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MIMUSOPS ELENGI: A COMPLETE PHARMACOGNISTICAL & PHARMACOLOGICAL REVIEW

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ABSTRACT
India is rich in ethnic diversity and traditional knowledge that has resulted in various ethno botanical researches in medicines which play an important role in health services. About three quarters of the world population depends on herbal medicines for health care. The plant *Mimusops Elengi* has been used from ancestors as medicine in the treatment of various ailments. Many of the Ayurvedic formulations contain this Medicinal Plant. In this review article called Studies on *Mimusops Elengi* such as Physical charecteristics, Morphological studies, microscopical studies & Pharmacological activity on CardioVascular & Central Nervous System activities of the above mentioned plant is reviwed.

KEYWORDS: Myocardial Infraction, Ischemic heart disease, Central Nervous System, Cardio Vascular System.

Mimusops elengi: A complete healthy herb

Herbs plays very important role in healthy aspects from ancient years in India. All herbs are having their own benefits for contributing ones good health. Herbs alone and polyherbs which are mixture of one or more herbs show significant synergistic activity in ones health. As a part of this an ancient old plant which having plenty of beneficial effects, number of active chemical constituents is used to treat number of disease & disorders in human beings.

Mimusops elengi a well-known herbal plant used to treat many disorders and diseases. This drug can administer alone or with poly herbs. Various parts of the plants are having their beneficiary effect along with different extraction procedures using various solvent extracts.

According to ancient literatures, Charaka has categorised in Aasavayoni phalvarg and recommended to use as anthelmintic & Sushrutha categorised in Kashaya by its fruits.

Taxonomic position

Kingdom: Plantae,
(Unranked): Angiosperms
(Unranked): Eudicots
(Unranked): Asterids
Order: Ericales,
Family: Sapotaceae,
Genus: Mimusops,
Species: Elengi Linn.

Vernacular names

Unani: Mulsari; Sanskrit: Anangaka, Bakula, Chirapushpa, Dhanvi, Gudhpushpa, Kantha, Karuka, Kesha, Mukula, Padyamoda, Sharadika, Sindhugandha, Simhakeshaa, Sthirmukhgandha, Surabhi Tailanga, Varalahdha, Visharada; Gujarati: Babhuli, Bolsari, Varsoli, Vovoli; Hindi: Bakul, Bolsari, Maulsarau, Maulser, Maulsari; Marathi: Bakhor, Bakula, Barsoli, Ovalli, Owli, Vavoli, Wovali, Wowli; Malayalam: Elengi, Ilanni, Iranni, Makuram, Bakulam, Makura, Mukura[1]; Tamil: Alagu, Ilangi, Kesaram, Kosaram, Magil, Magilam, Vagulam[2, 4]; Kannada: Bakula; Telgu: Pogada[1, 2, 4], Vakulamu[1]; Punjabi: Maulsari, Maulsiri; Bengali: Bakal,Bakul, Bohl, Bukal[2, 4]; Uriya: Baulo[3, 5], Bokulo; Assam: Gokul[3]; English: Bullet wood, Indian Medlar; Nepalese:Bakulapuspa; Sinhalese: Munemal; German: Affengesict; French: karanicum; Burmese: Kaya; Malaysian: Enengi[2, 4]; Thai: Pikul[6, 7]; Trade: Bulletwood.[3]

Mimusops elengi Parts, Their chemical constituents and pharmacological activities.

Flower

The flowers are very small, having width of 1.2cm and 1-3 in axillary fascicles, pedicel 1 cm long; calyx lobes 8 in 2 series of 4 each, thick, outer lanceolate, pubescent in which petals are 9 mm long, 3 series of 8 each, creamy-white, star-shaped and borne in small clusters on the leaf axils. They are bisexual, each with two side lobes, joined into a star-like corolla with 24 points and they fall off as a ring. There are 8 fertile stamens, alternating with 8

staminodes. The flowers open at twilight and gradually become very fragrant through the night, until the next morning when they are shed. Flowering from March-April Flowers bisexual, white, with hairs on back and margins, acuminate; stamens 8, alternating with pilose staminodes; filaments 1 mm, anthers oblong, cordate, 3 mm, connectives apiculate; staminodes lanceolate, acuminate, fimbricate, pilose; ovary 0.1-0.15 cm long, void, hirsute without, 6-8-celled; 1 ovule in each cell; style columnar, 5 mm; stigma minutely fimbricate..Fresh flowers of *Mimusops Elengi* on extraction with acetoneyielded D -mannitol where as extraction with ethanol yieldedβ -sitosterol and β -sitosterol- β - D -glucoside. F lowersalso yielded quercitol, ursolicacid and a triterpene alcoholwhich was later, identified as lupeol.[11]

Fruit

The fruits are in ovoid shape, contains yellow flesh berry, pointed and similar in size to small olives 2-3cm long and 1.5 cm across. They turn from green to orange-red when ripe and seeds are in dark brown colour, solitary, oblong and shiny. Fruiting season May onwards.Ethanolic extractof *Mimusops Elengi* seeds yielded quercitol, dihydroquercetin,and quercetin, β - D -glucoside of β -sitosterol and β- spinasterol.[12] The fatty oil comprised capric, lauric, myristic, palmitic (16.71%), stearic (17.23%), arachidic, oleic (53 . 48%) and linoleic (16.71%)acids, the unsaponifiablematter from the seed fat consisted of β and β –sitosterol.[11] Glucose is reported to be present in mesocarp, testa andkernel. Quercetin, quercetol types of flavonoids are presentin testa, spinasterol, type of steroid are present in kernel andtaxifolin type of flavonoid are present in testa.[13]

Bark

Bark was appeared to be dark grey, rough, deeply fissured. These are evergreen trees with a hemispherical crown. Sap white, grows upto 20 m high, cracked or fissured longitudinally, scaly, blaze pink with red streaks, young branches brown pubescent. Bark of *Mimusops Elengi* contains tannins, some wax, colouring matter, starch and ash forming inorganic salts.[9] Saponin was isolated from the ethanolic extract of the bark, which on hydrolysis yielded β -amyrin and basic acid.Hexane soluble fraction of the alcoholic extract yieldedtaraxerone, taraxerol, β -spinasterol, sodium ursolate andbetulinic acid, whereas hexane insoluble fraction yieldedβ - D -glucoside of β -sitosterol and the aqueous extract, gave quercitol. Other pentacyclic triterpenoids betulic acid (2-167), lupeol (4-167), taraxerol (3-167) and ursolic acid (3-167). Fatty acid was alsoisolate from bark.[11] β -spinasterol and taraxerol are isolated from Petroleum Ether. The ethanolic extract of heart wood of *Mimusops Elengi* gave lupeol and β -spinasterol whereas the aqueous, alcoholic and hexane-soluble fractions yielded hederageninand β -d-glucoside of β –sitosterol.[11] Ethanolic extractionof root contains lupeol acetate, taraxerol, β -spinasterol, β- D -glucoside of β -sitosterol and hederagenin.

Leaf arrangement

Alternate- simple spiral Leaves, stipulated. The leaves are thick, oblong, simple, and spirally arranged, between 5-12cm long and 3-6cm wide; elliptic or elliptic-oblong, base round or obtuse, apex obtuse to acuminate, margin entire, glabrous, coriaceous; lateral nerves many, slightly raised beneath, parallel, slender, looped near the margin forming intramarginal nerves; intercostae reticulate. The ethanolic extract of the leaves yielded quercitol (1.7%), hentriacontane, β-carotene and glucose. D-mannitol, β-sitosterol, β-sitosterol- β-D-glucoside, and quercetin were recovered from leaves.[8, 10, 11]

Antiviral activity

The crude aqueous and methanol extracts of *Mimusops Elengi* inhibited HIV type 1 protease (PR) by more than 70 % at a concentration of 0.2 mg/ml as determined by HPLC.[14]

Antibacterial activity

There are several studies reporting antibacterial potential of extracts prepared from different parts of *Mimusops Elengi*. Two antibacterial compounds viz. 2, 3-dihyro-3, 3'4'5, 7- pentahydroxyflavone and 3, 3', 4', 5, 7-pentahydroxyflavone from the seeds of *Mimusops Elengi* showed strong inhibitory activity against Gram-positive and Gram-negative bacteria.[15]

Mimusops Elengi, were screened for antibacterial activity against bacterial strains viz. Pseudomonas aeruginosa, Proteus mirabilis, Staphylococcus aureus, Bacillus cereus, Alcaligenes faecalis and Salmonella typhimurium using both agar disc diffusion and agar well diffusion methods. The ethanol extracts were found to be more potent than aqueous extracts of all the medicinal plants.[16]

Antiulcer activity

The effects of oral administration of 50 % alcoholic extract of *Mimusops Elengi* and its different fractions namely ethyl acetate, n-butanol, methanol and aqueous were studied against ethanol-induced gastric damage and it was observed that ethyl acetate fraction possessed anti-ulcer activity against experimental gastric ulcers.[17] Further in a study, the effect of alcoholic and petroleum ether extracts of bark (200 mg/kg body weight) of *Mimusops Elengi* was evaluated in rats. The alcoholic extract showed significant antiulcer activity compare to petroleum ether extracts of bark.[18]

Anticonvulsant activity

In this study with methanolic, aqueous, and n- butanolic extracts (50, 100 and 200 mg/kg body weight) of bark of *Mimusops Elengi* in Maximal electroshock (MES) induced convulsions in rats and Isoniazid (INH) induced convulsions in Swiss mice, it was concluded that methanolic extract of *Mimusops Elengi* showed maximum protection against MES and INH induced convulsions.[19]

Anti-anxiety activity

The anti-anxiety activity of methanolic (50,100 and 200 mg/kg body weight), aqueous (100 and 200 mg/kg body weight) and n-butanol (200 mg/kg body weight) extracts of bark of *Mimusops Elengi* was studied in Swiss albino mice and it was found that methanolic extract at 200 mg/kg had more significant anxiolytic activity as compared to aqueous and n-butanol extracts.[20]

Wound healing activity

A methanolic extract from bark of *Mimusops Elengi* was examined for wound healing activity in the form of ointment in three types of wound models on mice: the excision, the incision and dead space wound model. The extract ointments showed considerable response in all the wound models compared to standard drug Betadine ointment in terms of wound contracting ability, wound closure time, tensile strength and dry granuloma weight. Histological analysis was also consistent with the proposal that *Mimusops Elengi* bark extract exhibits significant wound healing.[21]

Diuretic activity

The diuretic and electrolyte excretion activities of petroleum ether, chloroform and alcoholic extracts (200 mg/kg body weight, p.o.) of bark of *Mimusops Elengi* were investigated. The highest diuretic and electrolyte excretion activities were presented by the alcoholic extract.[22]

Further in another study, the ethyl acetate, ethanol and aqueous extracts (250 mg/kg body weight, p.o.) of *Mimusops Elengi* were evaluated for diuretic activity. The aqueous extract showed a significant diuretic activity compared to other extracts.[23]

Immunostimulatory activity

The immune-stimulatory activity of methanolic extract (10, 20, 40 mg/kg body weight) of bark of *Mimusops Elengi* in mice was studied by Carbon Clearance Test (CCT), Haemagglutination Antibody Titre (HA) and Delayed Type Hypersensitivity using R.B.C. as antigen. Distilled water served as a control in all the tests and Vitamin E 150 mg/kg was used as standard. The *Mimusops Elengi* extract showed a dose dependent increased immune-stimulatory response. [24]

Larvicidal activity

The hexane (HEX) and ethyl acetate (EA) extracts of bark of *Mimusops Elengi* was shown to have promising larvicidal activity against IV instar larvae of A. aegypti and C. quinquefasciatus and its benefits in developing cost effective and environment friendly new type of larvicide for mosquito control.[25]

Molluscicidal activity

The molluscicidal activity of Bauhinia variegata leaf and *Mimusops Elengi*bark was studied against vector snail Lymnaea acuminata. The toxicity of both plants was time and concentration-dependent. Among organic extracts, ethanol extracts of both plants were more toxic. Toxicity of B. variegata leaf ethanolic extract (96h LC50- 14.4 mg/L) was more pronounced than *Mimusops Elengi* bark ethanolic extract (96 h LC50-15.0 mg/L).[26]

Antityrosinase activity

The various parts (bark, fruit, flower and leaves) of *Mimusops Elengi* were studied for their antityrosinase activity in various solvents. Among the parts studied, the methanolic extract of *Mimusops Elengi* flowers showed the highest inhibition of tyrosinase with an IC50 value of 401 µg which was followed by methanolic extract of leaves.[27]

Male antifertility activity

One study was done to screen anti-fertility activity of seeds of *Mimusops elengi*. When the aqueous powdered drug (2gm/body weight) was administered to male albino rats has proved to be an effective male contraceptive drug. The activity was confirmed by significant decrease in sperm count, biochemical assays so also through histopathological investigations.[28]

Antihyperlipidemic activity

The methanolic extract of bark was used for the evaluation of antihyperlipidemic activity on wistar rats. The groups treated with methanolic extract showed significant reduction in levels of triglyceride and total cholesterol as compared to Hyperlipidemic group after 7 and 24 h of induction which indicates its antihyperlipidemic potential.[29]

Anti-inflammatory, analgesic and antipyretic activities

Methanolic extract of leaf was investigated for analgesic activity using acetic acid induced writhing of white albino mice and hot plate test. In hot plate test the extract exerted significant prolongation in the response of latency time to the heat stimulus.[30] The ethanol extract of Bark was assessed for anti-inflammatory, analgesic and antipyretic activities in animals. Bark significantly inhibited the carrageenan-induced paw oedema. In analgesic models also the ethanol extract decreases the acetic acid-induced writhing and it also reduces the rectal temperature in Brewer's yeast induced pyrexia. However, there was no increase the latency time in the hot plate test. These results showed that ethanol extract of bark has an anti-inflammatory, analgesic and antipyretic activity.[31] The isolated fraction β- amyrincaprylate and ethanolic extract of bark was used for the evaluation of anti-inflammatory activity by using carrageenan induced paw oedema and cotton pellets. The effect was compared with Indomethacin used as standard drug. The results indicated that ethanolic extract and β amyrincaprylate contributes to the anti-inflammatory action of *Mimusops elengi* bark.[32]

Antidiabetic effect

The polar and nonpolar solvent extracts leaves were screened for antidiabetic activity using alloxan induced

hypoglycemic rats on acute and prolonged treatment. Alcoholic and aqueous extracts showed significant antidiabetic results with both acute and prolonged treatment studies.[33]

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