



PHYTOCHEMICAL AND BIOLOGICAL ACTIVITIES OF MIMUSOPS ELENGI: A REVIEW

Khaled Rashed

Department of Pharmacognosy, National Research Centre, 33 El Bohouth st.-Dokki, Giza, P.O.12622, EGYPT

ABSTRACT

Mimusops elengi is Indian native plant and is used for a long time in the history of the medicine. Plant was well studied in majority of the world because of its high potential medicinal value. Traditionally all different part of this plant, namely leaf, root, fruit, seed, bark and flower are used to cure various kinds of disorders. It has several medicinal properties such as astringent, tonic, and febrifuge. Chemical studies have shown that, Bark contain tannin, some caoutchouc, wax, starch and ash and Flower contain volatile oil as well as Seeds contain fixed fatty oil. Preclinical studies have proved that *Mimusops elengi* or some part of its phytochemicals proved Analgesic, Antibiotic, Antihyperlipidemic, Anti-inflammatory, Antimicrobial, Antioxidant, Antipyretic, Cytotoxic, Congestive enhancing, Gingival bleeding, Gastric ulcer, Hypotensive activity.

Keywords: *Mimusops elengi*, chemical compounds, plants, bioactivities.

INTRODUCTION

Natural products are known to play an important role in Pharmaceutical biology. Plants have been an important source of medicine for thousands of years. Even today, the World Health Organization estimates that up to 80 percent of people still rely mainly on traditional medicines. *Mimusops elengi* (Linn.) is an evergreen tree of the family Sapotaceae. It is most frequently known as “Bakul” which is cultivated as an ornamental tree largely in gardens. Conventionally, different parts of the plant are used in various ways to cure a number of human ailments. Several therapeutic uses such as cardiotoxic, alexipharmic, stomachic, anthelmintic and astringent have been ascribed to the bark of the plant. The bark and fruit of this plant are used in the treatment of diarrhea and dysentery, and a decoction of the bark is used as a gargle. The bark is also useful in painful high fever (1, 2). The bark of *M. elengi* produces a commercial dye. The chemical constituents of the color components responsible for dyeing have been identified. The dyeing behavior of these color components on wool has also been evaluated. The color components isolated from the bark mainly contain flavonoid moiety (3). The leaves have been considered as an antidote for snakebite. The flowers and unripe fruits are used as an ointment for treating wounds and ulcers. The powder from dried flowers is a brain tonic and relieves from cephalalgia. The flowers are used as expectorant, to cure problems of liver, nose, and are smoked in asthma. Further, the flowers are used to make garlands and for stuffing pillows (1, 2). The fruits are aphrodisiac, diuretic, astringent to the bowels and good in gonorrhoea. The pulp of the ripe fruits has been successfully used to cure chronic dysentery. The immature fruits are chewed to protect loose teeth. The ripe fruits are given orally to pregnant women to facilitate delivery. The hot aqueous extract of fruits is given orally to human as diuretic which also acts as antipyretic. The ripe fruits rich in carbohydrates are good source of food (2). The seeds of *M. elengi* are powdered and applied locally with ghee within the anus of children to cure constipation. The hot water extract of dried seeds is used to fix loose teeth. The seeds produce oil which is used in medicines for burning. The young twing of *M. elengi* like that of Neem tree is used as tooth brush for cleaning teeth, while the valuable wood is used in railway slipper. The roots are aphrodisiac, diuretic, astringent to the bowels and good in gonorrhoea. The hot aqueous extract of root as a gargle strengthens the gums and teeth, and can be given orally as antipyretic (1). The present review is an attempt to highlight the various phytochemical and pharmacological reports on *Mimusops elengi*.

Chemical Compounds:

Phytochemical studies of *M. elengi* proved the presence of tanins, alkaloids, saponins, cardiac glycosides, steroids, flavonoids and reducing sugar. The ethanolic extract of leaves showed presence of quercetin, quercitol, hentriacontane, β -carotene and glucose. The aerial parts together with the roots and seeds contain taraxerone, taraxerol and lupeol. The fruits, seeds and stems, in addition, gave quercetin, dihydroquercetin, myricetin, glycosides, hederagenin, betulinic acid and ursolic acid together with salts. The ethanolic extract of bark contained a saponin which on hydrolysis produced β -amyrin and brassic acid. The seed oil was comprised of capric, lauric, myristic, palmitic, stearic, arachidic, oleic and linoleic acids (4, 5, 6). A pentacyclic triterpene along with other known triterpenoids and gallic acid esters from the ethanolic extract of

the stem bark, while two new triterpenes from the methanolic extract of *M. elengi* have been isolated and characterized (7,8,9) Two novel triterpenoid saponins, mimusopins were isolated from the seeds of *M. elengi* and their structures were elucidated (10). Fresh flowers of *M. elengi* on extraction with acetone yielded D-mannitol whereas extraction with ethanol yielded β -sitosterol and β -sitosterol-3-D-glucoside. Flowers also yielded quercitol, ursolic acid and a triterpene alcohol which was later, identified as lupeol [11]. Ethanolic extract of *M. elengi* seeds yielded quercitol, dihydroquercetin, and quercetin, β -D-glucoside of β -sitosterol and spinasterol [12]. The fatty oil comprised capric, lauric, myristic, palmitic (16.71%), stearic (17.23%), arachidic, oleic (53.48%) and linoleic (16.71%) acids [11]. Hentriacontane, carotene and lupeol from the leaves, heartwood and roots were isolated. A new steroidal saponin, 5 α -stigmast-9(11) en-3-o-beta-D-glucopyranosyl (1-5)-o-beta-D-xylofuranoside was isolated from the roots of *mimusops elengi* [13, 14].

Bioactivities:

Antioxidant activity:

The chloroform extract of bark was assessed by using DPPH (1,1-diphenyl-2-picrylhydrazyl) radical, nitric oxide, ABTS radical and hydroxyl radical respectively. The result obtained in this study clearly indicates that *M. elengi* has a significant potential to use as a natural anti-oxidant agent [15]. Crude methanolic extract of leaf exhibited statistically significant antioxidant activity in DPPH free radical scavenging and Nitric oxide scavenging test [16]. Protective effect of leaf extract on Lipid Peroxidation and activities of both Enzymatic and Non-Enzymatic Antioxidants in Plasma and tissues were studied. The oxidative stress was measured by plasma and tissue Lipid Peroxidative markers levels, Non Enzymatic antioxidants and enzymatic antioxidants. It showed promising Antioxidant properties by significant Quenching impact on the extent of Lipid Peroxidation, along with Enhancement of Antioxidant defense System in Pancreas tissues [17]

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 [18]. The antihyperglycemic effect of methanolic extract of stem bark were evaluated by oral glucose tolerance test in diabetic and non-diabetic mice and the extract of barks of produced significant reduction in elevated glucose levels in glucose loaded non diabetic animals and also show reduction in elevated glucose levels. The aqueous bark extract of were evaluated for antidiabetic effect using alloxan induced hypoglycemic rats. Blood glucose, serum insulin, glycosylated haemoglobin and liver glycogen, glucokinase, glucose-6-phosphatase and glucose-6-phosphate dehydrogenase after 45 days of the treatment were analyzed. The bark extract produced significant alteration in biochemical and enzymatic parameters studied which indicates effect [19].

Diuretic effect:

The diuretic and electrolyte excretion activity in alcoholic extract were evaluated. After dosing of extracts and standards urine was collected and volume was recorded at 5 hours. The highest diuretic activity

was presented by the alcoholic extract [20]. The ethyl acetate, ethanol and water extract was evaluated for diuretic activity. Diuretic study was carried out in rodents by measuring the urine volume at 1, 2, 4, 6 and 24 hrs. The aqueous extracts showed a significant diuretic activity when compared with other extracts [21].

Cytotoxic activity:

The methanolic bark extract was screened for cytotoxic activity by brine shrimp lethality bioassay. The extract exhibited good cytotoxic activity with LC50 value of 40 µg/ml whereas LC50 of vincristine sulphate was 0.078 µg/ml. The methanolic extract of leaf was investigated for cytotoxic activity which was done by brine shrimp and lethality bioassay as an indicator of toxicity. The study clearly indicates that the methanolic extract possess cytotoxic substances [22].

Cognitive enhancing activity:

The effect of alcoholic extract of flower was evaluated for congestive enhancing activity using elevated plus maza and passive avoidance task method with mentat as standard by using parameter of step down and transfer latency. The alcoholic extract shows the significant effect [23].

Antibacterial effect:

The aqueous petroleum ether, toluene, methanol, ethanol and chloroform extract of leaves was investigated against five pathogenic bacteria *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Vibrio cholera* and *Streptococcus pneumonia* by using Agar cup diffusion method. The aqueous extract showed a strong antibacterial activity. Maximum and highly significant activity was observed in methanol and ethanol extract [24]. The bark extracts in aqueous and acetone solvents were evaluated and compared for antibacterial activity against salivary microflora using paper disc diffusion method. The aqueous and acetone extracts did not show any significant zones of inhibition [25].

Wound healing effect:

The Wound healing activity of methanolic extract of bark parts of *Mimusops elengi* 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 above said wound models as comparable to those of a standard drug [26].

Anti-atherosclerotic activity:

The methanol extract of the leaves was evaluated by performing assay of HDL Cholesterol, Triglycerides, Catalase, and Superoxide Dismutase. It showed potent anti-atherosclerotic activity [27].

Antiuro lithiatic effect:

Petroleum ether, chloroform, and alcohol extracts of bark were evaluated for antiuro lithiatic activity in male albino wistar rats. Oxalate, calcium, and phosphate were monitored in the urine and kidney. The alcohol extract bark significantly lowers the elevated levels of the oxalate, calcium, phosphate in urine and kidney as compared to Petroleum ether and chloroform extract [28].

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 [29]. The ethanol extract of Bark was assessed for anti-inflammatory, analgesic and antipyretic activities in animals. The ethanol extract of bark significantly inhibited the carrageenan-induced paw oedema at 3rd and 4th weight. In analgesic models also the ethano 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 [30]. 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.

Antiulcer activity:

The effect of bark alcoholic and petroleum ether extracts of *Mimusops elengi* was evaluated in rats. The alcoholic extract has significant antiulcer activity compare to petroleum ether extracts of bark [31]. The alcoholic extract of bark of *Mimusops elengi* and its different fractions namely ethyl acetate, N-butanol, and methanol and aqueous against different ulcer models, and concluded that Ethyl acetate fraction has anti-ulcer activity against experimental gastric ulcers [32]

Anti-anxiety activity:

The study evaluates the anti-anxiety activity of methanolic, aqueous and n-butanol extract of bark using elevated plus maze in swiss albino mice model by different doses. Methanolic extract at 200 mg/kg showed more significant anxiolytic activity as compared to aqueous and n-butanol extract [33].

CONCLUSION

M. elengi is one of the most important medicinal plants used in preparations of Ayurveda because of having a number of medicinal properties. It is the source of a variety of biologically active phytoconstituents which are responsible for antimicrobial, antioxidant, antihyperglycemic, anticancer and protective effects on various vital organs such as nerves, heart, kidney and liver.

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