INTERNATIONAL JOURNAL OF DECCAN PHARMA AND LIFE SCIENCES

www.ijdpls.com

(Original Article)

Received: 07-08-2012; Revised; Accepted: 18-08-2012

PHYTOPHARMACOLOGICAL REVIEW ON *THESPESIA POPULNEA* LINN

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Keywords:

Thespesia populnea, Phytopharmacological review

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ABSTRACT

Thespesia populnea is a reputed ever green tree belonging to the family Malvaceae; commonly known as Indian tulip tree. The plant is distributed tropical regions and coastal forest in India. It is well known and all the parts are used in Indian system of medicine. The plant has been used as astringent, antibacterial, hepatoprotective, haemostatic, anti-diarrheal and anti-inflammatory. This review will be helpful to create interest towards *Thespesia populnea* and may be useful in developing new formulations with more therapeutic and economical value.

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].

Thespesia populnea (Linn) belongs to the family Malvaceae, small evergreen plant distributed in Coastal areas of the Indian and Pacific Oceans from East Africa and India to mainland Southeast Asia, Indonesia, and the Philippines. Commonly known as Milo is used for carvings of traditional religious figures and decorative but useful items such as small stools, wood is mainly used today for bowls and other craft items. It has a short, straight or crooked trunk and a dense crown with crowded lower horizontal branches, aromatic or bitter-aromatic, stimulant and astringent properties[4]. They are used as tonics, emmenagogues, antispasmodics, burns, antimicrobial,antibacterial,antispasmodic ,analgesic,antiinflammatory,anticatarrhal hepatoprotective, antioxidant. A wide range of chemical compounds including terpenoid,alkaloid, acidic polysaccharide and 33 constituents were identified.

Vernacular names

English : Pacific rosewood, Indian tulip tree, cork tree,umbrella tree.

Hindi : Bhendi, gajadanda, paras-pipal, parsipu, porush.

French : Feuilles, motel debou.

Thai : Pho-thale, phrai.

Spanish : Alamo, blanco, carana.

Indonesia : Baru laut, waru laut.

Malay : Baru, baru baru.

Fig 1&2: *Thespesia populnea*

Habits and Habitat of *Thespesia populnea*

Leaves - Alternate, glossy green above, paler green below.

Flowers - Pale yellow with a maroon spot at the base

Fruit - Brittle,dry,woody.

Seeds - Brown seeds.

Flowering period- Flowering occurs from early spring to late summer

Habitat - Tropical

Distribution - Indian,Pacific oceans.

The plant has a short, straight or crooked trunk and a dense crown with crowded lower horizontal branches[5], Flowers are as typical hibiscus shape in appearance: bell shaped, 4–7 cm (1.5–2.5 in) in length, with five overlapping, broad, rounded petals. Leaves in the lower crown turn to yellow before falling to the ground. Fruits are brittle, dry, woody or papery seed capsules, rounded and flattened, containing five cells and several seeds, Mature fruits may usually be found on trees year-round. Seeds are blown short distances by wind but are more likely to be dispersed by water[6].

Traditional uses

Plant used as cutaneous infections such as scabies, psoriasis, , emmenagogues, diaphoretics, antispasmodics, burns and wounds, eczema, ringworm, guinea worm and the leaves of this plant used as anti-inflammatory for poultice as a folk medicine[7].

Chemical Constituents

Chemical constituents including terpenoid,alkaloid,acidic polysaccharide, tannins, flavonoids, phytosterols, proteins, fixed oils and glycosides were present in the *Thespesia populnea,* so by these chemical constituents many different activities were reported[8].

PHARMACOLOGICAL ACTIVITIES

Antimicrobaial activity

Shekshavali and Shivakumar Hugar had reported the antimicrobial activity of bark of ethanolic extract of *Thespesia populnea* by well diffusion method against four bacteria and two fungi (*Escherichia coli, Candida albicans*). Pet ether extract showed significant activity against all organisms where as ethanolic and aqueous extracts showed moderate to mild activity[9].

Antibacterial activity

Archana moon et al had reported the antibacterial activity of methanolic extract of *Thespesia populnea* leaves and its corresponding callus were studied against strains of *Escherichia coli, staphylococcus aureus, kiebsiella pneumonia* and *salmonella typhii* by Bauer-kirby method. Both the leaf of the plant and its corresponding callus showed great potential as source of anti bacterial agents[10].

Anti-diabetic activity

Parthasarathy et al had reported the anti-diabetic activity of ethanolic extract of *Thespesia populnea* leaves and bark (TPLE&TPBE) against streptozotocin induced diabetics in rats. The animals were treated with extract at different doses 200,400mg/kg orally for 15 days. oral administration of extracts shows significant decrease in blood glucose level in 10-15 days of treatment and is dose dependent manner against standard glibenclamide. The main mechanism of action is increased pancreatic secretion of insulin from beta cells of islets of langerhans or by increase in the peripheral glucose uptake. The result of this experimental study indicates that both the ethanolic extract posses' anti-diabetic effect against STZ induced diabetic rats[11].

Antioxidant activity

Beena joy et al had reported the antioxidant activity of ethyl acetate extract of *Thespesia populnea* by different methods like DPPH Radical scavenging activity, ABTS Radical cation Decolourisation assay and superoxide anion scavenging assay. In all these three methods absorbance was measured, the radical scavenging activity was high in ethyl acetate extract (28.03±0.98µg/mL) followed by hexane (38.38±1.42µg/mL). The IC 50 values are 0.4675±0.98µg/mL and standard Gallic acid (0.7674±0.46 µg/mL). In all the antioxidant assays

performed, ethyl acetate extract is the most active compared to all other extracts[12].

Anthelmintic activity

Siju et al had reported the anthelmintic activity of aqueous extract of *Thespesia populnea* flowers against Piperazine citrate as reference standard against *Raillietina spiralis, Ascaridia galli*. Three concentrations (10, 25, 50 mg/ml) of each extract were studied for activity, which involved the determination of time of paralysis and time of death of the worm. Piperazine citrate (10 mg/ml) was used as reference standard and distilled water as control. The result shows that the alcoholic and aqueous extracts possess modest anthelmintic activity. The activity is mainly due to presence of secondary metabolites like flavonoids and polyphenolic comnpounds[13].

Anti inflammatory activity

Elakkiya and Ananthi had reported the anti-inflammatory activity of ethanolic extract of leaf of Thespesia populnea in carrageenan induced paw oedema rats. The effect was assessed by difference in paw edema volume, before and after the low and high dose administration of the extract in rats. Ethanolic extract of *Thespesia populnea* leaf (100mg/kg body weight) were administered orally. The acute toxicity studies of oral doses of ethanolic extract of *Thespesia populnea* leaf in rats revealed that it has a high safety profile, as the extract (100mg/kg body weight) was well tolerated by the animals. The results of the study suggest that the extract possesses anti-inflammatory activity[14].

Anti implantation activity

Gosh and Battacharya had reported the anti-implantation activity of pet ether and ethyl acetate extracts of *Thespesia populnea* in Sprague dawley female rats of normal estrus cycle after overnight cohabitation with males of proven fertility. The day when spermatozoa were detected in vaginal smear was treated as 1st day of pregnancy. The compounds were administered to female rats from the 1st day to the 7th day of pregnancy. On the 10th day, the rats were laprotomized under light anesthesia and the numbers of implantation sites and corpora lutea were noted. Pet ether extract showed significant anti implantation activity (60%) at the dose

of 110mg/kg,b.w while that from ethanolic extract showed no such significant action[15].

Antipsoriatic activity

Sindhu et al had reported the anti-psoriatic activity was carried out by topical application of different extracts & isolated compounds (TpF-1, TpF-2 & TpS-2) of *Thespesia populnea* bark in the form of a cream using the Perry's scientific mouse tail model. Successive pet-ether extract showed maximum anti-psoriatic activity (increased orthokeratotic region by 25%) amongst the extracts tested where as the compound TpF-2 exhibited 38% increase in the same[16].

Antiulcer activity

Patil et al had reported the antiulcer activity of terpenoid fraction from the leaves of *Thespesia populnea* against aspirin induced ulcer in rats. The terpenoid fraction (TF) from the leaves of Thespesia populnea were tested orally at the doses of 50, 100 and 200 mg/kg, on gastric ulcerations experimentally induced by pylorus ligation, aspirin induced ulcer, aspirin induced ulcerogenesis in pylorus ligated rats and analyzed for ulcer index, gastric volume, pH, free and total acidity, sodium and potassium ion output. The terpenoid fraction significantly decreased the protein level and increased the total carbohydrate (TC). Mucin activity (TC: P) significantly increased at the tested dose level 200mg/kg[17].

Diuretic activity

The diuretic potential of various extract of the barks was assessed in albino rats. The volume of urine, urinary concentration of Na+, K+ and Cl- ions were the parameters of the study. Furosemide (100 mg/kg) was used as standard. The extract (400 mg/kg) has shown significant increase in the volume of urine, urinary concentration of Na+, K+ and Cl-. From the present study it may be concluded that the extract possess polyphenolic compounds, carbohydrates, proteins and possess natriuretic and diuretic activities[18].

Immuno-modulatory activity

Switi Gaikwad B, Krishna Mohan had reported the immuno-modulatory activity of methanolic extract of *Thespesia populnea* in wistar albino rats against levamisole as a standard drug

and cyclophosphamide has negative control. Treatment was given from1st -7th day and the sheep RBC 1×10^{8} cells was given intra-peritoneally on the 0th day. On 7th day prior to injection and for humoral antibody titre response to sheep RBC was similar to delayed type. On 7th day before injecting blood was withdrawn from retro-orbital plexus of each animal &RIA was performed, cyclophosphamide induced myelosupression and was protected by administration of METP and restoration of WBC count to normal[19].

Hepatoprotective activity

Yuvaraj and Subramoniam had reported the hepatoprotective activity of *Thespesia populnea* in carbon tetrachloride (CCl4)-induced liver injury in rats. The water suspension (500 mg/kg.b.wt.) of leaf, flower and stem bark of *T. populnea* showed varying levels of protective action against CCl4-induced liver damage as evidenced from significant reduction in the activities of serum marker enzymes for liver damage (alanine transaminase, aspartate transaminase, and alkaline phosphatase), and bilirubin levels when compared with CCl4-intoxicated control rats. The stem bark suspension showed maximum hepatoprotection compared with leaf and flower. An ethanol extract of the stem bark was more active than n-hexane and water extracts, showing remarkable protection at a dose of 60 mg/kg b.wt. The hepatoprotective effect of this extract was almost comparable to that of silymarin (100 mg/kg), a reference herbal drug[20].

Memory enchancing activity

Mani Vasudevan and Milind Parle had reported the memory enhancing activity of ethanolic extract of *Thespesia populnea* (TPE) in rats.TPE was administered orally for 7 successive days to young ones and the rats were exposed to training session using Elevated plus maze and Hebb-williams maze, retention (memory) was recorded after 24 hr. Transfer latency (TL), Time taken to reach reward chamber (TRC) reflects the memory of the animals by the mazes. Therefore, it seems likely that *Thespesia populnea* may prove to be a useful anti-Alzheimer agent, in view of its memory enhancing property observed in the current study[21].

CONCLUSION

The extensive literature survey revealed that *Thespesia populnea* 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 *Thespesia populnea* in order to uses and formulation of the plant in their practical clinical applications, which can be used for the welfare of the mankind.

ACKNOWLEDGEMENT

Authors are expressing indebted credit to Dr. M. Chinna Eswaraiah, Principal, Anurag Pharmacy College, Anurag Group of Institutions, Kodad.

REFERENCES

1. Adegoke A, Adebayo-tayo A and Bukola C. Antibacterial activity and phytochemical analysis of leaf extracts of *Lasienthera africanum*. African Journal of Biotechnology 2009; 8(1):77-80.
2. Audu SA, Ilyas M and Kaita HA. Phytochemical screening of the leaves of *Lophira lanceolata* (Ochanaceae). Life Science Journal 2007; 4(4):75-79.
3. Nagendra KK, Rangaiah GS, Varaprasad B and Sirisha C. Bactericidal activities of different medicinal plants extracts against ocular pathogen viz *Corynebacterium macginleyi*. Drug Invention Today 2010; 29(1):5-7.
4. Anonymous, the Wealth of India. Publication and information Directorate (CSIR), New Delhi; 1995.p.223-275.
5. Akila A, Rani K, Biosynthesis of gossypol in *Thespesia populnea*. Phytochemistry 1993, 335-340.
6. Daniel M, Medicinal plants-Chemistry and Properties, Science publishers; 2006.p.184.
7. Chatterjee A, Prakashi SC. Teatise of Indian medicinal plants. National institute of science communication, New Delhi; 1992,p.188-191.
8. Kirtikar KR, Basu BD, Indian Medicinal Plants;Orient Longman Ltd:Dehra Dun; 1998,p.340.
9. Shekshavali T and Shivakumar Hugar. Anti-microbial activity of *Thespesia populnea* bark extracts.

Indian Journal of Natural Products and Resources 2012; 3(1):128-130.

10. Archana Moon, Aqueel Khan, Bharat wadher. Anti bacterial potential of Thespesia populnea leaves and its corresponding callus against drug resistant isolates. Indian Journal of Natural Products and Resources 2010; 1(4):444-449.
11. Parthasarathy R, Ilavarasan R, Karrunakaran CM. Antidiabetic activity of *Thespesia Populnea* bark and leaf extract against streptozotocin induced diabetic rats. International Journal of Pharm Tech Research 2009; 1(4):1069-1072.
12. Beena Joy, Kavitha Sankar, Anjali. In-vitro antioxidant/antidiabetic activity of *Thespesia populnea* leaves extract. International Journal of Current Pharmaceutical Research 2012; 4(3):138-143.
13. Siju EN, Arun Shirwaikar, Sarala Devi, Premalatha. In vitro anthelmintic activity of *Thespesia populnea*. Asian Journal of Biochemical and Pharmaceutical Research 2011; 3(1):1-5.
14. Elakkiya S and Ananthi T. Studies on anti-inflammatory activity of *Thespesia populnea* Linn on the drug induced male albino rats. J Chem Pharm Res 2011; 3(5):473-477.
15. Gosh K, Bhattacharya TK. Preliminary studies on the anti-implantation activity of extracts of seeds of *Thespesia populnea*. Indian journal of Pharmacology 2004; 36(5):288-291.
16. Siddharth Shrivastav, Rakesh Sindhu K, Sanjeev Kumar, Pradeep Kumar. Anti-psoriatic and phytochemical evaluation of *Thespesia populnea* bark extracts. International Journal of Pharmacy and Pharmaceutical Sciences 2009; 1(1):176-185.
17. Patil PH, Patel JB, Surana SJ. Evaluation of antiulcer activity of the terpenoid fraction from the leaves of *Thespesia populnea* in albino rats. Research Journal of Pharmaceutical, and Chemical Sciences 2010; 1(4):495-513.
18. Parthasarathy R, Ilavarasan R, Rupali Nandanwar. A study on preliminary phytochemical and diuretic activity of bark of *Thespesia populnea*. IJPSR 2010; 1(2):72-77.

19. Switi Gaikwad B, Krishna Mohan G. Immuno-modulatory activity of methanolic extract of *Thespesia populnea* leaves in wistar albino rats. Asian Journal of Pharmaceutical and Clinical Research 2011; 4(4):99-101.
20. Yuvaraj P, Subramoniam A. Hepatoprotective property of *Thespesia populnea* against carbon tetrachloride induced liver damage in rats. J Basic Clin Physiol Pharmacol 2009; 20(2):169-77.
21. Mani Vasudevan and Milind Parle, Memory-Enhancing Activity of *Thespesia populnea* in rats, Pharmaceutical Biology 2007; 45(4):267–273.