ISSN 2229-3566
Review Article

IJRAP
www.ijrap.net

A REVIEW ON THERAPEUTIC USES OF *PEDALIUM MUREX* LINN

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Received on: 20/09/11 Revised on: 12/11/11 Accepted on: 19/11/11

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ABSTRACT
Traditional system of medicinal consists of large number of plants with various medicinal and pharmacological importances and hence represents a priceless tank of new bioactive molecules. *Pedalium murex* is a small herb distributed in tropical Africa, Ceylon, India and Mexico. It is commonly found in Deccan and some parts of Ceylon and Gujarat and in its costal areas of Southern India. It is commonly called Gokhru (Yaanai Nerinji) a member of family Pedaliaceae. The plant is sweet, cooling, mucilaginous, diuretic and inflammatory and used to treat digestive, carminative, tonic, spasmodic affections, amenorrhoea, and vitiated conditions of pita, inflammation and general debility. This review will be helpful to create interest towards *Pedalium murex* and may be useful in developing new formulations with more therapeutic and economical value.
KEY WORDS: *Pedalium murex*, anti-inflammatory, diuretics.

INTRODUCTION

Medicinal plants have been of age long remedies for human diseases because they contain components of therapeutic value[1]. Plants are used in modern medicine where they occupy a very significant place as raw material for important drugs[2]. Plants are considerably useful and economically essential. They contain active constituents that are used in the treatment of many human diseases. Plants are rich sources of ecologically developed secondary metabolites, which are potential remedies for different ailments. Extreme interest in plants with microbial activity has revived as result of current problems such as resistance associated with the use of antibiotics obtained from micro organisms[3].

Pedalium murex L. (Pedaliaceae) is a diffuse, more or less succulent herb found near the sea coast of south India[4]. Infusion of the leaves and stem in cold water is demulcent, diuretic and used for the treatment of gonorrhea. Leaves are used for ulcers. Fresh leaves and young shoots dipped and kept for few minutes in boiling milk, such milk is used as an aphrodisiac. Fruit is demulcent, diuretic, anti-spasmodic and aphrodisiac. The decoction is useful in irritation of the urinary organs. Juice of the fruit is an emmenagogue. Root is used for antibilious[5, 6]. Pharmacognostical study of the leaves of the plant was reported[7]. It contains alkaloids, a greenish fatty oil, small amount of resin and ash. Fruit contains a mucilagenous alkaloid, fat, resin, and gum. Caffeic acid, cumaric acid, daucosterol, ferulic acid, hepatatriacontonic acid[8], vanillic acid[9], ursolic acid and sitosterol were isolated from this plant. Flavonoids, triterpenoids, steroids, lipids, fatty acids, phenolic acids, amino acids and carbohydrates of Pedalium murex were reported[10].

Botanical Study

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Lamiales
Family: Pedaliaceae
Genus: Pedalium
Species: *Pedalium murex* Linn.

Traditional Uses

Plant pacifies vitiated vata, pitta, urinary retention, kidney stone, seminal weakness, amenorrhea, inflammation, flatulence and fever.

PHARMACOLOGICAL ACTIVITIES ON FRUITS

Anti-bacterial activity

Muruganantham have reported the antibacterial activity of *P. murex* fruits in methanolic extract against the different bacterial pathogens. The results of antibacterial activity are showed by *P. murex* leaf and fruits by the zone of inhibition against Gram-positive bacteria. The strongest antibacterial activities among all the 12 pathogens were obtained by *Bacillus subtilis* in leaf (17 mm) and fruit (15 mm) methanol extract with inhibition zone. Leaf and fruit demonstrated moderate (11 mm) and weak (8 mm) inhibiting activity against gram-negative bacteria. Positive control (Streptomycin) showed antibacterial activity and there was no inhibition with negative control[11].

Anti-microbial activity

Shelke et al., reported the anti-microbial activity of aqueous and ethanolic extract of *P. murex* on bacteria *Bacillus subtilus* and fungi, *Aspergillus niger* were determined using cup and plate method. The ethanolic extract showed the wider zone of inhibition (1.5cm) in comparison with the standard drug, Streptomycin (1.3cm) against bacillus subtilus. While inhibition zone (1.3cm) was recorded for the same organism with aqueous extract compared with standard drug (1.4cm). Similarly the growth of *Aspergillus niger* was inhibited significantly by the ethanolic extract was 20.0 and 40.0 mg/ml for both bacteria and fungi. This study revealed the ethanolic extract showed strong inhibitory effect on the test organisms than aqueous extract[12].

Anti oxidant activity

Madhu Babu et al., reported the antioxidant activity of methanol extract of fruits of *P. murex* (MEC) by using carbon tetrachloride (CCl4) and intoxicated rat liver as the experimental model. The MEC were administered hepatotoxic rats for 90 days (daily, orally at the dose of 70 mg per kg body weight). Lipid peroxidation (LPO) in CCl4 and intoxicated rats was evidenced by a marked increment in the levels of Thiobarbituric acid reactive substances (TBARS) and diene conjugates (CD), and also a distinct diminution in glutathione (GSH) content in the liver. In CCl4 + MEC – treated rats these biochemical parameters attained an almost normal level. The decreased activity of antioxidant enzymes, such as superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPX) and glutathione reductase (GRD) in CCl4 –intoxicatedrats, and its retrieval towards near normalcy in CCl4 + MEC& administered rats revealed the efficacy of MEC in combating oxidative stress due to hepatic damage. Elevated level of glutathione transferase (GTS) observed in hepatotoxic rats too showed signs of returning towards normalcy in MEC co-administered animals[13].

Aphrodisiac activity

Hemalatha et al., have reported the aphrodisiac activity of ethanolic extract of *P. murex* fruit during an oral glucose tolerance test was performed. While evaluating the anti-diabetic activity at a dose of

125, 250 and 500 mg/kg p.o. was given to the rats followed by administration of 2 g/kg p.o. of glucose 30 min after the administration of extract. Pregnancy was observed in the treated groups after 20-25 days of treatment in females which resulted in birth of pubs ranging upto ten in some females (more significant in case of 500 mg/kg p.o.). The observation also showed a significant increase in weights of pubs along with a normal behavior pattern. The increased pregnancy rate in the drug treated groups may be due to the healthy viable sperm and enhancement of sexual desire of the rats. From the results it may be concluded that the fruits of the plant may be used as a good aphrodisiac agent to promote fertility rate[14].

Anti-hyperlipidemic activity

Balamurugan et al., reported the anti-hyperlipidemic potential of the ethanolic extract of fruits of *P. murex* at doses of 200 and 4oo mg/kg/p.o. in high fat diet fed rats. Biochemical parameters like Serum Total Cholesterol (TC), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), Very Low Lipoprotein (VLDL) and Triglycerides (TG) levels were measured and compared with Standards Gemfibrozil and Atorvastin. The ethanolic extract showed a significant decrease in triglycerides ($p<0.01$), LDL ($p<0.001$), VLDL ($p<0.01$), cholesterol ($p<0.001$) and a significant increase in HDL ($p<0.05$) levels at the tested doses. This study revealed the ethanolic extract showed good anti-hyperlipidemic activity[15].

Nephro-protector activity

Sreedevi et al., reported the nephroprotective activity of the ethanolic and aqueous extracts of fruits of *P. murex* (600mg/kg body weight, p.o.) against Gentamicin-induced (100mg/kg/s.c.) renal toxicity in rats. The effect of plant extracts were examined by estimating blood urea nitrogen, serum creatinine, urinary protein, urine to serum creatinine ratio, lipid peroxidation, gluthione, catalase in kidney. In present study, Gentamicin-induced nephrotoxicity characterized by significant elevation of serum markers levels, increased urinary protein excretion, raised LPO levels, reduced GSH and CAT levels, and reduced creatinine clearance. Co-administration of either ethanolic or aqueous extract with Gentamicin was significantly prevented the renal injury protection both functionally and histological in dose dependent manner. The present study provides the corroborative scientific evidence for the folklore use of Pedalium murex in urinary troubles[16].

PHARMACOLOGICAL ACTIVITIES ON LEAVES

Anti-microbial activity

Nalini et al., reported the anti-microbial activity of petroleum ether (PEPM) and methanol extract (MEPM) of *P. murex*. The antimicrobial activity of PEPM and MEPM was determined (100-500 µg/disc) by disc diffusion method. Three gram-positive, five gram-negative and two fungal microorganisms were used for the study. PEPM exhibits the moderate activity in *Staphylococcus epidermidis* of gram positive organism. The gram negative bacteria, *Salmonella paratyphi* (A) showed significant activity in the concentration of 300-500µg/disc and *Salmonella paratyphi* (B) showed activity at 500µg/disc. MEPM exhibited the antimicrobial activity against the tested microorganisms except *Salmonella typhimurium* (MTCC 98). From the present study, it was concluded that MEPM had significant antimicrobial activity compared with PEPM[17].

Anti-inflammatory activity

Parimala Devi et al., reported the anti inflammatory activity of aqueous extract of leaves of *P. murex* in carrgenan induced paw edema model. The results shows the methanolic extract is having higher anti-inflammatory activity at a dose of 400 mg/kg/b.wt. The present study proved the traditional uses of *P. murex* as an anti-inflammatory agent[18].

Anti-ulcer activity

David banji et al., reported the antiulcer efficacy of the aqueous extract of leaves of *P. murex* on ethanol induced gastric lesions by ascertaining the content of total acid, acid volume, total protein, ulcer index and glutathione. Ulceration was induced in 36 hours fasted rats by the administration of 80% ethanol (1ml/kg) orally. The reference standard (famotidine, 3mg/kg) and aqueous extract of leaves of *P. murex* in doses of 50, 100, 200mg/kg was given to different groups, one hour before the administration of ethanol. Pretreatment with aqueous extract of leaves of *P. murex* particularly at a dose of 200mg/kg in a single schedule and 100mg/kg for 15 and 30 days treatment annihilated these alterations and elevated the level of glutathione. Therefore the aqueous extract of leaves of *P. murex* could be regarded as a favorable antiulcerogen[19].

PHARMACOLOGICAL ACTIVITIES OF ROOT

Anti-bacterial activity

Muruganantham have reported the antibacterial activity of *P. murex* fruits in methanolic extract against the different bacterial pathogens. The results of antibacterial activity are showed by *P. murex* leaf and fruits by the zone of inhibition against Gram-positive bacteria. The antibacterial activity was very high in 75% concentration in gram positive bacteria and then followed by 100%, 50% and 25% of concentration. The negative control did not produce any zone of inhibition[20].

Anti-diabetic activity

Ravi kumar and Krishnamoorthy reported the Anti-diabetic activity of an ethanolic extract of *P. murex* roots in alloxan induced diabetes. Oral administration of ethanolic extract at a dose of 100 and 200 mg/kg b.wt for 3 weeks resulted in a significant reduction in blood glucose and an increase in plasma insulin. Standard drug was Glibenclamide. The decrease in thiobarbituric acid reactive substances (TBARS) and hydroperoxides (HPx) and increase in the activities of superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), reduced glutathione (GSH) and glutathione S transferase (GST) clearly showed the anti-diabetic effect[21].

CONCLUSION

The extensive literature survey revealed that *Pedalium murex* is important medicinal plant with diverse pharmacological spectrum. The plant shows the presence of many chemical constituents which are responsible for varied pharmacological and medicinal property. The evaluation needs to be carried out on *Pedalium murex* in order to uses and formulation of the plant in their practical clinical applications, which can be used for the welfare of the mankind.

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Fig 1: *Pedalium murex*