MEDICINAL PLANTS AS HYPOCHOLES-TEROLEMIC AGENTS

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Coronary heart disease is sometimes, called arteriosclerotic heart disease produced by atherosclerosis, that is, deposition of cholesterol in the wall of the artery. Cholesterol is carried in the blood, combined with proteins and fats in so called "giant molecules" the lipoproteins, which are water soluble. The fats in the lipoproteins are valuable fuels, but when they are burned the protein and cholesterol remain. The proteins can replace the proteins lost from the cells by wear and tear, so they are readily used up. But the cholesterol cannot be burned as it is water insoluble, so some of the cholesterol tends to be deposited in the tissues. The liver which makes cholesterol to match the amount of fat to be converted into lipoproteins, also is efficient in disposing of excess of cho-r lesterol by excreting it in the bile both as cholesterol and as bile salts. Heart disease is one of the major diseases throughout the world. It has been shown that persons haying high serum cholesterol level are more prone to heart disease. It has been suggested that the cholesterol level can be controlled by a combination of physical exercise, diet and medicinal plants besides the use of alopathic synthetic drugs. In this paper a review is given of those vegetables and medicinal plants which have proved to be useful in reducing the cholesterol level and phospholipids. It has been proved that those vegetables which have more roughage or fibrous material are more effective in reducing blood cholesterol level. One explanation for this biological effect suggests that the indigestible material absorbs bile salts as it passes through the gut. Normally the biological detergents are readsorbed through the gut wall and recycled with loss of fifteen to twenty percent of the total each day. If these are adsorbed by the passing fibrous material, they pass on to the outside world. The body makes up the loss by manufacturing more in liver from cholesterol in the blood, where the level of cholesterol falls Oakenful's (1978) studies have indicated that only those fibrous vegetables which contain saponins absorb the bile salts, increase the rate of excretion of bile salts and lower the blood cholesterol level. Saponin rich diets are soyabeans, spinach, chick peas, bean shoots, sunflower seeds; soya beans being the best, reducing cholesterol level by twenty one percent.

Matricaria chamomilla Linn (Vernacular:
babuna-ke-phool)

Flowers are considered to be stimulant, attenuant, discutient, carminative, used in constitutional debility and dyspepsia. Oil is used externally in rheumatism, effective in flatulence and colic.

Herb contain 0.46-0.4/% essential oil, 26.1-46% azulence (Debska, 1958). Flowers contain choline (Bayer et at., 1958), carbohydrates like glucose, galactose, xylose and arabinose (Gorin and Yakoviev, 1974) Xanthones and Flavoncs like epigenin glucoside, patulitrin, huteotin glucosidc, umbelliferone, quercimeritrui (Hoerhammer et al., 1963; Poethke et al., 1969) etc.

The essential oil increased bile secretion and the level of cholesterol in bile. According to Sokolova and Co-workers (1972), when the essential oil was administered orally at 0.1 ml/kg to dogs or cats, it increased bile secretion and the level of cholesterol in bile. At 0.2 ml/kg the preparation had a hypotensive effect and decreased the frequency of cardiac contractions and respirations. The LD50 value of the essential oil, administered orally to mice was 2.2 ml/kg.

Commiphora mukal Syn. Balsamodendron mukul (Vernacular: Guggulu gum)

It is a gum obtained by the incision of the bark of the tree. It is said to be demul-cant, aperient, alterative, astringent, aphrodisiac, carminative and a purifier of the blood.

Gum contains L-a.rabinose, D-galactose and L-Fucose (Bose and Gupta, 1962). Resin contains diterpencids: cembrene A and Mukulol (Patil et al., 1973). Studies carried out by Arora and colleagues (1973) showed that the petroleum ether extract of C. mukul decreased serum cholesterol,

phospholipids, triglycerides and lipids in experimental hyper-cholesterolemic chicks. Ethyl acetate extract has less anticholesterolcmic activity.

The alcohol extract of the plant as well as two pure fractions i.e. a terpenoid and a steroid isolated from the petroleum ether extract of the oleoresin of commiphora mukul were investigated in cholesterol fed chick by L. Malhotra and Co-workers (1970). The pure steroid was found to be most potent in lowering serum cholesterol level by 69.31%, as well as choles-terol/phospholipid ratio (C/P) which fell to 0.73 from 1.24. The alcohol extract lowered the serum cholesterol by 59.26% and C/P ratio to 1.37 from the initial 2.15, whereas the pure compound (terpenoid) lowered the serum cholesterol by 54.30% and C/P from 1.48 to 1.10. Total guggul resin and its various fractions were similarly studied by Niiyanand and Kaour (1973) and Satyavati and Co-workers (1969).

Two species of Plantago namely Plantago ovata (vernacular is phagul), and Plantago major (vernacular: Bar tang) were also found to be useful in lowering cholesterol level. The seeds of the two species are used as cooling; demulcent, in chronic dysentery, diarrhoea and constipation. The leaves of P. major are applied to wounds.

Plantago ovata seeds contain fatty acids like linoleic, oleic and palmatic acids (Gelfi et al., 1969); phenolic acids like fumaric, benzoic, cinnamic, syringic, vanillic, p-hydroxybenzoic, ferulic, p-coumaric, gentiosic and salicylic acids (Pailer et al., 1969).

Plantago major leave contain flavonoids like baicalein and scutellarein (Maksyutina, 1971) pectin; Me-U-galacturonate, D-galactose, L-arabinose and L-Khamnose (Goriu et al., 1964). Siddiqui and others (1964) found that the oil extracted from the embryo of P. ovata seeds is more active than sun-flower oil in reducing the serum cholesterol level in cholesterol fed rabbits and specially in rabbits whose cholesterol level is already raised. It does not alter the serum cholesterol level in normal rabbits. The affect is due to the unsaturated nature of the oil present in the seeds. Unsaturated fatty acids are present upto 78.8% of which oleic acid is 25.40% and linoleic acid is 53.4. According to Garvin et al (1965), an oral hydrophilic colloid derived from the seeds of P. ovvata Metamucil (a mixture containing 50% of powdered mucilagenous portion of P. ovata powdered anhydrous dextrose and a small amount of inorganic salts), after a three week pre-experimental control period was fed for a 5-week experimental period to normally active young adult males on several dietary regimens. Subjects on a self selected mixed diet exhibited mean serum cholesterol levels during the last three weeks 9% below that of the control period. Subjects on an egg-supplemented regimen (6-8 eggs daily) exhibited mean cholesterol levels during the last 3 weeks 7% below that of the control period and 18% below a comparable group receiving the egg supplemented but no Metamucil. One drug (International Pharmaceutical Abstracts, 1979) was obtained from the leaves of P. majtn- which was found to have hypocholesterolemic activity, lowering total serum lipids, cholesterol, B-lipo-protein and triglycerides concentrations when tested on chinchillas (a strain of rabbits) at a dose of 0.2 mg/kg daily for a week.

Nigella sativa (Vernacular: Kalonjt, Kalazrra)

It is carminative, attenuant, diuretic, anthelmintic and stimulant. It contains Nigcllone (C18 1122 04) and a non-carbonyi compound (Mahfouz and Dakhakhny, 1960); 2-methyl-4-isopropyl p-guinone (Cano-nina et al., 1963), B-sitosterol and Thymoquinone (Dakhakhny, 1963). Its fatty oil (Gad et al., 1963) contain 78.20 percent of unsaturated acids comprising of 38.76% oleic acid, 37.56% linoleic acid and 1.88% linolenic acid.

According to Mahfouz and Co-workers (1962) seed oil of N. saliva increase bile flow and total solids of bile. Injection of 0.2 cc of seed oil/kg body weight produced a definite increase in the bile flow which reached a maximum in 1.5 hours and decreased slowly in 3 to 4 hours. The total solid increased to a maximum in 0.5 hours before decreasing slowly and marked bronchial dilation and lowering blood pressure were recorded. Oral administration of the oil also increased bile flow. The experiments were performed on anaesthetized dogs. Nigelline, a constituent of oil showed no choleratic action. This constituent has a strong bronchodilator activity. The seeds, leaves, stems and (lowering tops of M. sativa contain a hypotensive glycoside (Zawahry, 1964) when tested on dogs. The LD50 of the

alcoholic extract of the seeds from which the active glycoside is obtained, is 2.1 g/kg after 3 months.
Allium sativum (Vernacular: garlic, lassan)
It is stimulant, carminative, antirheumatic, anthelmintic and alterative. It is good as antiseptic and antispasmodic agent and effective in bronchial and asthmatic complaints. It is effective as blood pressure depressant and is now commonly used for this purpose. Its main and biologically active components are thio-com-pounds present in its essential oil (Ikram, 1972).
Clinical and pharmacological studies carried out by Petkov proved that garlic is definitely useful for patient suffering from hypertension and hypercholesteremia.
Terminalia belerica (Vernacular: Bakera)
It is astringent, tonic, digestive, attenuant, used as a remedy in flatulence, dyspepsia and other digestive disturbances. Fruits (Row et al., 1970) contain B-sitosterol, ellagic acid, gallic acid, ethyl gallate, gallylg-lucose, chebulagic acid and carbohydrates. The alcoholic (Siddiqui, 1963) extract of the fruits increase the bile secretion and total solid contents in bile, which may be useful in digestive orders. It may also lower the cholesterol level in blood.
B-sitosterol (Lower and Edger, 1979) has been found to be useful in reducing cholesterol level.
Boucerosia aucheriana (vernacular; Pamanke) contain B-sitosterol and also saponins. It is commonly used as a vegetable in Pakistan and Afghanistan. It will be worthwhile to investigate this vegetable for the above activity. Similarly other plants which are good for liver may be studied for this activity.
At present different allopathic drugs like clofibrate and Niacin are commonly used for this purpose, but these have harmful side effects like nausea, constipation etc. Recently the efficacy of clofibrate has been re-assessed (WHO Bulletin, 1979). It has found that clofibrate is not effective in the secondary prevention of ischaemic heart disease. Clofibrate has very little effect in decreasing plasma cholesterol concentration. Experiments carried out on rats showed that it caused cancer. In view of the above considerations it is recommended that the plants mentioned in the paper which are found to be effective should be tried for lowering plasma cholesterol and total lipid concentrations.

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