Therapeutic Effects of Palasa: A Boon to Community

Shradha Sinha1, Meetkamal Dwivedi2,*

1Department of Chemistry, B.B.D.N.I.T. Lucknow
2Department of Chemistry, Christ Church College, Kanpur
*Corresponding author: meeth_dwi@yahoo.co.in

Received April 02, 2021; Revised May 07, 2021; Accepted May 15, 2021

Abstract Buteamonosperma is widely distributed throughout India, Burma and Ceylon, popularly known as ‘kakracha’, ‘mooduga’, ‘palasamu’, ‘parasa’, ‘muttuga’, ‘dhak’ or ‘palas’. This plant is commonly known as ‘flame of forest’ and popularly known as ‘Palas’. Diverse biological activities are associated with the different parts of plant such as Antidiarrhoeal Activity, Antioxidant and free radical scavenging activity, anti-cancer activity, anti-anthelmintic activity, hepatoprotective activity, contraceptive activity, anti-ulcer activity, anti-stress activity, hypoglycemic activity, osteogenic activity, anticonvulsive activity. This article will discuss the recent findings on remarkable biological activities and chemical constituents of Buteamonosperma.

Keywords: Buteamonosperma, palasa, chemical constituents, biological activities

Cite This Article: Shradha Sinha, and Meetkamal Dwivedi, “Therapeutic Effects of Palasa: A Boon to Community.” Applied Ecology and Environmental Sciences, vol. 9, no. 5 (2021): 533-536. doi: 10.12691/aees-9-5-3.

1. Introduction

The tree Buteamonosperma is native to tropical and sub-tropical parts of the Indian Subcontinent and South East Asia. It is also found in Nepal, Burma, Sri Lanka, Cambodia, Bangladesh, Thailand, Vietnam, Malaysia and Western Indonesia. It belongs to family Fabaceae and is popularly known as palas. Palasa is known as Kimshuka, Brahnavriksha, Kimshuka in Sanskrit means “like a parrot” or what brightness. The genus Butea includes Buteamonosperma, Buteaparviflora, Butea minor and Butea superb widely distributed throughout India [1]. It is a deciduous and fast growing tree 49 feet tall. The leaves are pinnate with 8-16 cm petiole and three leaflet. Each leaflet are 2.5 cm long, bright orange red. The fruit is a pod 15-20 cm long and 4-5 cm broad. Palasa commonly known as Flame of the forest. It is regarded as one of the most beautiful tree of India due to its gorgeous canopy of scarlet flowers which looks like a flame [2]. It is considered to be purest of all woods so it is used in the religious rituals in Hindus [3]. It is found in the plains and slopes of the hills in India. The plants of this genus are well known for their colouring matters. It holds an important place because of its medicinal and other miscellaneous uses of economic value.

In traditional medicine [4] there are many natural crude drugs that have the prospective to take care of many disease and disorders, one of them is Buteamonosperma (Lam.). It is one of the most attractive tree has been put to some useful purpose in Ayurveda, Unani and Homeopathic medicine and has become a cynosure of modern medicine. The relationship between this plant and human is mentioned in Ayurveda since the origin of mankind. Palash was used for wound healing it was mentioned in Athervaveda [5,6,7,8] Ayurvedic vedic physicians used it for diarrhea and dysentery. Juice obtained from bark and leaves is used for regulating menstrual flow, colic and intestinal worms and flowers are useful as astringent, depurative and tonic [9].

Extracts of various parts of the tree as well as the whole parts possess has many beneficial effects such as anti-microbial, anti-bacterial, anti-fungal, hypoglycemic, anti-inflammatory, astringent, tonic, aphrodisia and diuretic properties. [10,11] It has confirmed to be a source of constitutive osteogenic agents belonging to isoflavonoid and pterocarpan groups. [12,13]

Kingdom: Plantae Division: Magnoliophyta
Class: Magnoliopsida Order: Fabales
Family: Fabaceae Genus: Butea
Species: Monosperma

2. Chemical Constituents

The different parts of the plant bears a series of chemical constituents such as seeds contain Fixed oil (Fatty acid: linoleic acid, oleic acid, linolenic acid, palmitic acid, stearic acid, arachidic acid, behinic acid and linoceric acid); a nitrogenous acidic compound, along with palasonin is present in seeds. They also contain monospermoside, butin, alpha-amyrin, beta-sitosterol and beta-sitosterol-glucoside [14,15]. Allophanic acid has been isolated and identified in seed coat [16].
Flowers contain flavonoids and glucosides, they are butin, isobutrin, butein, chalcones, aurones, isobutynine, palasin, coreopsin, isocoreopsin [17]. Flowers also contain myricylalcohol, stearic acid, palmitic acid, arachidic, lignoceric acids and some carbohydrates and amino acids [18]. Bark contains Kino-tannic acid, Gallic acid, pyrocatechin. The plant also contains palasin, and major glycosides as butin, butolic acid, cyanidin, histidine, lupenone, lupeol, (-)-medicarpin, miroestrol, palasin, and shellolic acid [19]. Leaves of Buteamonosperma contains flavonoids, chalcones, and tannins. Kino-oil containing oleic and linoleic acid, palmitic and lignoceric acid [20,21]. Gum contains tannins, pyrocatechin and mucilaginous material [22]. Roots contain glucose, glycine, aglycoside and an aromatic hydroxyl compound [23]. Stem contains euphane triterpenoid, stigmasterol glycoside and nonacosanoic acid.

2.1. Biological Activity

The plant is traditionally reported to possess aphrodisiac anthelmintic antidiabetic diuretic analgesic antitumour antiasmatic properties [22,23]. They are useful in vitiated conditions of pitta and kapha, diarrhoea, haemorrhoids, menorrha gia, strangury, fever, leprosy, skin diseases, swellings, hyperpipsia, haemoptysis, arthritis, Burning sensation, bone fractures, and are very efficacious in birth control [24,25].

2.2. Antidiarrhoeal Activity

Gunak kunru et al reported that ethanolic extract of stem bark inhibited castor oil induced diarrhoea and PGE2 induced enterpooling in rats. It also reduced gastrointestinal motility after charcoal meal administration [26]. The stem bark extract also inhibited castor oil induced diarrhoea and PGE2 induced enteropooling in rats; it also reduced gastrointestinal motility after charcoal meal administration. The results obtained establish the efficacy and substantiate the use of this herbal remedy as a non-specific treatment for diarrhoea in folk medicine [27].

2.3. Antioxidant and Free Radical Scavenging Activity

Flowers showed free radical scavenging activity [28]. The Leaf extracts contain compounds capable of inhibiting the cyclophosphamide induced oxidative stress and subsequent DNA damage in both the peripheral blood and bone marrow cells in mice [29].

2.4. Anti-cancer Activity

Flowers inhibited cell proliferation and accumulation of hepatoma cell in G1 phase with significance induction of apoptotic cell death suggesting chemopreventive and anti-cancer property [30]. Similarly, the pre-treatment of methanolic extract of Buteamonosperma have chemopreventive effects on 2- acetylamino fluoreine induce hepatic carcinogenesis. Ganeshan et al reported that *In vitro* and *In silico* docking data studies suggested that the floral extracts showed potential anticancer activity.

2.5. Anti-anthelmintic Activity

Borkar et al reported that leaves exhibited significant in *vitro* anthelmintic activity against earth worms, roundworm and tapeworms [31]. Seeds exhibited significant in *vitro* anthelmintic activity against *Caenorhabditis elegans* (zwild strain, N2 type) [32]. The crude powder of Buteamonosperma seeds exhibited significant in *vitro* anthelmintic activity in sheep naturally infected with mixed species of gastrointestinal Trichostrongylid nematodes [33]. The Seeds aqueous extracts exhibited anthelmintic efficacy against *Haemonchus contortus* of sheep and goats [34]. Crude powder of seeds at doses of 1, 2 and 3 g/kg to sheep naturally infected with mixed species of gastrointestinal nematodes exhibited a dose and a time dependent anthelmintic effect. The maximum reduction of 78.4% in eggs per gram of feces (epg) was recorded on day 10 after treatment with 3 g/kg. Levamisole (7.5 mg/kg), a standard anthelmintic agent, exhibited 99.1% reduction in epg. The anthelmintic activity of different species of butea has been reported against ascaridiagalli, ascarislumbricoides, earthworms, toxocaracanis, oxyurids, dipylidiumcaninum and taenia.

2.6. Hepatoprotective Activity

Sharma et al. [35] reported that flowers restored serum transaminases, hepatic lipid peroxidation, reduced glutathione and total protein levels against CCl4 induced acute liver injury. Significant hepatoprotective effect against CCl4 induced acute liver injury was reported by Sathish et al. [36]. The hydroalcholic extract of the stem bark have significant hepatoprotective effect CCl4 induced toxicity [37]. Oral administration of flowers powder (100 mg/kg) effectively inhibited paracetamol induced changes in the serum marker enzymes in rabbits. Increase in transaminases aspartate transaminase, alanine transaminase and alkaline phosphatase was observed with
paracetamol treated group and possessed significant hepato protective activity. Isobutrin and butrin, the antihepatotoxic principles of flowers was reported and this activity was monitored by means of CCl₄ and gain-induced liver lesion invtro [38].

2.7. OsteogenicActivity

Maurya et al. reported that medicarpin, cajanin, formonentin, isoformonentin and cladrin isolated from stem bark have shown promising osteogenic activity [39]. Similarly, Cajanin increased bone mineral density at all skeletal sites and bone biomechanical strength [40].

2.8. Contraceptive Activity

Bhargava et al. reported that Butin isolated from the seeds possesses postcoital anti-implantation and anti-conceptive activity in the pregnant rats during the implantation period [41]. Similarly, the administration of seed powder caused disintegration of ova in the ovaries [42].

2.9. Anti-ulcer Activity

Patel et al. showed that significant recovery against aspirin and ethanol induced gastric ulcerations suggesting anti-ulcer and anti-secretary potential. The stem bark also markedly inhibited the acid output, the number of lesion along with reduction in volume of gastric juice, reflecting a positive effect on indomethacin induced gastric ulcers [43,44,45].

2.10. Anti-stress Activity

Water immersion stress induced elevation of brain serotonin and plasma corticosterone level comparable to diazepam was attenuated by the water soluble part of ethanolic extract [46].

2.11. Hypoglycemic Activity

Administration of stigmasterol, isolated from the bark 2.6mg/kg/d for 20 days reduced serum triiodothyronine (t₃), thyroxin (t₄) and glucose concentrations as well as the activity of hepaticglucose-6-phosphatase (g-6-pase) with a concomitant increase in insulin indicating its thyroid inhibiting and hypoglycemic properties in mice. A decrease in the hepatic lipid peroxidation and an increase in the activities of catalase, superoxide dismutase and glutathione suggested its antioxidative potential. The highest concentration tested (5.2 mg/kg) evoked pro-oxidative activity [43].

2.12. Anticonvulsive Activity

Anticonvulsive activity is due to the presence of a triterpene [46]. Flowers exhibited anticonvulsant activity as it is protects animals from maximum electroshock, electrical kindling pentyleneetetrazole and lithium-pilocarpine induced convulsions but failed to protect animals from strychnine –induced convulsions [47].

3. Conclusions

The plant has a number of therapeutic effects and traditionally being used for the treatment of number of diseases such as cancer, diabetes, diarrhoea etc. It has a potential role in Ayurveda medicine. The plant have been used experimentally and clinically in both animals and human. Further studies are also necessary to study the mechanism for its effective utilization as therapeutic agent.

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