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A COMPRHENSIVE REVIEW ON PHARMACOLOGICAL ACTIVITY OF BUTEA FRONDOSA LINN

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ABSTRACT

Butea frondosa (Lam.) kuntze [Family: leguminosae] is a average-sized deciduous tree generally known as Flame of forest, Dhak or palas in Hindi, Bastard Teak in English, Parasa in Tamil which is extensively disseminated throughout India, Burma and Ceylon. It has a inclusive range of active principles like coreopsin, isocoreopsin, sulphurein, butein, butin, isobutrin, monospermoside and isomonospermoside, aurones, chalcones, flavonoids (palasitrin, prunetin) and steroids. Butea frondosa contains phytoconstituents such as alkaloids, flavonoids, phenolic compounds, amino acids, glycosides, steroids etc. The pharmacological activity is primarily shown by flowers, seeds, barks, fruits, leaves etc. The existing review focused on subsequent pharmacological actions like astringent, aphrodiasiac, anti-helmintic, anti-inflammatory anti- bacterial, anti- fungal, anti – asthmatic, hepatoprotective, antifertility, anti-filarial, anti-diabetic, antiviral, anticonvulsant, antifungal, antimicrobial, anti-estrogenic, anticancer, antioxidant, antiulcer, wound healing, anti-diarrhoeal, anti- implantation, anti-dopaminergic, anti-mycobacterial, osteogenic and osteoprotective activity. These explanations are striking for advance studies on current scientific lines.

KEYWORDS: Butea frondosa, Butea monosperma, Flame of forest, Pharmacology, Palash.

INTRODUCTION

There is a tree which nurtures at the age of 50 years of the altitude of 8m and known as Butea frondosa Roxband Koen. Syn. Butea monosperma Lam. (fabaceae or Leguminosae).[1]

The Butea frondosa belongs to the family Fabaceae which is an average sized evanescent tree. For the therapy of many diseases, it is extensively used by rural and tribal people in various parts of india, it is generally used as Ayurvedic plant and having medicinal values plays a vital role in treatment.[2] The flowers of Butea frondosa is used as a medicine from old time for the diagnosis of ulcer, hepatic disorder, inflammation, and eye disorder.[3]

Botanical Description

Butea frondosa is a straight tree of 12-15cm in altitude with twisted trunk and asymmetrical branches, rough bark, colorful ash, and the new parts are feathery. It has following botanical description.

- Petioles- 10-15cm long
- Leaves- 3- foliate
- Stipules- linear lanceolate

Leaflets- Coriaceous, leaflets terminal 10-20 cm long, the leaflets are widely oval in shape originate from a enumerate basal. The leaflets are laterally smaller 10-15 cm/7.3-10 cm. The leaflets are at basal part rounded obliquely, equilateral and the lower side are longer. All leaflets are obtuse in shape, sleek on the above portion, when become old, finely smooth and the veins on the beneath visibly reticulate, and petioles are 6mm long firm-staple, stimulate, evanescent. The flowers of Butea frondosa are large, in a stiff, coned 15 cm in length, the tumid nodes was formed by Butea frandosa flowers combining together, which are of dark olive-green color andvelvety rachis in texture. The calyx of Butea frandosa is 13mm long and from outside, the calyx is of dense velvet texture, the calyx is covered with silky hairs, and it consist of 2 upper innate, short teeth, this deltoid areat equally lower portion. The corolla of Butea frandosa is 3.8-5cm long, the outside covering is silver and silky.[4]

BOTANICAL DESCRIPTION

A. Botanical Classification

Kingdom- Plantae Division- MagnoliophytaClass- Magnoliopsida Order- Fabales
Family- FabaceaeGenus- Butea.
Species- monosperma.

B. Botanical Name

Butea monosperma (Lam.) kuntze

C. Common Names

According to Basu and Kritikar in 1935, all the common names of the Butea frondosa are as follows-.English- Parrot Tree, Bastard Teak

Hindi- Chalcha, Palas, DhakSanskrit- Palasah

Marathi- Kakracha Bengali- Polashi, PalasTamil- Parasa

Gujarati- Khakharo.[5]

D. Native

Thailand, Tropical south Asia specially from the region of Pakistan, Nepal, Vietnam, Myanmar, Malaysia,Bangladesh, Western Indonesia, Srilanka, Combodia, Laos.

E. Occurrence

The Butea Frandosa is collectively occurs in the Burma, and the countless portion of India, Ceylon spreading in the north west Himalayas up to 1000 meter in altitude, and having more height in the outer part of Himalayas, having altitude in the hill of south India up to 1300 meter Chopra, (1991) and Khandesh Akarani up to 1200 meter in altitude. The Butea Frandosa is specifically found in Karnataka (Coorg, Shimoga, Chikmagalur, Mysore, S. Kanara), Rajasthan (Jaipur), Maharastra (Kolhapur), Nagaland, Mizoram, Udaipur, Kerala (Idukki), Alapuzha, Kasaragod, Malapuram, Kollam.

F. Butea species

The Butea frondosa belongs to family fabaceae which is widely spreaded in throughout the world. The following mentioned species were recorded. Butea volubilis, Butea dubia , Butea Africana, Butea balansae, Butea braamiana,v, Butea balansae, Butea bracteolate, Butea cuneiforms, Butea crassfolia, Butea parviflora, Butea ferruginous, Butea gyrocarpa, Butea harmandii, Butea laotica , Butea listeria, Butea loureirii, Butea apoensis Butea purpuea, Butea crassfolia Butea minor, Butea macroptera, Butea maingayi, Butea merguensis,, Butea riparia, Butea suberecta , Butea rosea Butea superba , Butea oblong folia ,Butea varians.[5]

Pharmacological properties of Butea frondosa linn.

There are various pharmacological action of Butea frandosa present in its several parts. The multiple medicinal properties of various parts of Butea frandosa such as seed, leaves, fruits, flower and bark were collected. The root bark of Butea frandosa is applied as analgesic, anti-helmintic and aphrodisiac. Like this, the flowers of Butea frandosa were applied for the therapy of liver diseases and the seed of Butea frandosa were used as anti- helmintics. The

Butea frandosa flowers activity were recorded and proof that, it has diuretic, anti-inflammatory and astringent activity. It is also recorded as, the petal concentrate of Butea frandosa exerts antiestrogenic activity and when the decoction of flowers takes place, it exhibits anti-implantation activity and it is applied in diarrhea. The bark stem of Butea frandosa is applied in the therapeutic activity of diarrhea, diabetes, sore throats, dyspepsia, snake bites, dysentery. And, the activity of roots of Butea frandosa were recorded and it is applied in the therapy of tumors, filariasis, helminthiasis, ulcers, night blindness and piles. There are various machenism which have been suggested for the antidiabetic of medicinal plants such as, enhancing insulin releasing activity, inhibition of carbohydrate metabolizing enzymes, beta- cell regeneration, manipulation of glucose transporter.[6-14]

The actions of various parts of *Butea frandosa* are as follows.[15-19]

Plant parts	**Extract**	**Pharmacologicalaction**	**References**
Bark	Methanol	Erectogenic andAphrodisiac	Goswami
Leaf	Alcoholic and aqueous extracts	Anthelmintic activity	Mendhe
Leaf	chloroform andwater extracts	Antipyretic activity	Khattak
Leaf	Alcoholic and aqueous extracts	Antistress, antianxiety, cognition enhancer	Soman
Leaf	Hydro-ethanolic	Antidiabetic,antioxidant	Farooq
Flower	Methanol	Suppression of tumournecrosis factor α, interleukin-6	Rasheed
Leaves & bark	Aqueous extracts	Hypoglycemic	Harish
Leaves	Alcoholic extracts	Antidiarrhoeal	BANJI
Leaves & bark	Aqueous extracts	Antidiabetic,	Ahmed
Leaves	Ethanolic extract	Stimulate insulin secretion, emnhancehepatic glycogen formation	Samad
Seeds	Aqueous extracts	Anthelmentic	Singh
Stem bark	Petroleum, ethylacetatae	Antifungal	Bandara
Bark	Alcoholic	Wound healing	Sumitra
Flower	Petroleum ether	Antiobesity	Golandaz
Bark	Ethanolic	Hepatoprotective	Mishra
Leaves	Aqueous	Antifilarial	Sahare
Barks	Methanolic	Osteogenic & osteoprotective activity, antiulcer	Bhargavan
Flower	Petroleum	Anticovulsant	Kasture

Erectogenic and Aphrodisiac Activity

The release of gonadotropic hormone (Gnrh) from the hypothalamus can be increase by use of androgenic compound, so the release of male sex hormone also increases. The Gnrh is in change for the development of leydig cells and sertoli cells that can expand the size of testis.

The groups which were studied under this having high sperm count in comparison of control group. The compounds which is present in Butea superba is somehow have the same properties of testosterone or follicle stimulating hormone (FSH) due to which the count of sperm can be increase. The sexuality in men can be increased by the use of this plant (Thai Folklore) which isdiscussed in this study.[20-23]

Antipyretic Activity

It is studied in pyrexic rabbits, the antipyretic characteristics was orally monitored, which is performed by the extract of ethanol which is divided into chloroform soluble and hexane soluble parts which is extracted by selected of plant. On the basis of initial of initial study the isolation and characterization of the active principles of medicinal plant is reported to be effective .[24]

Antifungal Activity

The antifungal activity have been observed against the Cladosporium cludosporioides, from the ethyl acetate and petroleum extracts of the bark stem of Butea frondosa. On the basis of comparison of physical data, the (-≥ medicarpin were identified and chromatographically fractionated, and observed by bioassay, and the low polarity active constituent were isolated. The Renlate has lower antifungal activity in comparison of (-≥ medicarpin, Renlate is a standard fungicide where as the (-) – medicarpin acetate also shows beneficial activity in front of Cladosporium cludosporioides. The compounds were isolated from Butea frondosa are butrin, isobutrin and butein, the flowers inhibited the PMACI is induced and human most cells are activated. The current study, shows the following result, IL-6 and IL-8 via inhibiting the NF-B activation by suppressing IKK activity, Butea frandosa polyphenol down-regulate the production TNF-inhibiting I-B-phosphorylation and degradation. The new techniques for the treatment was recorded and derived the following compounds Butrin, Butein and Isobutrin. By the use of petroleum ether and ethanol (70 % v:v), 1 kg Butea frondosa (shed dried flowers) were extracted successfully. The anticonvulsant activity which is exerted by the petroleum ether extract (1.2 gm), it is partitioned into insoluble portion and acetone soluble parts. The anticonvulsant activity is observed only in acetone soluble part (ABM, yield 1.0 gm).The triterpene is a acetone soluble part. The partition was dispersed in Polyethylene glycol (PEG). These partitions were administered by intraperitoneal route. All the partition are failed to provide protection of Strychnine induced convulsion and it is inhibited by PTZ and MES- induced convulsion. It is

advised that the anticonvulsant action of the part is intermediated by the GABA Benzodiazepine receptor by the chloride channel.[25]

Anti-inflammatory Activity

The Butea frondosa having the dose dependent anti- oedmatogenic activity which accommodates the traditional application of this plant, Butea frondosa as an anti-inflammatory substance and it is shown by the leaf water extract of Butea frondosa.[26]

Anti-clastogenic Activity

It is observed on the basis of obtained data, that ETEBM and AQEBM, can be act as a prospective antioxidant, chemopreventive and antigenotoxic agent and it can be applied as an alternative in chemotherapeutic uses. On the basis of obtained data, it is recorded that, ETEBM and AQEBM are pre-treatment reduced the CP- induced oxidative stress and subsequently it peripheral blood and bone marrow cells of mice.[27]

Anti-diabetic Activity

Severly diabetic rats STZ is induced by glucose metabolism of Butea frondosa bark and leaves aqueous extracts. For the characterization of Anti-diabetic activity, the models which were broadly used are STZ-induced diabetic rats. There is overproduction and reduced use of glucose by the tissues which involves the basic mechanism of underlying hyperglycemia in diabetes mellitus. As, a result, it is proved that, the insignificant anti- hyperglycemic properties were produced, extracted by leaf and bark of Butea frondosa. The blood glucose level were reduced to an extent of 28% and 11% respectively, by the extract of leaf and bark. As it is observed that histopathologic studies, the pancreatic architecture and reflected, is not improved and did not enhance the insulin synthesis by both leaf and bark extract was evidenced.[28]

Anxiolytic activity & Cognition Activity

Thus, the demonstrating non-tropic properties, the percent of ARs were enhanced, as alcoholic and aqueous extracts at a dose of 300mg/kg significantly enhanced the retention and acquisition of memory of the learning task. Specifically, the performance of learning strength and memory are, the non-tropic represent a standard of agents that facilitate the integrative functions of the CNS. A 7 days of period of treatment, it is observed in studies, the extract facilitatory effect or learning and memory. This probably can be recognized to involvement of neurotransmitter, thus, the memory building is augmented only when the

neurotransmitter levels and reduced on repeated dose administration of the extract of Butea frondosa.[29]

Anti-obesity Activity

The presence of the components such as flavonoids, phenol and saponin, when phytochemically screened, the Butea frondosa extract presence were observed. It has been recorded that saponin are useful in the treatment of obesity.[30]

Anti-hyperglycemic and Anti-hyperlipidemia Activity

In NIDDM (non-insulin dependent diabetes mellitus) rats, the hypoglycemic and lipid-lowering effects, were characterized in the current studies. It is the sign of improved glucose metabolism, that hexokinase activity and hepatic glycogen content are significantly observed in NIDDDM rats upon BMSE treatment.[31]

Dermal Wound Healing Activity

For the injury of tissue, wound healing occurs as a basic treatments. There are various natural substances which boost up the healing procedure. As the area of wound, there is large portion applicable for topically administered drug which are having higher efficacy, in making wound contraction faster. As we performed this study on rat. Further on, it can be said that, in wounds which were treated, having short period of epithelialization. From this study, it can be concluded that, the Butea monospermain have shown effective results in the wound healing. As we conclude all the prospect, we can say that, Butea frondosa alcoholic extract, topical administration have been found to improve collagen synthesis and maturation, epithelialization, wound contraction and the various phases of wound repair.[32]

Anthelmintic Activity

The seeds of Butea frondosa (Lam.) were aqueous extracted to characterized the in vitro anthelmintic activity. Kuntze against H.contortus, the higher concentration of tannin (10.80 ± 0.70 mg of GAE/g of extract), phenolic (11.93 ± 0.64 mg of GAE/g of extract), and the flavonoids (238.17 ± 19.14 mg of quercetin/g extract) content are the extract which are obtained by phytochemical analysis. The data which is recorded, according to that, the parasites were sluggish and movement of parasites were little at 4h post exposure of 25, 50 mg/ ml and very sluggish in 100mg/ ml of concentration. At the time of exposure, of 6h, it is observed that the extract showed complete mortality of the adult H. cotortus worms at the concentrations of 100 mg/ ml.[33]

Anti-filarial Activity

The motility of microfilariae (Brugia malayi) is inhibited by the aqueous extract of Butea frondosa. In a dose dependent manner with IC50 value at 83 mg/ ml this effect was observed.[34]

Anti-cancer Activity

By accumulation of cells in G1 phase and inhibiting cell proliferation with beneficial induction of apoptotic cell death advised anticancer properties of Butea frondosa and the anti-cancer effect was observed by Butea frondosa aqueous extract.[35]

Hormone balancing Activity

The anti- implantation activities and anti-estrogenic activity is observed by the Butea frondosa aqueous extract. Due to the presence of Butin active component, the estrogenic effect is observed, Butin also exerts the male contraceptives characteristics. The anti-fertility activity and uterine peroxidase effect are also obtained by methanolic extracts of Butea frondosa seeds.[36]

Anti-tumor Activity

The development of cantharidin- based anticancer drug conjugates and are briefed, with protein phosphatase related and other categories of mechanism of action, SAR, and potential antitumor activity were dicussed in the studies. In the tumor microenvironment, protein phosphatase play an important role, and also having the capacity for formulating new tumor microenvironment- targeted cancer chemotherapeutic agents.[37]

Anti-estrogenic and Anti-fertility Activity

The Butea frondosa also exerts the anti-estrogenic activity by its alcoholic extracts of flowers. (Shah et al., 1990). The beneficial anti ovulatory and anti- implantation effect was observe, when hot, alcoholic extract of Butea frondosa seeds have been given to rabbits and rats. The Butin has been recognized as the active component (Bhargava, 1986). The male contraceptives activities also exerts by Butin (Dixit et al., 1981). In a study on mice, it is concluded that, the Butea frondosa seed extract shows the antifertility activity (Razdan et al., 1970). There are three compounds which are recognized and isolated from the bark stem of Butea frondosa areas follows.

Buteaspermin A, Buteaspermin B,

And, Buteaspermanol along with nineteen known compounds (Maurya et al., 2009).[38]

Thyroid inhibitory, Anti- peroxidative and Hypoglycemic Activity

From the bark of Butea frondosa, the stigmasterol were isolated and characterized which is a thyroid hormone and the serum of thyroxine (T4), glucose concentrations, tri- iodothyronine (T3), and also the activity of hepatic glucose -6- phosphatase (G-6-Pase) with an elevation in insulin is reduced in the mice glucose regulatory efficacy, when administered at 2.6 mg/ kg/d for 20 days. From this, it is observed that, inhibition of thyroid and hypoglycemic characteristics. The anti- oxidative capacity has been seen because of reduction in the LPO (Hepatic lipid peroxidation) and CAT (Catalase), SOD (Superoxide dismutase) and GSH (Glutathione) effects are increased. (Panda et al., 2009).[38]

Anti-Dopaminergic Activity

The methanolic extract of Butea frondosa, isolate the isoflavone compound, in which the anti- dopaminergic effect is observed and the foot shock- induced aggression in rats is also inhibited and in a dose dependent manner, potentiated haloperidol- induces catalepsy.[39]

CONCLUSION

In the present discussed review, we have concluded the knowledge pertaining phytochemical, traditional, botanical, nutritional claims and recent studies. The tree of Butea frondosa has vast capacity and it appears to have a wide spectrum of activity on several ailments. Several parts of the plant have been explored for dermal wound healing, anti- diarrhoeal, antioxidant. Many bioactivity studies of Butea frondosa plant spinoffs are at the preliminary near demanding further lessons to demarcate the contrivance of actions. Only few studies shed light in the mechanism of actions in fact. This review delivers an outlook on several pharmacological aspects like, A clinical trial of the plant in worm invasion proved its success in cases of round worm and thread worm infestations and the drug was found to be hopeless in the only case of tapeworm infestation. An Ayurvedic formulation containing Butea frondosa as one of the constituents is used in the treatment of giardiasis. A number of reports are available with respect to anti-hepatotoxic potential of flower and seed of Butea frondosa. Utility of flower, seed, fruit, leaves against various eye complaints are not broadly evaluated by scientific means. Plant has enormous potential as antidote and in symptomatic treatment of either snake bite or scorpion sting. There are traditional claims for utility of fresh branches, stem bark and seed of Butea frondosa in snake bite and scorpion sting, if these claims are scientifically estimated.

CONFLICT OF INTEREST

The authors have no conflicts of interest regarding this investigation**.**

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