Antidiabetic activity of Sapota roots

A study of the antidiabetic activity of alcohol extract of *Achras zapota* Linn. (Hindi-Chiku) roots, each with a dose 20, 40, 80 g/Kg body wt. (BW) given orally to rats has been conducted, using the Glucose Tolerance Test Method. The administration of alcohol extract at various doses indicated that doses equivalent to the fresh material 80 g/Kg BW gave the strongest decreasing activity, followed respectively by doses equivalent to the fresh material 40 g/Kg BW and 20 g/Kg BW. The activity of alcohol extract with a dose equivalent to the fresh material 80 g/Kg BW is almost as strong as tolbutamid with a dose 100 mg/Kg BW. This experiment showed that the increasing doses of alcohol extract of roots of this plant cause an increase in the antidiabetic activity [Muhtadi *et al*, *Bionatura* (Indonesia), 2000, 2(2), 60-65].

**Biological activity of extracts from Catalpa bignonioides Walt.**

*Catalpa bignonioides* Walt. (Family—*Bignoniaceae*) is grown in gardens as ornamental. Although this plant is consumed by indigenous cultures of South America for medical uses, experimental studies of the biological properties are lacking. Ethyl ether, butanolic and aqueous fractions of the pod extract were examined for the antimicrobial activity against five bacteria and one yeast, the cytotoxic activity against HepG2 cells and the anti-inflammatory and antinoceptive effects in rodents. A preliminary phytochemical analysis of the extracts and fractions was also conducted. Results showed no antimicrobial or antitumoral effects, but prominent anti-inflammatory and antinoceptive actions of the extracts. These last activities may be a result of the presence of either of saponins, sterols or phenols, mainly found in the leaves and pods of the plants [Muñoz-Mingarro *et al*, *J Ethnopharmacol*, 2003, 87(2-3), 163-167].

Antioxidant activity of Saussurea

The roots of *Saussurea lappa* Clarke have been used as aromatic stomachic, and also as an important fragrance. Several sesquiterpenes, such as costunolide and dehydrocostus lactone isolated from the methanolic extract were found to show a potent inhibitory effect on nitrite (NO$_2^-$) accumulation in LPS (lipopolysaccharide)-activated mouse macrophages (IC$_{50}$ = 3.5 µg/mL). There have been many pharmacological studies on the activities of extracts or principal constituents, costunolide and dehydrocostus lactone from the roots of *S. lappa* such as the anti-ulcer, anti-carcinogenesis in rats, the vasorelaxant effect and the inhibitory effects on killing activity of cytotoxic T lymphocytes. In addition, previous studies of this species and other herbal medicines demonstrated that sesquiterpene lactones including costunolide and dehydrocostus lactone inhibited nuclear factor-kB activation thereby preventing iNOS (inducible nitric oxide synthase) and TNF-α (tumour necrosis factor-α) expression.

Matsuda and others from Japan studied the methanolic extract of the roots and found that it inhibits nitric oxide (NO) production in lipopolysaccharide-activated mouse peritoneal macrophages. Among the constituents from the methanolic extract, two sesquiterpene lactones (costunolide and dehydrocostus lactone) and two amino acid sesquiterpene conjugates (saussureamines A and B) potently inhibited LPS-induced NO production (IC$_{50}$ = 1.2-2.8 µM). Saussureamines A and B in addition to costunolide and dehydrocostus lactone did not inhibit iNOS enzyme activity, but they inhibited both induction of inducible NO synthase and activation of nuclear factor-kB in accordance with induction of heat shock protein 72 (Matsuda *et al*, *Bioorg Med Chem*, 2003, 11, 709-715).
Inhibition of experimental gastric lesion and inflammation by *Phyllanthus amarus* extract

*Phyllanthus amarus* Schum. & Thonn. is found wild during the month of July-August. It is reported to possess many medicinal properties especially against diabetes and jaundice. Scientist at Amala Cancer Research Centre, Thrissur, Kerala evaluated anti-inflammatory activity of the plant using experimental rat paw edema produced by carrageenan administration. The protection of gastric lesions by extract was also studied.

Methanolic extract of the plant 50, 200 and 1000mg/kg body weight significantly inhibited gastric lesions, induced by intragastric administration of absolute ethanol (8ml/kg). Mortality, increased stomach weight, ulcer index, and intraluminal bleeding were also reduced significantly. Biochemical analysis indicated that reduced glutathione (GSH) of gastric mucosa produced by ethanol administration was significantly elevated by treatment with the extract. Aqueous and methanol extracts produced an inhibition of rat paw edema up to 42% compared to control in 3h and continued up to 8h. Anti-oxidant activity of the extract as well as presence of tannins in the extract may be responsible for these observed activities [Raphael & Kuttan, *J Ethnopharmacology*, 2003, 87(2-3), 193-197].

**Antihepatotoxic activity of Chicory seeds**

The rhizome of *Cichorium intybus* Linn. commonly known as Chicory or Kasni is used for blending coffee. The plant is used as liver tonic, cardiotonic, diuretic, stomachic, cholagogue and jaundice. The seed of the plant is also one of the main ingredients of a formulation which is used for the treatment of various diseases of liver.

Researchers at Antihepatotoxic Research Laboratory, Jamia Hamdard, New Delhi and Department of Pharmacognosy, King Saud University, Riyadh, Saudi Arabia carried out a thorough pharmacological screening for the antihepatotoxic activity of different fractions of the seeds of the plant on carbon tetrachloride (CCL4)-induced liver damage in rats. The study showed different degrees of activity on measuring the different biochemical parameters like aspartate transaminase, alanine transaminase, alkaline phosphatase, and total protein, wherein the methanol fraction and compound AB-IV were found to be most active. The histopathological study of the liver of the methanolic fraction and compound AB-IV (isolated from methanol fraction) also showed almost complete normalization of the liver tissues as neither fatty accumulation nor necrosis was observed. The central vein appeared clearly indicating a potent antihepatotoxic activity [Ahmed et al, *J Ethnopharmacology*, 2003, 87 (2-3), 237-240].

**Hypoglycaemic effect of water extracts of Bael fruits in diabetic rats**

Many indigenous drugs have been used by local people and practitioners of Ayurvedic system for the treatment of diabetes mellitus in India. Different parts of Bael, *Aegle marmelos Corr.* (leaves and ripe fruits) have been reported to be used in the treatment of diabetes mellitus. Preliminary reports indicate Bael leaf extract exhibits antidiabetic action in glucose-induced hyperglycaemic rats and in alloxanized diabetic rats. Aqueous decoction of root bark exhibits hypoglycaemic action in rats. Researchers at Department of Biochemistry, Annamalai University, Tamil Nadu carried out studies to see, whether the aqueous extract of Bael fruits exert any effect on blood glucose, plasma lipid peroxides and non-enzymatic antioxidants in streptozotocin (STZ)-induced diabetic rats. The effect of the extract was compared with glibenclamide, a well-known hypoglycaemic drug.

During experiment hypoglycaemic effect of the water extract of the fruits was examined in streptozotocin-induced diabetic Wistar rats. Oral administration of the water extract (125 and 250mg/kg) twice a day for 4 weeks resulted in significant reductions in blood glucose, plasma thiobarbituric acid reactive substances, hydroperoxides, ceruloplasmin and α-tocopherol and a significant elevation in plasma reduced glutathione and Vitamin C in diabetic rats. The effect of the extract at a dose of 250mg/kg was more effective than glibenclamide in restoring the values of these parameters. The results of this study clearly shows the hypoglycaemic activity of the fruit extract [Kamalakkannan & Prince, *J Ethnopharmacology*, 2003, 87(2-3), 207-210].
Angiogenesis inhibitors from *Saussurea*

Angiogenesis is the generation and growth of new blood vessels from pre-existing vessels. When the balance between angiogenic and angiostatic factors is disrupted, tumour cells may begin to release uncontrolled angiogenic factors, including vascular endothelial growth factor (VEGF) and basic fibroblast growth factor (bFGF). These factors go on to stimulate endothelial cell proliferation, and newly formed endothelial cells break down the extracellular matrix, migrate to cancer cells, and eventually begin to form lumen. Tumour angiogenesis is well-known to play a key role in tumour growth and metastasis and angiogenesis inhibitors have been regarded as potential therapeutic agents for cancer treatment. Jeonga and others from Japan investigated angiogenesis inhibitors from natural products and screened about 170 medicinal plants to assess their affects on endothelial cell proliferation. A significant inhibitory activity was observed against proliferation of bovine aortic endothelial cells (BAECs), exerted by an MeOH extract from the roots. When the MeOH extract was analyzed by a chromatographic method using bioassay-guided fractionation methods, costunolide (CT) was isolated as an active principle. CT, a representative sesquiterpene lactone from *Saussurea lappa C B Clarke* (Hindi-Kuth) has been reported to exert several biological activities such as an inhibitor of NF-κB mobilization, NO synthase, and killing function of cytotoxic T lymphocytes. They further reported the effects of CT on *in vitro* and *in vivo* models of angiogenesis.

The results demonstrated that CT inhibited angiogenic response *in vitro* and *in vivo* by blocking the angiogenic factor signaling pathway. CT was found to be a more potent tyrosine kinase inhibitor against KDR than against VEGF Receptor-1. Moreover, a non-toxic concentration of CT suppressed VEGF induced neovascularization in mouse cornea. Taken together, the results suggested that CT is a potent angiogenesis inhibitor with the potential to be adopted as a novel agent in anticancer therapy.

CT exerted an antiangiogenic effect and selectively inhibited the endothelial cell proliferation induced by vascular endothelial growth factor (VEGF). Further, CT was also found to inhibit the VEGF-induced chemotaxis of human umbilical vein endothelial cells (HUVECs) in a dose-dependent manner (Jeong *et al*, *Cancer Lett*, 2002, 187, 129-133).

The new compounds 1-3 and 5 showed more potent inhibitory effects on the nitric oxide (NO) production in lipopolysaccharide (LPS)-activated macrophage-like J774.1 cells than a positive control N⁶-monomethyl-L-arginine (L-NMMA) [Awale *et al*, *Bioorg Med Chem Lett*, 2003, 13(1), 31-35].

**Antioxidative activity of Orthosiphon**

Kidney Tea Plant, *Orthosiphon spiralis* (Lour.) Merrill [syn: *O. aristatus* (Bl.) Miq.; *O. grandiflorus* Bold.; *O. stamineus* Benth.] is one of the popular traditional folk medicines extensively used in Southeast Asia for the treatment of wide range of diseases. Awale and others from Japan in preliminary screening of biologically active compounds found that the methanolic extract of an aerial part showed significant inhibitory activity on the nitric oxide (NO) production in lipopolysaccharide (LPS)-activated macrophage-like J774.1 cells (IC₅₀ 40.1 µg/mL). Further separation of the methanol extract led to the isolation of four novel highly oxygenated isopimarane type diterpenes named siphonols A-D (1-4) and a novel norisopimarane-type diterpene, siphonol E (5).

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Anti-hyperlipidemic activity of Artichoke

The leaves of artichoke (Cynara scolymus Linn.; Hindi-Hathichak) are used for the treatment of hepatitis and hyperlipidemia. Various constituents and extract from the leaves of artichoke, polyphenols such as cynarin, caffeic acid, chlorogenic acid, and luteolin inhibit oxidative stress generated by reactive oxygen species in human leukocytes. Cynaroside inhibited hepatic cholesterol biosynthesis without affecting hydroxymethylglutaryl (HMG)-CoA reductase activity in rat hepatocytes and cynaropicrin inhibited contraction of rabbit isolated thoracic aorta. The leaves of artichoke were also reported in various clinical trials to be effective for patients with irritable bowel syndrome and hyperlipoproteinemia and to show choleretic effects. To clarify the anti-hyperlipidemic effect of artichoke, Shimoda and others from Japan examined the effect of methanolic (MeOH) extract and several components from the leaves of artichoke in olive oil-loaded mice.

The methanolic extract from the leaves was found to suppress serum triglyceride elevation in olive oil-loaded mice. Through bioassay-guided separation, sesquiterpenes (cynaropicrin, aguerin B, and grosheimin) were isolated as the active components together with new sesquiterpene glycosides (cynarascolosides A, B, and C). In addition, inhibition of gastric emptying was shown to be partly involved in anti-hyperlipidemic activity (Shimoda et al, Bioorg Med Chem Lett, 2003, 13, 223-228).

Vegetable

Tomatoes and cardiovascular health

Tomatoes and tomato products contain several nutrients such as lycopene, beta-carotene, folate, potassium, vitamin C, flavonoids, and vitamin E associated with theoretical or even proven effects related to cardiovascular disease. Overall, the strongest evidence comes from epidemiological data, linking serum levels of nutrients with decreased incidence of cardiovascular disease outcomes such as myocardial infarction, atherogenesis, and mortality. Clinical intervention trials offer conflicting but overall positive results, with perhaps a lesser degree of confounding effects. Fresh tomatoes are available for consumption year round and are not only nutrient rich, but are also devoid of saturated fatty acids and cholesterol, considered unhealthy in terms of cardiovascular disease. Fresh tomatoes are also very low in sodium, although some processed tomato products, such as paste and tomato sauces, do contain higher levels. Many of the nutrients found in tomatoes are proven antioxidants, some of which have been shown to work in concert with respect to improving oxidation status. The evidence of feeding individual antioxidants is conflicting, while the evidence of eating fruits and vegetables is more consistent in terms of protection from heart disease. Therefore, it would seem prudent to identify and consume foods, such as tomatoes, which provide a combination of these antioxidants as a source of cardiovascular protection.

Willcox and others from North Carolina State University, USA propose that tomatoes and their products should be included as cardiovascular protective foods [Willcox et al, Crit Rev Food Sci Nutr, 2003, 43(1), 1-18].