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RESEARCH ARTICLE

A SYSTEMATIC REVIEW OF *MALACHRA CAPITATA*: MEDICINAL PROPERTIES AND CONSTITUENTS.

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ABSTRACT

Malachara capitata belonging to family Malvaceae is very common erect or underground shrub. It grows up to 1.5 metres tall. The plant is usually erect, covered throughout with a rather dense tomentum of fine close stellate hairs, the stems often bearing a few long spreading hairs. M. Capitata is planted as fibre plant in India, formerly also in Cuba. The fiber is excellent, 8-9 feet long, and that experts have declared it little, if at all, inferior to jute. Roots and leaves are in some regions used as medicines. But though it is very commonly found it is neglected. The plant is used medicinally; especially the root extracts are reported to be used medicinally as compared to other parts. This paper is representing systematic review of medicinal and pharmacological properties of *Malachra capitata*.

INTRODUCTION

Malachra capitata is belonging to family Malvaceae. It is very commonly seen near annual or perennial, erect herbs or undershrubs, to 1.5 m high; stems, petioles and peduncles densely pubescent with prickly stellate and simple hairs. Leaves alternate, orbicular or ovate, 3-5 angled or lobed, cordate at base, crenate to serrate at margin, obtuse or rounded at apex, 3-14 x 4-20 cm, velutinous with stellate and simple hairs on both surfaces, glabrescent, 5- nerved at base; petioles 2-8 cm long; stipules 1-2 cm long, filiform, rarely forked, hispid. Inflorescences 0.5-1.5 cm long, stout bearing 3-7 heads; each head with 2-5 flowers encircled by 3 or 4 leafy bracts; bracts ovate to orbicular, cordate to rounded at base, entire or crenate-serrate at margin, acute at apex with a slightly recurved tip, 0.5-2 cm across, folded along midnerve, stellate-pubescent and also with stiff bristles at margin and on nerves beneath. Calyx cupular, accrescent; lobes oblong to deltoid, acuminate, ca 6x 1.5 mm, 3-nerved with a few stiff simple hairs at apex. Corolla ca 1.5-2.5 cm across, bright yellow; petals obovate, ca 1.5 x 1 cm, ciliate at base, densely stellate-hairy outside, glabrous inside. Staminal column ca 1 cm long, pubescent with both stellate and simple hairs and a few glandular hairs, antheriferous throughout.

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Ovary glabrous; styles ca 1.3 cm long, glabrous, 10-branched; stigmas capitate, hairy. Schizocarps obpyriform, 5-6 mm across; mericarps 5, 3-gonous, acute at base, rounded at apex, ca 3 x 2 mm, glabrous, reticulate with brownish nerves, whitish; seeds 3-gonous, ca 2.5 mm long, covered with minute stellate hairs, brownish black.

Proven activities

The preliminary phytochemical analysis of eight ethnomedicinal plants from Akola District (MS) was done. The plants were *Ocimum sanctum L., Hyptis suaveolens* (L) Poit*., Croton tiglium* L*., Physalis minima* L*., Tephrosia villosa* (L) Pers*., Malachra capitata* L*., Cleome viscosa* L*., and Galphimia glauca* Cav. Qualitative phytochemical analysis of these plants confirms the presence of various phytochemicals like alkaloids, flavonoids, tannins, phlobatannin, terpenoid, saponin, steroid and cardiac glycosides in their aqueous leaf extracts. Some of these phytochemicals were further estimated quantitatively. Present paper deals with the significance of these phytochemicals with respect to the role of these plants in traditional medicinal system (11). The roots of *Malachra capitata (L.)* are used traditional Indian medicine to treat epilepsy. The purpose of the study performed by Gandhimati & Kumar, (2) is to investigate the effect of aqueous (95%) extract of *Malachra capitata (L.)* (AMC) on biogenic amines

concentrations in rat brain after induction of seizures by MES and PTZ.

Our aim of study was relationship between seizure activities and altered the monoamines such as noradrenaline (NA), dopamine (DA), serotonin (5-HT) and Gamma amino butyric acid (GABA) in forebrain of rats in MES and PTZ seizure models. In MES model, AMC (200 & 400 mg/kg) showed significantly restored the decreased levels of brain monoamines such as NA, DA, 5-HT and GABA. Similarly in PTZ model, AMC showed significantly increased the monoamines in forebrain of rats. Thus, this study suggests that aqueous extract of *Malachra capitata (L.)* increased the monoamines on rat brain, which may be decreased the susceptibility to MES and PTZ induced seizure in rats.

The roots of *Malachra capitata L.* is used traditional Indian medicine to treat epilepsy. In this study the effect of aqueous extract of *Malachra capitata L.* (AMC) on antioxidant enzymes in rat brain after induction of epilepsy by MES and PTZ were observed. In which Superoxide dismutase, glutathione peroxidase, glutathione reductase and catalase was significantly ($P<0.01$) decreased in rat brain due to epilepsy and it was significantly ($P<0.01$) restored by administration of aqueous extract of *Malachra capitata L.* treated rats. Similar dose dependent results were obtained in PTZ model also. Whereas AMC significantly decreased lipid peroxidation in both models. The anticonvulsant activity of AMC might be presents of antioxidant properties and it delays the generation of free radical in MES & PTZ induced epilepsy (3). *Malachra capitata (L.)* a member of the Malvaceae family, is used in folk medicine because of its treat the many disease condition such as pain, hepatic cirrhosis, inflammation, diarrhea, convulsion, dementia, pyrexia, ulcer, healing of wounds. The study of antioxidant activity is done by Kumar *et.al*,(4). To investigate the antioxidant activity of the aqueous extract of *Malachra capitata (L.)* (AMC) was investigated in rats with carbon tetrachloride (CCl4) induced erythrocyte damage. Simultaneous administration of the AMC (200 and 400 mg/kg body weight/day i.p) with carbon tetrachloride (1ml/kg of body weight) to rats for alternate days of two weeks protected the loss of functional integrity and membrane lipid alteration in red blood cells induced by oxidative stress. AMC inhibited the accumulation of lipid peroxidation products in the plasma as well as maintained the activities of antioxidant enzymes such as superoxide dismutase (SOD) and catalase. The AMC further had the ability to decrease the membrane fluidity induced by carbon tetrachloride. It can therefore be suggested that the AMC possess an erythrocyte protective activity against drug induced oxidative stress.

The roots of the *Malachra capitata* (L.) (Family: Malvaceae) is traditional remedies for the many disease condition such as pain, hepatic cirrhosis, inflammation, diarrhea, convulsion, dementia, pyrexia, ulcer, healing of wounds. The investigation was carried out by Rajlakshmi *et.al*,(5) to evaluate the safety of aqueous extract of *Malachra capitata (L.)* (AMC) roots by determining its potential toxicity after acute and chronic administration in rats. Study on acute toxicity of extract found to be safe at the doses 2000mg/kg body weight orally as per OECD guidelines No.423. General behavior adverse effects and mortality were determined for up to 14 days. In the chronic toxicity study, the AMC was administered orally at doses of 100, 200 and 400 mg/kg once in a week for 6 weeks to rats. Biochemical and hematological parameters were determined after 6 weeks. In the acute study in rats, there was no toxicity/ death was observed at the dose of 2000mg/kg b.w. The onset of toxicity and signs of toxicity also not there. In the chronic toxicity study, no significant treatment-related changes in the levels of haematological, hepatic and renal parameters such as SGOT, SGPT, cholesterol, creatinine, urea, uric acid, protein and glucose, and serum ALP activities were observed at the termination of the study. It suggests that the aqueous extract of *Malachra capitata (L.)* does not appear to have significant toxicity. In view of the dose of *Malachra capitata (L.)* consumed in traditional medicine, there is a wide margin of safety for the therapeutic use of the aqueous extract of *Malachra capitata (L.)* roots. The purpose of the study performed by was to evaluate scientifically the anti-diarrhoeal effects of aqueous extract of roots of *Malachra capitata* Linn (AMC) was studied against castor oil-induced-diarrhoea model in rats. Antidiarrhoeal activity of aqueous extract of *Malachra capitata* was investigated in this study using castor oil-induced-diarrhoea, enteropooling and Small intestinal transit models in rats. The weight and volume of intestinal content induced by castor oil were studied by enteropooling method. Standard drug diphenoxylate (5 ml/kg, p.o) was significant reductions in fecal output and frequency of droppings whereas AMC at the doses of 200 and 400 mg/kg p.o significantly ($P<0.001$) reduced the castor-oil induced frequency and consistency of diarrhoea and enteropooling. The gastrointestinal transit rate was expressed as the percentage of the longest distance travelled by the charcoal divided by the

total length of the small intestine. AMC at the doses of 200 and 400 mg/kg significantly inhibited (P<0.001) the castor oil induced charcoal meal transit. The AMC showed marked reduction in the number of diarrhoea stools and the reduction in the weight and volume of the intestinal contents, as well as a modest reduction in intestinal transit. The results obtained establish the efficacy and substantiate the folklore claim as an anti- diarrheal agent. Further studies are needed to completely understand the mechanism of anti-diarrhoeal action of *Malachra capitata* (6). The present study is performed by Gopi *et.al*, (7) an investigation of anti-epileptic activity of *Malachra capitata L.* (Family- Malvaceae) is a well-known plant which is being used in Indian traditional medicines for treating epilepsy and inflammation. The aqueous extract of *Malachra capitata L.* (AMC) was subjected to acute toxicity and then screened for anticonvulsant activity on Maximal Electroshock (MES) and Pentylenetetrazole (PTZ) induced seizures models in albino wistar rats. Acute toxicity of extract was non toxic up to the recommended dose 2000 mg/kg. p.o. Animals were treated with AMC at doses of 250 and 500 mg/kg body weight. Study results showed, the mean duration of extensor phase of treated groups reduced significant level than compared to control group. In Pentylenetetrazol induced seizure model, onset of myoclonic spasm and clonic convulsion was delayed in the AMC treated groups. AMC showed anti-epileptic activity against MES and PTZ animal models. However, further studies still needed to be carried on exposure of the extract to humans. The aim of this study is to evaluate the anti-ulcer activity of aqueous extract of roots of *Malachra capitata (L.)*. The aqueous extract of *Malachra capitata (L.)* (AMC) was investigated for its anti-ulcer activity against pylorus ligation and ethanol induced gastric ulcers in rats. Ranitidine (50mg/kg,p.o.) and misoprostol (100ug/kg,p.o.) were used as standard drugs. A significant (p<0.01) anti-ulcer activity was observed in both the models. Both does of *Malachra capitata (L.)* produced gastric anti-secretory effect in pylorus ligated rats and also showed gastric cytoprotective effect in ethanol induced gastric ulcers. Pylorus ligation showed significant (p<0.01) reduction in gastric volume. Free acidity, ulcer index as compared to control. It also showed significant (p<0.01) reduction in ulcer index in ethanol induced model with respect to control. This present study indicates that, *Malachra capitata (L.)* roots extract have potential anti-ulcer activity in this tested models (8).

The present study is performed by Sriram *et.al*, () to investigate the phytoconstituents, acute oral toxicity and hepatoprotective activity of aqueous extract of *Malachra capitata (L.)* (AMC) using CCl4 induced hepatotoxicity in male Wistar albino rats. The AMC at doses of 100, 200 and 400mg/kg, p.o and the standard drug Liv.52 (40mg/kg, p.o) were administered for 7 days in CCl4 intoxicated rats. The hepatoprotective activity was assessed by using various biochemical parameters like SGOT, SGPT, alkaline phosphatase (ALP) and acid phosphatase (ACP), also total bilirubin and urea. The biochemical changes and histopathological studies were observed on 4th and 8th day. AMC at tested doses significantly decrease *(P*<0.001) the elevated levels of the hepatic enzymes, total bilirubin and urea in a dose dependent manner after 3days whereas it's subsequent return towards near normal after 7days indicating the recovery of hepatic cells. The AMC afforded significant protection against CCl4 induced hepatocellular injury. The study was carried out to evaluate analgesic and anti-inflammatory activity of alcoholic extract of leaves of *Malachra Capitata* in male Wistar rats. The collected plant material (Leaves) *Malachra capitata* was evaluated for its analgesic activity and anti-inflammatory activities. Analgesic activities was carried out by Acetic acid induced writhings and Tail immersion methods, were as anti-inflammatory activity was evaluated by Carageenan induced paw edema and cotton pellet granuloma method. The results revealed that in the analgesic activity the plant extract shown significant dose dependant inhibition of Writhing's and significant increase in time taken for removal of tail from hot water in treated animals were noted. In anti-inflammatory activity there was 41.38% reduction of edema volume and the extract shown dose dependent decrease in both dry and wet cotton pellets weight. The present study revealed that *Malachra capitata* found to exhibit significantanalgesic and anti-inflammatory properties (1). Isolation and Study of β-sitosterol the Unsaponifiable Matter from the Plant *Malachra capitata* (Linn) is carried out by Jadhav & Parihar,(12) .The fat obtained from the shade dried plant Malachra capitata (Linn) was saponified and the unsaponifiable matter was isolated. The unsaponifiable matter was identified as β - sitosterol by chemical and spectroscopic analysis. Methanol extracts of *Malachra capitata* root, stem and leaf samples were analyzed for the quantification flavonoid profile using HPLC by Sindhu and Neelamegan, (9).

The results of HPLC analysis indicate the presence of flavonoid compounds -gallic acid, caffeic acid, rutin, quercetin and ferulic acid in the root sample methanol extracts of *Malachra capitata* while the methanol extract of leaf sample shows only two compounds (rutin and ferulic acid) and one compound (gallic acid) in the stem sample methanol extract. Maximum amount of flavonoid compound (gallic acid - 30mg/g) noted in the stem sample as compared to other compounds among the plant samples tested. GC-MS analysis in the ethanol extracts of *Malachra capitata* root, stem and leaf samples reveals the presence of 8 compounds in root, 11 compounds in stem and 13 compounds in leaf samples. Among the compounds detected, Hexadecanoic acid, ethyl ester shows maximum peak area of 54.65% in root sample, while it was 42% in stem sample and 39.79% in the leaf samples. Out of 8 compounds detected in root sample, 5 compounds shows bioactivities and the remaining three compounds are not reported to have any bioactivities. Similarly, the out of 11 compounds 4 compounds in stem samples have no activity. In leaf sample, out of 13 compounds detected 11 compounds identified and 4 compounds are not reported to have any bioactivity (13).

Conclusion

The above review indicates the detail study and proven activities of *Malachra capitata* which is medicinally important. Most of the work is done with the help of root extract of this plant, so there is scope to do work on other parts of plants which are not yet studied.

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