

HEALTH AND NUTRITION FROM ORNAMENTALS

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ABSTRACT

Ornamental plants are grown for decorative purposes in gardens and landscape design projects, as house plants, for cut flowers and specimen display. Ornamentals and flower crops are not only grown for the display of aesthetic features, but also have some nutritive and medicinal properties. There has been renewed interest in utilizing garden environments as therapeutic entities to enhance the process of healing that occurs in healthcare environments. By minimizing the stress response, therapeutic gardens can promote recovery from illness or preserve health. From centuries roses have been valued for their culinary, medicinal, cosmetic and aromatic properties. Flower crops like Hibiscus, Plumbago, Periwinkle, and Lotus are highly valued for their medicinal use as in cosmetics, skin disorders, cancer *etc.* Ornamental tree species like Palash, Amaltas, Bauhinia, Asoca, Kadamba are used in traditional Ayurvedic system of medicines. Many of the flower crops such as nasturtium, hibiscus, rose, cosmos, and chrysanthemum are rich in minerals and vitamins, used as edible flowers. Some of the flowers like rose, jasmine, lavender and tuberose are used for extraction of essential oils. They are having soothing and curative properties and are used in aromatherapy. An attempt was made to collect the reviews on the therapeutic properties of these ornamentals.

KEY WORDS: ornamentals, health, nutrition, aromatherapy, damask rose

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INTRODUCTION

Flowers have been used for edible purpose since ancient times, and have medicinal as well as nutritional value. Oriental dishes through the ages have made use of Daylily buds and Chrysanthemums, the Romans used mallow, rose and violets, Italian and Hispanic cultures gave us stuffed squash blossoms and Asian Indians continue to use rose petals in many recipes. Now a day, in the Western world, the most common use of flowers is in salads. But more and more people are becoming adventurous as they realize the flavour and health potential of flower blooms and bud. Edible flowers have lot of nutraceutical potential. It can be added to sauces, tarts, preserves, pickles, fritters and soft cheeses.

Though many blossoms contain vitamin C and/or vitamin A, not all flowers are edible. Herb flowers usually offer the same flavour and attributes as the edible leaves, though they may be milder. If someone suffering from asthma or allergic reactions to composite-type flowers (calendula, chicory, chrysanthemum, daisy,

English daisy, and marigold) they should avoid eating flowers altogether as they may cause personal discomfort. If sampling of edible flowers for the first time, the best way is to introduce them into diet a little at a time to avoid digestive problems. Some of the medicinally important ornamentals were discussed below.

ROSE (*Rosa* species) Family: Rosaceae

Roses from centuries have been valued for their culinary, medicinal, cosmetic and aromatic properties. The apothecary rose (*R. gallica*) and the Dog rose (*R. canina*) are used for making medicinal remedies. It is the hips of the dog rose that are used because they contain high levels of vitamin C and also flavonoids, tannins and vitamins A, B1, B2, B3 and K. In the middle ages, the Dog rose was heralded as a marvellous cure for chest complaints. The Damask rose is used today more for its aromatherapy and cosmetic properties. It is used as sedative and antidepressant and useful for lowering cholesterol. In Chinese medicine, *Rosa rugosa* is used as

a tonic to boost the liver and as an antidote to some forms of poisoning. Rose oil is used in aromatherapy to cool hot inflammation or swellings and to bind and stay fluxes of the humours, to sores and is also put into ointments and plasters that are cooling and binding.

Zang *et al.*³⁶ studied the anti-inflammatory and analgesic effects of *Rosa multiflora* Thunb. hips. The study aims to assess the effects of Fructus Rosae Multiflorae (FRM) hips of *Rosa multiflora*. FRM was extracted with 75% ethanol and the dried extract (FRME) was administered intragastrically @ 100, 200, 400 mg/kg. The anti-inflammatory effect was evaluated in four experimental animal models and analgesic effect in two animal models. Pre-treatment with single dose of FRME produced significant dose dependent anti-inflammatory effects on carrageenin induced rat hind paw edema, xylene induced mouse ear edema and acetic acid induced mouse vascular permeation. In a 7-day study, daily administration of FRME suppressed cotton pellet induced rat granuloma formation. Pre-treatment with single dose of FRME also produced dose dependent antinociceptive in thermally and chemically induced mouse pain models. These results demonstrate that FRME possesses anti-inflammatory and analgesic confirming the folk use of FRM in treating various inflammatory disorders.

A study was conducted to compare powdered rose hip (*Rosa canina* L.) with or without fruits with regard to their phytochemical profile and *in vitro* anti-inflammatory and radical scavenging properties³¹. From the water and methanol extracts of two powders, triterpenic acids, urosolic acids, oleonic acid and betulinic acid were identified. Some of the extracts showed considerable DPPH radical scavenging activity, the methanolic extract being more potent.

HIBISCUS (*Hibiscus rosa-sinensis*) Family: Malvaceae
The flowers and leaves of hibiscus are highly nutritious are used in culinary purposes⁸ (Table 1, 2&3). Chinese hibiscus is a sweet, astringent, cooling herb that checks bleeding, soothes irritated tissues and relaxes spasms. The flowers are aphrodisiac, demulcent, emmenagogue, emollient and refrigerant. They are used internally in the treatment of excessive and painful menstruation, cystitis, venereal diseases and to promote hair growth. The leaves are anodyne, aperients, emollient and laxative. A decoction is used as a lotion in the treatment of fevers. The leaves and flowers are beaten into a paste and poultice onto cancerous swellings and mumps. A paste made from the root is used in the treatment of venereal diseases⁶.

The study on antipyretic activity of *Hibiscus rosa-sinensis* was conducted in Sangli²⁴ (Maharashtra, India). The experiment was undertaken for the antipyretic activity of ethanolic extract of flower of two species of *H. rosa-sinensis* (Lahina and China rose). It was trialed on brewer's yeast induced pyrexia method in rats. The standard drug Paracetamol @ 150mg/kg is used as a reference drug over the flower extract. The flower extract of both the species @ 300mg/kg showed significant antipyretic activity by decreasing the elevated body temperature. The results were on par with that of standard drug paracetamol.

COTTON ROSE (*Hibiscus mutabilis*) Family: Malvaceae

The leaves contain rutin alkaloid. Root is edible with fibrous texture. Flowers are mucilaginous, without very much flavour. The leaves are anodyne, antidote, demulcent, expectorant and refrigerant. With the flowers, they are applied to burns, swellings and other skin problem. The flowers are antiphlogistic, depurative, febrifuge, pulmonary and stimulant. A decoction is used in the treatment of lung ailment⁶.

An experiment was initiated in Japan by Ewaoka *et al.*¹² to study the allergy preventive measures of *Hibiscus mutabilis*. Allergy preventive activity was demonstrated for the aqueous extract of petals of *Hibiscus mutabilis* (versicolour) using the *in vivo* assay method on mice. Different flavanoids were isolated from the serum of mice. Among them Flavonol triglycoside, quercetin 3-O-beta-D-xylopyranosyl and beta-D-galactopyranoside were showed a significant anti-allergic effects.

HOLLYHOCK (*Althea rosea*) Family: Malvaceae

Young leaves are used as raw or cooked. A mild flavour, but the texture leaves something to be desired. They have been used as a pot-herb, though they are not particularly palatable. They can also be chopped up finely and added to salads. Inner portion of young stems also used as raw. Flower petals and flower buds consumed in raw form or added to salads. A nutritious starch is obtained from the root. A refreshing tea is made from the flower petals.

The flowers are demulcent, diuretic and emollient. They are useful in the treatment of chest complaints and a decoction is used to improve blood circulation, for constipation, dysmenorrhoea, haemorrhage *etc.* The root is astringent and demulcent. Internally, it is used in the treatment of dysentery. The roots and the flowers are used in Tibetan medicine, where they are said to have a sweet, acrid taste and a neutral potency. They are used in the treatment of inflammations of the kidneys/womb, vaginal/seminal discharge and to treat loss of appetite. The seed is demulcent, diuretic and febrifuge⁶.

CARNATION (*Dianthus caryophyllus*) Family: Caryophyllaceae

Carnations have a light peppery flavour that makes a healthful addition to salads or flavourful garnish to cheese dishes. Medicinally, its anti-bacterial properties can help to alleviate gastric discomfort and promote health of the gastrointestinal system³. Carnation flowers are an aromatic, stimulant herb that has been used in tonic cordials in the past to treat fevers. It is traditionally prescribed in European herbal medicine to treat coronary and nervous disorders⁴. The flowers are considered to be alexiteric, antispasmodic, cardio-tonic, diaphoretic and nervine tonic. The plant has been used as a vermifuge in China⁶.

CHRYSANTHEMUM (*Chrysanthemum morifolium*) Family: Asteraceae

Chrysanthemum has a light, sweet flavour. It can be added to cool drinks and teas as well as garnishing desserts. The flower contains vitamins A and B and amino acids. It helps to calm the nerves and relieve cold and flu symptoms. In traditional Chinese medicine, it is used for the prevention of sore throat and fever. In Korea it is used as a stimulant, to keep people alert and awake. Western holistic and herbal medicine touts the benefits of drinking this tea to treat atherosclerosis and varicose veins. When the steeped flowers are squeezed of excess moisture, they can then be applied as compresses to reduce itching and dryness of the eyes. Traditional Chinese medicine also uses these compresses to treat other eye ailments such as blurring, dizziness and diminished vision. These compresses are also often used to help reduce acne swelling and redness³².

CALENDULA (*Calendula officinalis*) Family: Asteraceae

This relative of the marigold has a tangy, peppery taste that makes it great for salads or soups and tasty added to cream cheese for sandwiches. It also adds a beautiful saffron colour to your cooking. Medicinally it has antispasmodic properties and so can relieve ulcers, cramps and colitis. The petals and pollen contain triterpenoid esters (an anti-inflammatory) and the carotenoids flavoxanthin and auroxanthin (antioxidants, and the source of the yellow-orange coloration). The leaves and stems contain other carotenoids, mostly lutein (80%) and zeaxanthin (5%), and beta-carotene.

Calendula officinalis is used for the treatment of skin disorders and pain, and as a bactericide, antiseptic and anti-inflammatory. Plant extracts are also widely used by cosmetics, presumably due to presence of compounds such as saponins, resins and essential oils¹³.

NASTURTIUM (*Tropaeolum majus*) Family: Tropaeolaceae

All parts of the Nasturtium are edible and nutritious. The flowers are quite sweet, while the leaves have a mustard-cress flavour. The seeds can be pickled as a substitute for capers. The flowers and leaves make an unusual and decorative salad dish with pasta and snow peas. Nasturtiums have several medicinal properties. It is antiseptic and expectorant and therefore good for head colds. It is also effective for curing and preventing urinary tract infections.

Nasturtium contains glucosinolates, a mustard-oil glycoside; glycotropeoline, which releases a disinfectant sulphur compound when added to water, which have antibiotic and anti-tumour effects. They can also alleviate respiratory congestion, stimulate the digestive system and mitigate hyperthyroidism; and many flavonoids. The plant is also a great source of vitamin C, which the flavonoids help the body to absorb. Nasturtium has spilanthal, oxalic acid and the enzyme myrosin¹⁰.

MARIGOLD (*Tagetes* spp.) Family: Asteraceae

The petals of the flowers of some varieties can be eaten. The fresh receptacle is eaten by children. A yellow dye obtained from the flowers can be used as a saffron substitute for colouring and flavouring foods. The plant is used as a condiment.

The whole herb is anthelmintic, aromatic, digestive, diuretic, emmenagogue, sedative and stomachic. It is used internally in the treatment of indigestion, colic, severe constipation, coughs and dysentery. Externally, it is used to treat sores, ulcers, eczema, sore eyes and rheumatism⁸. A paste of the leaves is applied externally to treat boils, carbuncles and earaches³. The flowers are carminative, diuretic and vermifuge. It is applied externally for skin diseases, conjunctivitis and sore eyes and root is used as a laxative¹⁹.

CHITRAKA (*Plumbago zeylanica*) Family: Plumbaginaceae

Chitraka enjoys an important place among medicinal herbs in India since ancient times. The name chitraka denotes one which renders discoloration to the skin, when applied topically. It is used as an appetizer, combats anorexia, anti – haemorrhoidal and relieves colicky pains (*Charaka Samhita*). According to Sushruta, chitraka is a lactodepurant and as sperm purifier herb, deflatulent, mitigates tumours, alleviates dyspepsia.

Plumbago zeylanica root, bark and seed are used for variety of medicinal treatments. The roots of the evergreen increase the digestion and promote appetite, and small doses stimulate central nervous system. In

Africa, a cold infusion of the root is used for influenza and fever. In Zimbabwe *Plumbago* root is cooked with meat in soup as an aphrodisiac. Bark of the *Plumbago* used to stop bleeding, cure baldness, and treat diarrhoeas. In Ethiopia powdered bark, root or leaves are used to treat gonorrhoea, syphilis, tuberculosis, rheumatic pain, swellings and wounds. Root-bark is useful to treat obesity³³.

LOTUS (*Nilumbo nucifera*) Family: Nelumbonaceae

Dried carpels of lotus contain protein (16%), carbohydrates (66%) and minerals. Leaves, carpels and rhizomes contain three alkaloids called nuciferine, roemerine and nornuciferine⁹.

Krishnamoorthy *et al.*¹⁸ conducted an experiment to study the anti oxidant activity of *Nilumbo nucifera* flowers. The effect of flower extract was evaluated in 6 groups of isolated oxidatively stressed rat kidney. It reduced the activities of stress inducing enzymes like Glutathione peroxidase (GPx), catalase, Glutamate oxaloacetate transaminase (GOT) and Glutamate pyruvate transaminase (GPT) in diseased rats. On treating the animals with the extract, oxidative stress was decreased with increase in anti-oxidants and the marker enzymes were found to maintain the normal level. They concluded that the flower extract exhibits considerable anti-oxidant property.

HYDRANGEA (*Hydrangea macrophylla*) Family:

Hydrangeaceae

The young leaves, when dried and rubbed between the hands, become very sweet and are used to make a sweet tea called 'tea of heaven', it is used in Buddhist ceremonies. The leaves contain phellodulcin (its chemical formula is C₁₆ H₁₄ O), a very sweet substance that can be used as a sugar substitute. One small leaf is sufficient to sweeten a cup of tea. The older leaves can be dried, powdered and used as flavouring on foods. The young leaves and shoots are also eaten cooked⁸.

The leaves, roots and flowers are anti-malarial, antitussive and diuretic. They are said to be a more potent anti-malarial than quinine, due to the presence of an alkaloid⁶. Effect of *Hydrangea macrophylla* on diabetic complication was studied by Kim *et al.*¹⁶ The improvement of diabetic complications such as lipid lowering and anti-oxidative potential of *Hydrangea dulcis* folium (HDF) variety, the fermented leaves of *Hydrangea macrophylla* was studied. The streptozotocin induced diabetic male rats were divided into three groups- normal control; diabetic control and diabetic HDF supplement (fermented leaves with hot water extract @ 40g/kg diet) fed for 3 weeks. The HDF significantly decreased the serum glucose concentrations,

increased insulin level and improved glucose homeostasis in diabetic control rats. The total cholesterol and triglyceride concentrations in the serum and liver were markedly reduced in HDF treatment.

COSMOS (*Cosmos bipinnatus*) Family: Asteraceae

Jang *et al.*¹⁴ conducted an experiment to study the anti-oxidative and anti-genotoxic activity of Cosmos flowers. The methenolic extract of *Cosmos bipinnatus* flowers of four different colours (white, pink, orange & violet) were taken for the study. The anti-oxidant properties determined by total phenolic contents (TPC), Diphenyl-1- Picrylhydrazyl Radical Scavenging Assay (DPPH RSA). The highest TPC was found in violet colour flower at a concentration of 1mg/ml showed highest anti-oxidative property. The antigenotoxic effect of the CFE (Cosmos Flower Extract) on the DNA damage induced by H₂O₂ in human leukocytes was evaluated. Pre-treatments with CFE produced significant reductions in oxidative DNA damage at a concentration of 500 micro g/ml. the results suggested significant antioxidant activity and protective effect against oxidative DNA damage.

PERIWINKLE (*Catheranthus roseus*) Family:

Apocynaceae

Periwinkle is known to increase blood flow and oxygen supply to the brain, and has been used to treat arteriosclerosis and dementia caused by insufficient blood flow to the brain. Periwinkle is also employed as an astringent and blood-staunching herb, effective against internal bleeding, heavy menstrual bleeding, or nosebleeds. In the Philippines, the traditional use of the Madagascar periwinkle is for treating diabetes.

It is the plant having largest number of alkaloids, among them vincristine, vinblastin, ajamalicine and serpentine are the major constituents. The root alkaloids ajamalicine and serpentine are used as medicines for curing hypertension. Leaf alkaloids like vincristine and vinblastin are used to treat blood cancer. Leaves are used for curing diabetes, menorrhagia and wasp stings. Roots are used as tonic, stomachache, sedative and tranquilizer²⁹.

BOUGAINVILLEA (*Bougainvillea spectabilis*) Family:

Nyctaginaceae

Hypoglycemic action of *Bougainvillea spectabilis* was studied by its leaf extracts (expressed in alcohol) fed to diabetic mice resulted significant hypoglycemic activity²². The fresh green leaf juice (extracted in distilled water) @ 1g/kg body weight/day as oral administration in alloxan- induced diabetic rats for 14 days. The consumption lowered the blood sugar level significantly. 1g of leaf gives 1ml of juice⁷.

AMALTAS (*Cassia fistula*) Family: Caesalpinaceae

The whole plant possesses medicinal properties useful in the treatment of skin diseases, inflammatory diseases, rheumatism, anorexia and jaundice¹⁷. A new bioactive flavone glycoside 5,3',4'-tri-hydroxy-6-methoxy-7-O-alpha-L-rhamnopyranosyl-beta-D-galactopyranoside with antimicrobial activity was reported by³⁵. The hepatoprotective activity² and the hypoglycaemic activity have also been reported from the bark extract¹¹.

Raju *et al.*²⁷ conducted an experiment to study the anti-inflammatory and antioxidant activities *Cassia fistula*. Anti-inflammatory and antioxidant activities of the aqueous (CFA) and methanolic extracts (CFM) of the *Cassia fistula* bark were assayed in wistar albino rats. The extracts were found to possess significant anti-inflammatory effect in both acute and chronic models. *Cassia fistula* bark extracts showed significant radical scavenging by inhibiting lipid peroxidation initiated by CCl₄ and FeSO₄ in rat liver and kidney homogenates. Both the extracts CFA (250 and 500mg/ kg) and CFM (250 and 500mg/ kg) exhibited significant anti-inflammatory activity. They exhibited significant antioxidant activity in DPPH, Nitric oxide and Hydroxyl radical induced *in vitro* assay methods.

TABEBUIA (*Tabebuia avellanedae*) Family: Bignoniaceae

The comparative studies of effect of *Tabebuia avellanedae* bark extract and beta-lapachone were conducted by Quiroz *et al.*²⁶ on tumour bearing mice. The bark of the tree is traditionally prescribed in the treatment of cancer. The naphthoquinone beta-lapachone (β -lap) is used as a standard drug which is commercially used to treat cancer cells. The tumour bearing mice were treated with TACE (30-500 mg/kg diet) and β -lap (1-5 mg/kg diet). The optimal biologically active doses of 120 mg/kg TACE and 1mg/kg β -lap prolonged the life span of tumour bearing mice. Both TACE and β -lap were producing similar activities and same rate of extension in the duration of survival.

PALASH (*Butea monosperma*) Family: Fabaceae

The gum, seeds, flowers, barks and leaves have great medicinal value. Externally, the local bath with the decoction of its bark is useful in bleeding piles and flowers (made hot) below the naval facilitate the maturation. The paste of seeds is also applied in skin diseases, edema and diseases of the eye. The seed powder, in the form of nasal drops, helps to regain the consciousness in epilepsy. The paste of seeds, matted in lemon juice, is an effective panacea for skin diseases like eczema and ringworm. Internally, palash is useful in diarrhoea, dysentery and colitis. Palash helps for healing

the intestinal ulcers. The flowers are useful in fever, thirst and diarrhoea.

Anti-lithiatic effect of *Butea* was studied by Mute and Awari²⁰. Ethanolic extract of stem bark of *B. monosperma* was screened for anti-lithiatic activity in male rats and results were summarized based on the ionic changes in urine. Lithiasis was induced in rats by administration of ethylene glycolated water (0.75%) for 28 days. Supplementation with bark extract of *B. monosperma* significantly reduced the elevated urinary oxalate and calcium ion concentration in urine confirming the stone inhibitor effect. It also increased the urinary concentration magnesium ions, which is considered as one of the inhibitors the crystallization.

PARIJAT (*Nyctanthes arbor-tristis*) Family: Oleaceae

The seeds are used in treatment of piles. The decoction of parijat flowers are used in treatment of gout. Leaves used against dry cough, the leaf juice with honey are given internally. The aqueous paste of leaves is used externally in treatment of skin related troubles specifically in treatment of ring worm. The young leaves of parijat are used as female tonic.

Karnik *et al.*¹⁵ studied the anti-malarial activity of *Nyctanthes*. Patients with malaria were treated with the paste of five fresh leaves of *Parijat*, given orally 3 times/day for 7-10 days. The relief of symptoms and signs of malaria and the features of *Vishama Jwara* was graded basally and daily. Out of 120 patients, 92 (76.7%) showed complete clinical and parasitic cure within 7 days. Other 20 patients, who then continued on the same treatment, were cured by 10 days.

An investigation was carried out to assess the antidiabetic property of *Nyctanthes arbortristis* leaves and flowers chloroform extracts²⁸. The antidiabetic properties of *N. arbortristis* were investigated by hypoglycaemic effect, potentiating action of exogenous insulin and streptozotocin-induced diabetic rat model. The *N. arbortristis* exerted hypoglycaemic effect at relatively high dose 8 gm/kg of leaves and flowers chloroform extracts treated rats, significantly lowered blood serum glucose levels. The animals were made diabetic by streptozotocin (55 mg/kg, i.p) after confirming the diabetes level more than 300 mg/dl the chloroform extract from leaves and flower of *N. arbortristis* (50, 100, 200 mg/kg) were used for 27 days in diabetic rats. The extract significantly lowered serum glucose levels in treated rats when compared with control. The anti-diabetic activities of the leaves and flowers chloroform extract were comparable to glibeclamide at 10 mg/kg orally (positive control).

LAGERSTROMIA (*Lagerstromia speciosa*) Family: Lythraceae

An experiment was conducted to study the hypoglycemic activity of *Lagerstromia speciosa* leaves Ambujakshi and Salma¹. Investigation was carried out in Alloxan (120 mg/kg) induced diabetic rats. Glibenclamide was used as standard reference drug which was used commercially against diabetes. The toluene and methanolic extract of leaves of *L. speciosa* was administered @ 500mg/kg for 21 days resulted in significant reduction in serum glucose and cholesterol. At the end of the 21st day blood sugar level was reduced from 300mg/dl to 150mg/dl and 168mg/dl in toluene and methanol extracted drug respectively

CAMEL FOOT TREE (*Bouhinia purpurea*) Family: Caesalpiniaceae

The leaves of *B. purpurea* are used in indigenous system of medicine. The leaf paste is used to treat jaundice and liver disorders. Leaves are used as ophthalmic drugs for night blindness, cataract, conjunctivitis, eyesores and to improve vision. The exudates flowing from the leaves and young twigs is used as an ointment which is applied to get relief from irritation and red colouration of eyes⁵. The physico-chemical studies of the leaves reveals that, leaves contain high amount of potash. Quantitative estimation of leaves resulted in total ash value (8.9%), insoluble ash (1.32%) and water soluble ash of 0.87 per cent.

ASHOKA (*Saraca asoca*) Family: Fabaceae

Ashoka bark has been very widely used in Indian System of Medicine from time immemorial for the treatment of uterine and menstrual troubles, particularly uterine hemorrhages, dysmenorrhea and menorrhagia. The plant parts acts on central nervous system. The bark of the tree is bitter, cool, and capable of curing inflammation and enlargement of cervical gland, burning sensation, dyspepsia, intestinal worms and animal poisoning. Flowers are used in the treatment of bleeding piles, scabies in children and other skin diseases. *Ashokaristam* is a commercial formulation of ashoka which is mainly used as a heart tonic, gives charm to skin and cures renal stones²⁵.

KADAMBA (*Neolamarckia cadamba*) Family: Rubiaceae

The bark is bitter, astringent, cooling, anti-inflammatory, digestive, carminative, expectorant and tonic. It is useful in fever, cough, diarrhea, vomiting, burning sensation, wounds and ulcers²⁵. The fruits are aphrodisiac, refrigerant and used to relief from gastric troubles in children. Leaf decoction is used for gargling against throat infections³⁰.

TEMPLE TREE (*Plumeria* spp) Family: Apocynaceae

The latex of the *Plumeria alba* is applied to ulcers, herpes and scabies. The whole plant is used as a febrifuge, used in tribal medicine in the treatment of cholera and in indigestion. The flowers contain α and β -amyryns and they are used as contraceptive. The seeds are used to possess haemostatic properties³⁰. The latex of *Plumeria rubra* acts as a purgative, applied externally for itches and rheumatism. The bark extract is used in the treatment of diarrhea and leprosy²⁵. Root bark is a powerful anti-herpetic, purgative and useful in venereal sore.

KALANCHOE (*Kalanchoe pinnata*) Family: Crassulaceae

An investigation was carried out to study the effect of *Kalanchoe pinnata* on cutaneous leishmaniasis²¹. In order to demonstrate the safety and oral activity of *K. pinnata*, different flavonoids were extracted from the plants and were evaluated in vivo in murine model of cutaneous leishmaniasis. Daily oral doses of quercetin 3-o- α -L-arabinopyranosyl, α -L-rhamnopyranoside, quercetin 3-o- α -L-rhamnopyranoside and free quercetin (16mg/kg body weight) were administered. The results indicated that, they were able to control the lesion growth and significantly reduce the parasite load. The flavonoids were also effective as the crude aqueous extract given @ 320 mg/kg body weight.

Patil *et al.*²³ studied the diuretic and anti-urolithiatic activity of *Kalanchoe pinnata*. Hydroalcoholic extract of leaves of *K. pinnata* was administered to male Wistar rats by orally and intraperitoneal way at the doses of 100, 300, 500 and 800 mg/kg body weight. The effect of extract on urine output was determined by comparing the urine volume collected by keeping the individual animals in metabolic cages. Calcium oxalate urolithiasis was induced in rats by giving ethylene glycol orally for 7 days and the effect of extract was studied by its concurrent administration. The *K. pinnata* extract was found to be exerting significant diuretic and anti-urolithiatic activity. It protected rat kidneys from ethylene glycol induce oxalate related alterations. The diuretic effect was more potent in intraperitoneal way of administration.

AROMATHERAPY FOR HEALTH

Aromatherapy means "treatment using scents". It is a holistic treatment of caring for the body with pleasant smelling botanical oils such as rose, lemon, lavender and peppermint. The essential oils are added to the bath or massaged into the skin, inhaled directly or diffused to scent an entire room. Aromatherapy is used for the relief

of pain, care for the skin, alleviate tension and fatigue and invigorate the entire body³⁴.

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Table 1: Nutritional composition of Hibiscus flowers on fresh weight basis

Water	89.8%	Minerals	Thiamine (B ₁) 0.03mg*
Protein	0.06g*	Calcium 4mg*	Riboflavin (B ₂) 0.05mg
Fat	0.4g	Phosphorus 27mg	Niacin 0.6mg
Fibre	1.56g	Iron 1.7mg	Ascorbic acid (C) 4.2mg

Table 2: Nutritional composition of Hibiscus flowers on dry weight basis (Water 0%)

Calaries	353/100g*	Minerals		Vitamins	
Protein	3.9g	Calcium	39mg*	Thiamine (B ₁)	0.29mg*
Fat	3.9g	Phosphorus	265mg	Riboflavin (B ₂)	0.49mg
Carbohydrate	86.3g	Iron	1.7mg	Niacin	5.9mg
Fibre	15.7g	Ash	5.9g	Ascorbic acid (C)	39mg

Table 3: Nutritional composition of Hibiscus leaves on dry weight basis (Water 0%)

Fat	3.5g*	Calcium	1670mg*
Carbohydrate	69.7g	Phosphorus	520mg
Fibre	15.5g	Ash	11.4g

* Figures in grams (g) or milligrams (mg) per 100g of food.