid and caprylic acid. The oil is known to have antioxidant, antiviral, antibacterial, antifungal antiprotozoal, antihyperlipidemic effects and excellent healing & moisturizing properties. However, more research is needed to clearly understand the many good effects of the oil.

ACKNOWLEDGEMENT: I am thankful to Director, Deputy Director, Assistant Directors, Drug Inspector, Department of Unani Medicine Rajasthan – Jaipur, India, for their encouragement and support.
REFERENCES:


