

Polyherbal contraceptive – 'Praneem'

A number of spermicides and pessary based on herbal formulation have been reported and prepared but a totally safe one having antibacterial, antifungal and antiviral properties is yet to be reported. While working in this direction scientists at the Talwar Research Foundation, New Delhi and Postgraduate Institute of Medical Education & Research at Chandigarh, formulated a polyherbal pessary named '**Praneem**'. The ingredients of this pessary include Neem, *Azadirachta indica* A. Juss. leaves, pericarp of the fruits of Soap-nut Tree of India, *Sapindus mukorossi* Gaertn. and oil of *Mentha citrata*.

The spermicidal action of '**Praneem**' was tested on human sperm by Sander-Cramer slide test *in vitro* and by post-coital tests *in vivo*. Contraceptive action was tested in rabbits. Pregnancy was prevented in rabbits after implanting '**Praneem**' polyherbal pessary. These tests confirmed the spermicidal properties in women. This formulation also inhibited a wide range of microbial and viral pathogens of the genital tract (Raghuvanshi *et al*, *Indian J Med Res*, 2001, **113**, 135-141).

Ocimum could cure diarrhoea

In traditional medicine the paste of Shrubby Basil (Hindi-Ban Tusli or Ram Tulsi), *Ocimum gratissimum* Linn. leaves is used for stomachache and in the treatment of diarrhoea. Small quantities of essential oil from leaves if taken orally is also reported to stop diarrhoea. To validate these claims Nigerian scientists evaluated the essential oil properties *in vivo* for antidiarrhoeal activity in mice. The test group of animals was given emulsions of essential oil in Tween 80 (0.883, 2.67 and 7.91 µg/g). During the test two techniques were also employed for evaluation.

The essential oil was found to reduce faecal output in a dose-dependent manner, the highest dose of 7.91 µg/ml being similar to the action of loperamide which was given to control animals. The oil also significantly prevented enteropooling at all doses. An aqueous leaf extract and essential oil emulsion were also tested on mice intestine *in vitro*. The extract was spasmogenic at low concentrations (1.2-4.8 µg/ml) but was spasmolytic at high concentrations (9.6-38.4 µg/ml) whereas the oil was spasmolytic at all concentrations (2.44-9.6 µg/ml) and exhibited a dose-dependent non-competitive

spasmolysis of acetylcholine-induced contractions. The oil also exhibited antibacterial activity against *Escherichia coli*. Thus it has been concluded that the essential oil of *Ocimum gratissimum* Linn. could be employed as an affordable alternative to antibiotics for curing diarrhoea [Orafidiya *et al*, *Pharm Pharmacol Lett*, 2000, **10**, 9-12; Harris, *Int J Aromatherapy*, 2001, **11** (2), 108-109].



Ocimum gratissimum Linn.

Burns and wounds healing property of Hypericum

It is reported that tribal people of Shola forest, Tamil Nadu use the aerial parts of *Hypericum hookerianum* Wight & Arn. for treating burns and wounds. Considering this potential Mukherjee and his associates at J. S. S. College of Pharmacy, Rocklands, Tamil Nadu studied the antibacterial activity of chloroform, acetone and methanol extracts of leaves and stems of this plant. All extracts showed antibacterial activity against six different Gram-positive and Gram-negative bacteria. The methanol extract exhibited maximum inhibitory activity at 400 µg/ml comparable to tetracycline 100 µg/ml. Thus the use of this plant by tribal people could be supported as it protects the burns and wounds from infection thereby enhancing the healing process (Mukherjee *et al*, *Fitoterapia*, 2001, **72**, 558-560).

Anticancerous Paulownia flowers

The flowers of *Paulownia tomentosa* Steud. are commonly used in traditional Chinese medicine for the treatment of bronchial diseases. Recently cytotoxic activity of this plant has been investigated by Moon and Zee at Pharmacognosy Laboratory, South Korea. A cytotoxic compound identified as isoastraplicolide tiglate (C₂₀H₂₂O₆, mp, 150°C) was isolated from the methanol extract of air-dried flowers. Only the chloroform soluble fraction was found active against the growth of five tumour cell lines, viz. lung carcinoma, adenocarcinoma, malignant melanoma, central nerve system tumour and colon adenocarcinoma [Moon & Zee, *Nat Prod Sci*, 2001, **7**(1), 21-22].

Antibacterial *Bergenia* rhizome

The rhizome of *Bergenia ciliata* Sternb., a Himalayan herb, is used by local people for many ailments including diarrhoea, vomiting, pulmonary affections, boils, etc. Presuming its antibacterial property Sinha and his colleagues investigated methanol extract of the rhizome. It exhibited a broad spectrum of activity at all tested concentrations. The maximum effect was observed on *Staphylococcus aureus* and was comparable to that of chloramphenicol (10 µg/disc). Thus traditional use of the herb could be supported by these findings (Sinha *et al*, *Fitoterapia*, 2001, 72, 550-552).



Bergenia ciliata Sternb. Plant (left), rhizome (right)

Liquorice can heal wound too

Liquorice, *Mulhatti*, *Glycyrrhiza glabra* Linn. is chiefly known for its expectorant property and as a flavouring agent in food but it also possesses peptic ulcer healing property. Considering this scientists at Vel's College of Pharmacy, Chennai studied the antioxidant and wound healing properties of the dried ethanolic extract of liquorice roots.

During the experiment vacuum dried extract was formulated as an ointment in simple ointment base for excision wound healing model (albino rats) and suspended in 0.5% carboxy methyl cellulose for incision wound healing model (rats). Formulated ointment (0.5g) was applied on the wound of excision wound healing model once daily for 21 days starting from the day of wounding. In case of incision wound healing model the wounded edges were closed by interrupted silk sutures (non-absorbable). The sutures were removed on 7th day of wounding and the tensile strength of the wound was measured on 10th day. A dose of 1g/kg and 200 mg/kg of root extract and α -tocopherol, respectively was administered orally once daily by intragastric tube. The α -tocopherol served as a standard.

Wound contraction (4th, 8th, 12th and 16th day of wounding) and period of epithelization were observed. Antioxidant property was observed by TLC method. Results showed a significant reduction in the period of epithelization as compared to control. An increase in the tensile strength of incision suggests that the extract promotes collagen formation equipotent to β -tocopherol. The wound healing property may be attributed to antioxidant property and flavanoids present in the extract (Sam *et al*, *Indian Drugs*, 2001, 38, 355-57).



Liquorice

False Rosewood fruit extract is a wound healer

Fruit poultice of False Rosewood, *Paras-Pipal*, *Thespesia populnea* Soland. ex Correa is applied by villagers to treat skin problems including wounds. Nagappa and Cheriyan at S.C.S. College of Pharmacy, Harapanahalli, Karnataka studied the wound healing property of the aqueous extract of fruits to validate the traditional use.

The experiment was done on rats as excision and incision wound models. The



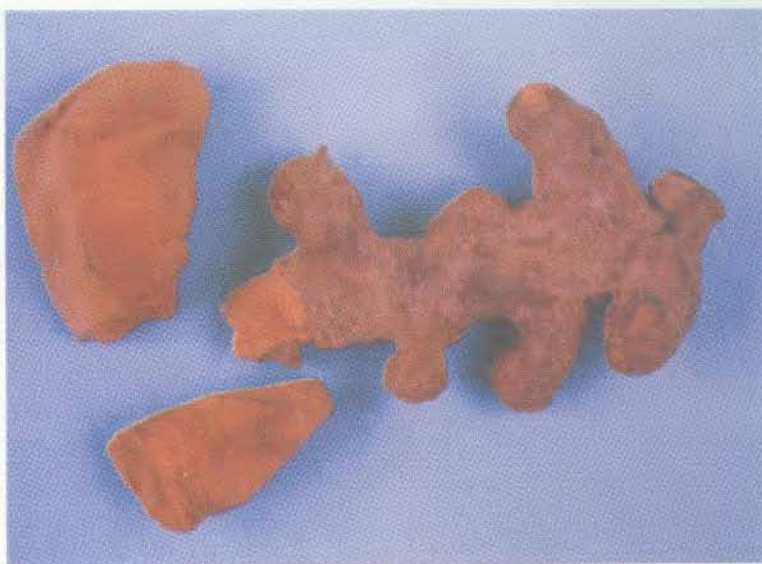
Thespesia populnea Soland. ex Correa

extract of dried and powdered fruits was filtered and concentrated under reduced pressure to a semi-solid mass. The extract (50 mg/rat) was applied topically once a day to the excision wound models and 200mg/kg p.o. extract was given daily for 10 days to incision wound models. The results revealed a significant wound healing property of the fruits (Nagappa & Cheriyan, *Fitoterapia*, 2001, 72, 503-506).

Antioxidant property of China root

China root, *Smilax china* Linn. is originally described in the Chinese system of medicine, but is also being used in India for a long time by the physicians of Ayurvedic and Siddha system of medicine. Roots and rhizome of this plant are used as medicine. Different preparations of China root are used as a medicine to delay the process of ageing. It prevents weight loss and is considered to be a strong anabolic drug. It has been reported to have antimutagenic and anticarcinogenic properties. It completely inhibits the mutagenicity, induced by benzo[a]pyrene. It is also used in chronic rheumatism, management of gout, syphilis, skin diseases, leprosy, epilepsy and insanity. In the Ayurvedic system of medicine, this plant is placed under the group "Rasayana drugs". This group of medicine is rejuvenative and prevents the age-related diseases in general. Tripathi and others from Institute of Medical Sciences, Banaras Hindu University evaluated the effect of plant extract on superoxide radicals, hydroxyl radicals, reduced glutathione and degree of lipid peroxidation.

The alcoholic extract of rhizome showed significant protection against FeSO₄ induced lipid peroxidation in rat liver homogenate. This extract scavenges the superoxide and hydroxyl radicals, but the effect was more towards the removal of superoxide than that of hydroxyl radicals. Thus it could be concluded that rhizome of China root has strong antioxidant property [Tripathi *et al*, *Indian J Exp Biol*, 2001, 39(11), 1176-79].



China root, *Smilax china* Linn.

A multi-herbal formulation for tumours

Plants contain active principles which exhibit chemopreventive activity with defined mechanism of action. Rajesh Kumar and Kuttan at Amala Cancer Research Centre, Thrissur, formulated a multi-herbal drug named as 'Cancare' for chemoprevention of cancer. 'Cancare' consists of 75% methanol extract of *Curcuma longa* Linn., *Phyllanthus amarus* Schum. & Th., *Allium sativum* Linn., *Emblica officinalis* Gaertn., *Picrorhiza kurroa* Royle ex Benth. and *Spirulina pratensis* (Nordst.) Geitl. During the studies hepatocarcinogenesis was induced by N-nitrosodiethylamine (NDEA) in rats and 20-methyl-cholanthrene (20-MC) induced sarcoma development in mice. Oral administration of 'Cancare' was found to inhibit the liver tumour development induced by NDEA. Elevated levels of serum alkaline phosphatase, glutamate pyruvate transaminase, bilirubin, liver glutathione S-transferase, glutathione and γ -glutamyl transpeptidase in the NDEA administered group was significantly reduced by 'Cancare' administration. 'Cancare' administration inhibited the sarcoma development and increased the life span of mice administered with 20-MC dose dependently. 'Cancare' administration (30 mg and 150 mg/kg) inhibited the sarcoma development (46.7 and 60%) as well as increased the life span (53.3 and 66.7%). Thus this new formulation possesses chemopreventive potential against chemically induced tumours in experimental animals (Rajesh Kumar & Kuttan, *Indian J Exp Biol*, 2001, **39**, 654-659).

Analgesic activity of *Grangea*

The plant *Grangea maderaspatana* Poir. has a reputation as analgesic and is used in pains of the eyes and ears. Ahmed and others from Department of Pharmacy, Dhaka, Bangladesh studied the methanol extract of the whole plant for its analgesic activity.

The methanol extract of the whole plant (1 and 3 g/kg, p.o.) significantly and dose-dependently inhibited acetic acid induced writhing in mice, the lower dose being as effective as aminopyrine (50 mg/kg, p.o.), which was used as a reference. The observed antinociceptive effect provides support to the traditional use of the plant as an analgesic [Ahmed *et al.* *Fitoterapia*, 2001, **72**(5), 553-54].

Antibacterial activity of Coral plant

Coral Plant, *Jatropha multifida* Linn. is used in traditional medicine as purgative and febrifuge, for gonorrhoea, urinary infections and wound dressing. Aiyelaagbe from University of Ibadan, Nigeria studied the extracts of roots of this plant for their antibacterial activity.

Hexane, ethylacetate, chloroform and methanol extracts of yellow rootbark, red rootbark, and rootwood effectively inhibited the growth of *Bacillus subtilis* and *Staphylococcus aureus* at concentration of 200 μ g/disc. The extracts from rootwood showed activity against *Escherichia coli* also [Aiyelaagbe, *Fitoterapia*, 2001, **72**, 544-546].

Traditional medicine for wounds possess antimicrobial activity

The ethnobotanical reports on traditional medicine have given lead to several pharmacological and phytochemical studies. The Adivasi tribes of the forests of eastern ghats of Andhra Pradesh apply the paste of *Rhynchosia beddomei* Baker leaves on wounds, cuts, boils and rheumatic pains. To confirm efficacy of this herb scientists at Sri Krishnadevaraya University, Anantapur studied the antimicrobial activity of extracts of the leaves. Results revealed that petroleum ether and acetate extracts inhibited the growth of both Gram-positive and Gram-negative bacteria and one fungus, *Candida albicans*. Thus the folklore claims are supported by this scientific study (Bakshu & Raju, *Fitoterapia*, 2001, **72**, 579-582).

Antioxidant activity of stem bark of mango tree

Free radicals are inevitable by-products of biological redox reaction. Reaction of the reactive oxygen species with biomolecules generally leads to an impairment or loss of biological functions. The structure and function of proteins exposed to free radicals are altered. Depending on the free radical involved, the nature of the protein and the conditions of interaction, protein molecules can undergo scission and cross-linking, destruction of amino acids, an increase in susceptibility to proteolysis and heat denaturation, and a loss of biological function.

Lipid peroxidation is important *in vivo*. It has potential importance in relation to the oxidative damage that occurs during cardiovascular diseases, such as preeclampsia and atherosclerosis, ageing and ischaemia reperfusion injury; in addition, the end products of this process can cause damage to proteins and DNA.

That a role exists for free radicals and antioxidants in the pathogenesis of human diseases and in the process of ageing has led to the suggestion that antioxidants, in particular, plant-derived antioxidants, might have health benefits as prophylactic agents.

QF808, an extract from the stem bark of selected varieties of mango tree, *Mangifera indica* Linn., has a definite mixture of components (polyphenols, terpenoids; fatty acids and microelements). Martinez and others studied the antioxidant effect of QF808 on hydroxyl-mediated oxidation of bovine serum albumin (BSA) by measurement of carbonyl group formation and sulfhydryl group loss in the protein. They also assayed the antioxidant effect of QF808 on the course of lipid peroxidation by ADP/Fe/NADPH or ascorbate iron in rat liver microsomes.

The extract was effective in reducing the oxidation of BSA, since its half-maximal inhibition concentration (IC_{50}) was 0.004% w/v in the inhibition of carbonyl group formation and lower than 0.0025% w/v in the inhibition of sulfhydryl group loss. QF808 inhibited lipid peroxidation which was initiated enzymatically by the reduced nicotinamide adenine dinucleotide phosphate (NADPH), $IC_{50}=0.0126\%$ w/v, or non-enzymatically by ascorbic acid, $IC_{50}=0.0126\%$ w/v. The extract tested did not inhibit NADPH-dependent cytochrome-P450 reductase activity, since it had no effect on the oxidation rate of NADPH. These results suggest that QF808 has an antioxidant activity, probably due to its ability to scavenge free radicals involved in microsome lipid peroxidation (Martinez *et al*, *Phytother Res*, 2001, 15, 581-585).

Antiulcerogenic activity of common Seabuckthorn

In Turkey, the roots of common Seabuckthorn, *Hippophae rhamnoides* Linn. have been used extensively in traditional medicine to treat ulcers. Peptic ulcers are poly-etiologic, frequently recurrent and a widespread chronic disease. Although there are many antiulcerogenic drugs, it is not always possible to obtain effective treatment of the ulcer with these drugs. Therefore, the treatment of ulcers is still an important problem and the development of new drugs for stomach ulcers is required. There are a number of medicinal plants that are alleged to be effective against the ulcer diseases in traditional medicines. As the folkloric uses are supported by a long history of human experience, these medicinal plants may be a good source for the isolation of potential drugs. Suleyman and others from Turkey undertook a study to identify new compounds, with more potency against ulcers and having few side effects. In addition, they also investigated the potential effects of the new drugs on ulcer aetiology models and compared them with classic antiulcerogenic drugs. They studied antiulcerogenic effect of a hexane extract of ripe fruit of this plant on ulcer models produced by stress and indomethacin. The extract was found to be active in preventing gastric injury [Suleyman *et al*, *Phytother Res*, 2001, 15(7), 625-627].

Hypoglycaemic activity of Pomegranate seeds

Almost all parts of Pomegranate, *Punica granatum* Linn. are used in Indian traditional medicine for the treatment of various ailments. In Bangladesh, the seeds are used against diabetes. Das and others from Jadavpur University, Kolkata, evaluated the hypoglycaemic activity of the methanol extract of seed in streptozotocin (STZ) induced diabetic rats. The methanol extract of the seed at doses of 300 and 600 mg/kg and chlorpropamide 200 mg/kg was administered to STZ diabetic rats. The seed extract (150, 300 and 600 mg/kg, orally) caused a significant reduction of blood glucose levels in STZ induced diabetic rats by 47% and 52%, respectively, at the end of 12 hours (Das *et al*, *Phytother Res*, 2001, **15**, 628-629).



Pomegranate

Induction of Apoptosis by Garcinol and Curcumin

Dietary factors play an important role in human health and in the development of certain chronic diseases including cancer. Some foods contain antitumour compounds as well as mutagens and/or carcinogens. The minor constituents or non-nutrients, which possess antimutagenic and anticarcinogenic properties, are chemopreventive agents against cancer development in humans.

Garcinol is a polyisoprenylated benzophenone derivative from fruit rind of Kokam Butter Tree, *Garcinia*

indica Choisy. The dried fruit rind is used as a garnish for curry and in traditional medicine in India. Garcinol has been reported to possess antioxidative and antibiotic activities and suppressed colonic aberrant crypt foci (ACF) formation.

Curcumin, structurally similar to garcinol, is a dietary pigment from Turmeric, *Curcuma longa* Linn. It has been considered a potentially important chemopreventive agent against cancer. Studies on animals have demonstrated that curcumin inhibits carcinogenesis in various tissues, including skin, colorectal, oral, fore stomach and mammary cancers.

Apoptosis, a morphologically distinct form of programmed cell death, is an evolutionary highly conserved phenomenon that plays an important role in the regulation of cellular activities. Various stimuli, such as cytokines and

anticancer drugs, as well as growth factor deprivation and radiation damage, cause a cell to undergo a rapid, inflammatory-free clearance that is characterized by cell shrinkage, blebbing of plasma membranes, nuclear condensation and DNA fragmentation. Curcumin selectively kills immortalized and transformed cells by apoptosis.

Pan and others explored the induction of apoptosis signaling pathway by garcinol in human leukaemia cell line, HL-60. Their results demonstrated that garcinol more strongly induced apoptosis than curcumin in a dose dependent manner in HL-60 cells. Garcinol-induced apoptosis can activate caspase-2, caspase-3, and caspase-9, leading to the cleavage of PARP, D4-GDI, and DFF-45. These results suggest that garcinol-induced apoptosis through a caspase-dependent mechanism may contribute to the chemopreventive functions (Pan *et al*, *J Agric Food Chem*, 2001, **49**, 1464-74).



Fruit rind of Kokam Butter Tree

Psychopharmacological activity of *Hypericum*

In folklore practices the aerial parts of different species of *Hypericum* are used as sedative in nervous disorder along with its use for the treatment of many ailments including antibacterial use, and for treating burns and wounds. *Hypericum hookerianum* Wight & Arn. and *Hypericum patulum* Thunb. are well known in folklore medicine for their different therapeutic potentials including antidepressant, spasmolytic, stimulant, hypotensive and antifungal activities. Because of the use of these plant species in the mental treatment in traditional practices, Mukherjee and others undertook a study to evaluate the psychopharmacological potential of the aerial parts extract of these plants, and thereby investigated this claim in different animal models.

Psychopharmacological profiles of these two plants were investigated at two different dose (200 mg and 400 mg/kg, p.o.) in different animal models, viz. spontaneous motor activity (SMA) test in mice; exploratory behaviour test by head dip test in mice and Y-maze test in rats; effects on pentobarbitone induced sleeping time in mice and study of the effects on body temperature in rats. All the extracts tested showed enhancement in SMA in mice and exploratory behaviour by head dip test in mice and Y-maze test in rats. The extract reduced significantly the pentobarbitone induced sleeping time in mice. When tested for their effect on body temperature in rats, the extract of *H. hookerianum* showed significant reduction in yeast-induced pyrexia with no effect on normal body temperature, while the other plant showed no activity in this experimental model.

The study confirms that the extract has significant and reproducible psychopharmacological activity which is comparable to the antidepressant group of drugs like imipramine. This study substantiates the claim of using these plants as a sedative in nervous disorder in folklore medicine (Mukherjee *et al*, *Phytomedicine*, 2001, **8**, 331-337).

Anti-inflammatory activity of *Pergularia*

The plant *Pergularia daemia* (Forsk.) Chiov. syn. *P. extensa* N.E.Br. is used as a pungent, coolant, anthelmintic, laxative and antipyretic. It is also known to cure biliousness, asthma, ulcers, leucoderma, uterine complaints, facilitates parturition and useful in eye troubles. Juice of the leaves is squeezed into sore eyes and is applied to inflammatory swellings due to rheumatic fever and rheumatoid arthritis in combination with lime and ginger. Hukkeri and others studied anti-inflammatory activity of the ethanolic extract of leaves and its various fractions in rats at a dose of 100 mg/kg intraperitoneally. Ethanol extract and its butanol fraction exhibited significant anti-inflammatory activity when compared with respective controls and was comparable with that of standard drug aspirin [Hukkeri *et al*, *Indian J Pharm Sci*, 2001, **63**(5), 429-431].

Antibacterial activity of *Clausena*

The bark of the plant, *Clausena heptaphylla* W. & A. is used as medicine for treating cattle wounds and sprains. The plant oil is used as a poultice for skin inflammation and the flower extract in ophthalmia. Sohrab and others from Phytochemical Research Laboratory, Dhaka, Bangladesh studied the antibacterial activity of the leaves of the plant. Three different extracts, petroleum ether, dichloromethane, hot methanol extracts were used for study.

Although all the extracts showed antibacterial activity against most of the test bacteria, the highest activity was exhibited by the petroleum ether and hot methanol extracts at 500 µg/disc. On the other hand, the purified compounds demonstrated prominent antibacterial activity against some of the test bacteria. Clausmarin A, lunamarins A and -B from the leaves showed significant zones of inhibition (9-14 mm) even at a concentration of 50 µg/disc against *Staphylococcus aureus*, *Aeromonas hydrophilla*, and *Salmonella paratyphi* A (Sohrab *et al*, *Fitoterapia*, 2001, **72**, 547-549).