

Systemic Review on Palash – Butea Monosperma Lam. Kuntze

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ABSTRACT:

Background: Butea monosperma lam. is a well-known medicinal plant which is a moderate sized deciduous tree and widely distributed in India. It has been used in traditional medicine practice from ancient time. It is also known as flame of forest commonly known as Palash or Dhak. Palash is described in Charaka Samhita, Susruta Samhita, Upanisads, Vedas, Astanga Sangraha and Astanga Hridaya. Palash belonging to the family Fabaceae has a wide range of active principles like coreopsin, isocoreopsin, sulphurein, butein, butin, isobutrin, monospermoside and isomonospermoside, aurones, chalcones, flavonoids (palasitrin, prunetin) and steroids. Butea monosperma contains phytoconstituents such as alkaloids, flavonoids, phenolic compounds, amino acids, glycosides, steroids etc. **Objective:** Our present study was undertaken to give systematic review on Palash with the help of all classical references. **Material & method:** Regarding the plant reviewed from various research article, review article, various Nighantu, Samhita & API **Result:** This review article helpful for all the Ph.d researcher because all the references are used in this review article from API, Nighantu, Samhita, Text books of Darvya guna & pharmacognosy and some of previous review & research article. **Conclusion:** The current review focused on new finding on Butea monosperma flower like neutrectual value of flower, micrometry, microscopical, macroscopical characters. The detailed review of Palash (Butea Monosperma) was compiled from ancient as well as recent texts and various researches on pharmacognostical, phytochemistry & pharmacological actions of Palash so it was concluded that the Palash (Butea Monosperma) had many properties and it's very useful in many diseases as it reviewed in detailed in many researches. Palash leaves were used in antifilarial, antidiabetic, anti-inflammatory & anti-oxidant. Flower of Palash were used in anti-cancer, anti-convulsant, antidiabetic, anti-oxidant, antimycobacterial activity, antimicrobial. Seeds of

Palash were used in hormone inbalancing effect, anti-implantation activity & antihelmintic effect.

KEYWORDS: Butea monosperma, Palash, pharmacognostical, phytochemistry, pharmacological.

I. INTRODUCTION

Butea monosperma lam. Kuntze commonly known as flame of forest, belongs to the subfamily Caesalpinioideae, family Fabaceae (formerly Leguminosae). The plant is commonly called as Palash tree in India. It grows throughout India as well as South Asian peninsula. There are four types of Palash viz. Rakta (red), Pita (yellow), Shweta (white) and Nila (blue) as mentioned by Narahari in Raj Nighantu. Out of above varieties, Shweta and Nila are seldom available and Pita is rare. As Pita variety becomes endangered the abundantly available Raktavariety is used commonly in medicines and it is called as flame of forest. It is the most important plant for Yajna (ritual) according to Vedic literature. In India, in most of the regions it is used in worship of God. In many festivals it is used in different way. According to an ancient science of life i.e. Ayurveda, there is always scientific theory behind celebrating any festivals and Aacharyas have scientific view for using any drug as medicine. The use of Rakta Palash flowers used for Holi, i.e. festival of colour in India. The thought behind it was that, the colour prepared from flowers is natural, good for skin and has no any adverse effect. Though there is an evidence of the uses of Palash since ancient time its review was chosen for study. The references of Palash tree are found in Vedic literatures. It is mentioned in Vedic literature that Palash tree is a form of = Agnidevta i.e. the god of fire. The dry stem of Palash was used to make sacred fire. Since old ages this plant is used for ritual process in all ways. In Telanagana, these flowers are specially used in the worship of lord Shiva on occasion of Shivratri. In Kerala, this is called as Plasu and Chamata. Chamata is the vernacular version of Sanskrit word Samidha, small pieces of wood that is used for Agnihotra or fire ritual. In Theravada Buddhism, it is said to have used as the tree for

achieved enlightenment or Bodhi by second lord Buddha. As per history of Palash forests, dhak forests covered much of the doab area between the Ganges and Yamuna, but these were cleared for agriculture in the early 19th century as the English East Company increased tax demands on the peasants. Nirukti-पलाश : | Palash, - the tree having beautiful and useful leaves'. Vyutpatti-कर्मणः| The Sanskrit word = Palash'literally means looks like a flesh or blood.

Botanical classification

Kingdom - Plantae (plants)

Subkingdom - Angiosperms

Superdivision - Eudicots

Division - Rosids

Vernacular names of Plash

Sanskrit	Palash
Hindi	Dhak
English	The flame of forest
Gujarati	Khakharo
Marathi	Palas
Tamil	Palashu
Telugu	Modugo
Bengali	Palash
Kannada	Mutag

HABIT & HABITAT

Palash *Butea monosperma* Lam. Kuntz is a medium-sized erect deciduous tree which has a height of 12 to 15 meters. It has up to 43 cm DBH (diameter at breast height). Young trees grow at a slow rate that is only few feet per year. Branches are crooked and irregular. Wood is gray in colour. There are no annual rings. Medullary rays are broad and the darker tissue between the rays is broken into oblong patches by concentric bands of pale tissue. The bark is fibrous, have reddish exudates and of grayish brown color. Its leaves are trifoliate; petioles are 10 to 15 cm long with linear-lanceolate stipules. Leaflets are more or less leathery. Petioles are 6mm long and stout. Stipels are subulate. Flowers have an indeterminate type of inflorescence and are borne on short pedicels lying along a common axis. This type of inflorescence is known as Raceme. Flowers are 5-40 cm long; Corolla is 5-6 cm long, covered with silky hairs on an outside, orange-red or salmon coloured, and keel semi-circular, beaked and veined. Calyx is about 12mm long, dark olive green in colour, have silky hairs from within, teeth short, two upper connate and the lower three are equal and triangular. They are densely pubescent. Fruits are pods, stalked; covered with brown hairs, appear yellowish brown

Order - Fabales

Family - Fabaceae

Genus - *Butea*

Species - *B. monosperma*

Distribution of plant in world

This plant is widely distributed in tropical and subtropical regions of Indian subcontinent. It is common in the south-East Asia ranging from Bangladesh, India, Nepal, Sri Lanka, Myanmar, Thailand, Indonesia, Malaysia, and Vietnam. It is very common throughout the greater part of the India up to 1000 MSL or higher in the outer Himalaya. In India, the drier parts, open grasslands, and other wastelands have *Butea monosperma*.

in colour when ripe. Fruit is about 13-20 cm long and 4-5 cm broad, Reticulate veined and argenteoanescant stalked 2 cm long. Only single seed present near the apex, Seed is ellipsoid and 3 cm long. Seed is brown in colour.

TYPES OF PALASH

There are four types of Palash

- A/c to Raj Nighantu:
1. Rakta (Red)
 2. Pitta (Yellow)
 3. Shweta (White)
 4. Nila (Blue)

Synonyms of Palash

- Palash - The leaves are fleshy and beautiful.
- Kinshuka - Resembling parrot's beak.
- Ksharashrestha - The plant is one of the best among the sources of alkali.
- Parna - The Leaves are useful.
- Brahmavrksha - Used in religious rites and sacrifices.
- Yajniya - Used in religious rituals.
- Raktapuspa - Flowers are red.
- Vatapotha - It pacifies vata.

Properties (Rasapanchak) Flower -Ras -Tikta, Katu, Kashay, Guna -Laghu, Singdha, Veerya – Sheet, Vipaka -Madhur Doshagh- nata - Kaphapittashamaka Bark, Leaf, Seed, Gum –Rasa- Katu, Tikta, Kashay, Guna-Laghu, Ruksha, Veerya-Ushna Vipaka –Katu, Doshagnata- Kaphavatashamak.

HISTORIC ASPECT

Samhita Era:- Charak Samhita: In Caraka Samhita, Palash is not described in Mahakasaya. But it is mentioned in Sutra, Chikitsa, and Siddhi sthana for treating the diseases like Arsha, Atisar, etc. by the only name Palash in Charak Samhita. [Table no.1] Sushrut Samhita: In Susruta Samhita, Palash is described in Rodhradi, Muskakadi, Ambasthadi and Nyagrodhadi Gana. [Table no.2] Kashyapa Samhita:In this Samhita kwath of Palash is used to give mukti from =Sheetaputana grah’ for kids. Ashtang Hridaya: In Astanga Hridaya, Palash is mentioned in Rodhradi, Muskakadi, Ambasthadi and Nyagrodhadi Gana. In Astanga Sangraha, Palash is mentioned in Rodhradi, Muskakadi,

Ambasthadi and Nyagrodhadi Gana. Referances found in Chikitsa sthana-2/43- Raktapitta, Chikitsa sthana9/68- Atisar. Chakradutta: He has told utility of Palash same as Acharya Charak but he used Kimshuk as its syn- onym. Palashis also mentioned in Cikitsagranthas like Gadanigraha, Bhaishajya Ratnavali and Bhava- prakasha Samhita.

4. Nighantu Era: In Nighantu, many drugs have been described in detail by giving different synonyms and their properties and uses. The synonyms of Palash which are found in most of the Nighantu are Brahmavriksha, Kimshuka, Parna, Yajniya, Raktapuspa, Samidvara and Vatapotha etc. Many of the Nighantu have described the properties of Palash. i.e., the Rasa of Palash as - tikta and kashaya’, Virya ushna but flower of Palash is - sheet’in nature. The fruit is laghu, ushna and used in Prameha, Arsha, Krm and Vatakaphaja rogas, according to Bhavaprakash Nighantu. While in Nighantu Adarsh, the rasa of Palash is katu, tikta, kasaya, virya- ushna, vipaka – katu, Doshaghnta- Kaphavatanasaka.

Table no.1Charak Samhita

References	Adhaya/ Shloaka	Rogagnata
Sutra sathana	3/ 16	Kushtha
Chikitsa sathana	5/173	Raktagulma
Chikitsa sathana	9/122	Arsha
Chikitsa sathana	19/59- 60	Atisaar
Siddhi sathana	3/44-45	Yonidosha

Table no. 2 Sushruta Samhita

References	Adhaya/ Shloaka	Rogagnata
Sutra sathana	45/21	Kapha – pitta
Sutra sathana	46/196-197	Krimighna
Chikitisa sathana	5/18	Aptanaka
Chikitisa sathana	20/14	Vidarika
Uttartantra	10/9	Pittaj abhishanada
Uttartantra	12/50	Pittaj abhishanada
Uttartantra	42/107	Paitric shool
Uttartantra	45/29	Rakta pitta
Uttartantra	54/25	Krimighna

Table no.3: Nighantu

S.no.	Nighantu	Plant parts	Varga/Shloka	Rogagnata
1.	Raj Nighantu	Flowers	Karviryadi varga/37	Kushtha
			Karviryadi varga/37	Pama, Twacha roga
2.	Bhavaprakasha	Flowers	Vatadivarga/50	Krumighna
		Beeja	Vatadivarga/52	Kushtha

3.	Dhanvantri	Navpatra	Aamradi/151	Pliha, gulma, grhni
		Beeja	Aamradi/146	Krumighna
4.	Shodhal	Kanda	Aamradi/536	Rasayana
		Beeja	Aamradi/536	Krumighna
5.	Madanpal	Flowers	Vatadivarga/40	Grahi
		Beeja	Vatadivarga/40	Krumighna

Classification according to Ayurvedic text

1. According to Karya-Karana Bheda – Karya Dravya

2. According to Chetanachetana Bheda – Chetana Dravya

3. According to Yoni Bheda – Audbhida Dravya

4. According to Aushadha – Aushadhi Dravya

5. According to Rasa – Kashaya, Katu, Tikt

6. According to Vipaka – Katu Vipaki Dravya

7. According to Veerya – Ushna Veerya Dravya

8. According to Guna – Laghu, Ruksha

9. According to Doshakarma – Kapha vata - shamaka

10. According to Roghagnata - Prameha, Arsha, Krimihar, Kushta, Gulma, Udar roga, Kandu, Shoola.

PROPERTIES (Rasapanchak of Palash twak) Table no. 4

Sr.no.	Name of text	Rasa	Vipaka	Veerya	Guna	Mahabhoot
1.	Dhanwantri Nighnatu	Tikta, Kashya	Katu	Ushna	.....	Vayu Pruthvi + Aakash
2.	Raj Nighnatu	Kashya	Katu	Ushna	.....	Vayu +Pruthvi
3.	Kaiydeva Nighnatu	Kashya	Katu	Ushna	Laghu, Ruksha	Vayu + Pruthvi
4.	Bhavprakash Nighantu	Kashya, Tikta, Katu	Katu	Ushna	Laghu, Ruksha, Snighdha	Vayu + Pruthvi +Aakash +Aagni
5.	Nighantu Adarsrh	Katu, Tikta, Kashya	Katu	Ushna	.....	Vayu + Pruthvi + Aakash + Aagni
6.	Madanpal Nighantu	Katu, Kashya	Katu	Ushna	Laghu, Ruksha	Vayu + Aagni + Pruthvi

Raspanchakof Palash Pushpa Table no. 5.

Sr.no.	Name of text	Rasa	Vipaka	Veerya	Mahabhoot
1.	BhavPrakasha Nighantu	Kashya, Katu, Tikta	Madhura	Sheeta	Vayu + Pruthvi + Aakash + Aagni
2.	Dhanwantari Nighantu	.....	Madhura	.....	.....
3.	Raj Nighantu	Kashya		Ushna	Vayu + Pruthvi

Doses -Decoction (bark) - 50-100ml

Juice (leaf)-10- 20ml

Flower powder- 3-6gm

Gum -1-3gm

Seed powder - 3-6gm.

Formulations and preparations Krimikuthar rasa, Mahanarayan taila, Janam ghutti, Palashbijadi churna, Palashkshara ghrita, Kunkumadi tailm.

KARMA

Therapeutic Utilization of Palashas per Samhita

1. Acharaya Charakaused Palashbeejain Udarroga.
2. Acharya Charaka used Palashchoorna in Kasa.
3. Acharya Sushrutmentioned Palashbeej choornain prameha.
4. Acharya Sushrutdescribed Palashbeej lepain Kushta.
5. Ashtang Sangrahaalso described Palash Choorna in Arsha.
6. Ashtang Hirudayaused Palashbeejain Krumi.
7. Acharya Sharangdharalso mentioned Palashbeeja choorna Krumihar.
8. Bhaishajya ratnavalialso mentioned PalashPushpa Kwathin Prameha.
9. Bhavprakash Nighantualso said that Palashfruit is useful in prameha.

Amaykiya Prayoga (uses)

1. **Fever**– In case of burning sensation in fever, the tender leaves of palash, should be pounded with sour gruel and this cold paste should be applied on the body to alleviate burning sensation.
2. **Diarrhoea**- Decoction of palash fruit (seeds) mixed with milk should be given followed by intake of warm milk according to strength. By this, impurity is eliminated and thus diarrhea is checked.
3. **Intrinsic haemorrhage**- Flowers of palash 160 gm. Mixed with double sugar should be taken with milk. It checks intrinsic hemorrhage and also preserves the beauty of woman.
4. **Worms**– Decoction of palash seed or paste of the same with rice-water should be taken.
5. **Colic**- Soup prepared with palash mixed with sugar should be taken.
6. **Cough**- Palash seeds, Udumbara fruits and Marich taken together alleviates cough within three days.
7. **Filaria**- Juice of Palash roots mixed with oil of yellow mustard in equal quantity should be taken.
8. **Scorpion-sting**- Palash seeds impregnated with arka latex should be made in to a paste and applied locally. It removes pain.

9. Pumsavana- One leaf of Palash pounded with milk should be taken by the pregnant woman. Thus she achieves powerful son.

Modern Era: -

1) Indian Materia Medica -The author of this book has mentioned vernacular names and chemical constituents of this drug. Flowers are indicated in many diseases.

2) Data base on medicinal plants used in Ayurveda Vol I-Detail explanation regarding Palash plant has been given such as family, classical text, vernacular names, morphology, useful parts, along with pharmacognosy, chemical constituents, pharmacological activity, toxicology and therapeutic evaluation is explained.

3) Medicinal plants quality standards of Indian medicinal plants -Description regarding plant is given and also all types of phytochemical tests are explained in details.

4) The Ayurvedic Pharmacopeia of India -It includes pharmacopeial standard of Palash. Scientific data on Palashis available in this text.

5) Indian Medicinal Plants Palash is mentioned in this book including sanskrit meaning, paryay, properties, and uses of Palash. Synonyms of Palash and its interpretation Synonyms have lot of importance in Ayurveda. It originates from the properties and action of the drugs. Sometimes synonyms of the drug indicate specificity and specialty of the drug. Kimshuk -Flowers looks like beak of parrot, Palash -Leaves are beautiful, Triparna- Three foliate leaves, Raktapushpa - Flowers are of red colour, Yadnyik- Used in yajna since vedic period, Beejs neha -Seeds are oily, Samidvara -Describing its usefulness in rituals as samidha, Krumighna- Pacifies krimi.

PHYTOCHEMISTRY

Butea monosperma contains various phytoconstituents like alkaloids, flavonoids, phenolic compounds, amino acids, glycosides, resin, saponin and steroids (Table 6). Here we have described various constituents present in different parts such as flower, gum, seed, leaves, bark and stem.

The constituents are as follows.

• **Flower:** It contains triterpene butrin, isobutrin, coreopsin, sulphurein, isocoreopsin, monospermoside and chalcones, isomonospermoside, auronones, steroids and flavonoids. Glycoside of the Butea monosperma contains 5,7-dihydroxy -3,6,4-trimethoxy flavone-7-O- α -L xylopyranosyl (1 \rightarrow 3)-O- α -L

arabinopyranosyl-(1→4)-O-β-D galacto pyranoside.

• **Gum:** Gum contains mucilaginous material, pyrocatechin and tannins.

• **Seed:** Oil contains polypeptidase, lypolytic enzymes, proteinase and proteolytic. Palasonin and nitrogenous acidic compounds is present in seeds. Seed also contains isomonospermoside, monospermoside and allophanic acid. Flavone glycoside present in the seeds of Butea monosperma which possess potential antiviral activity. BM seeds contain fixed oil, mixed fatty acids, and unsaponifiable matter.

• **Resin:** Resin contains jalaric esters I, II and laccijalaric esters III, IV α amyrin, β-sitosterone its glucoside and sucrose; lactone-nheneicosanoic acid-δ-lactone.

• **Saponin:** Saponin contains butein, butin, butrin, colourless isomeric flavanone and chalcones.

• **Leaves:** Leaves contain kino-oil containing oleic, linoleic acid, lignoceric acid and palmitic.

• **Stem:** Stems contain 12 dimethyl-8-oxo-octadec-11-enylcyclohexane, Stigmasterol-β-D-glucopyranoside and nonacosanoic acid.

• **Bark:** Barks contain gallic acid, kino-tannic acid, pyrocatechin. Barks also contain allophanic acid, butolic acid, shellolic acid, butrin, alanind, palasitrin, cyanidin, histidine, palasimide and miroestrol. Isolation from stem bark methanolic extract of Butea monosperma gives two structurally related methoxyisoflavones; cajanin and isoformononetin. The phytochemical investigation and isolation of the stem bark of Butea monosperma contain following compounds such as buteaspermina, buteaspermin and buteasperminol, medicarpin, cajanin, formonentin, isoformonentin and cladrin. The active constituent obtained from ethyl acetate and petroleum extracts of the stem bark of Butea monosperma was medicarpin.

Active Principles in different parts of Butea monosperma Table no. 6

Sr.no.	Plant Part	Active Principal
1.	Flowers	Triterpenes, Glycoside
2.	Gum	Tannin
3.	Seed	Enzymes
4.	Resin	Easter
5.	Saponin	Polyphenol
6.	Leaves	Fatty acid
7.	Bark	Aminoacid
8.	Stem	Steriods

API Standards for Phytochemistry of Palash

Physicochemical character	Standard Value	Appendix
Foreign matter:	Not more than 2 per cent,	Appendix 2.2.2.
Total Ash:	Not more than 12 per cent,	Appendix 2.2.3.
Acid- insoluble Ash:	Not more than 1.5per cent,	Appendix 2.2.4.
Alcohol-Soluble extractive	Not more than 10 per cent,	Appendix 2.2.6.
Water-soluble extractive	Not more than 12 per cent,	Appendix 2.2.7.

Macroscopic characteristic

Mature stem bark, 0.5-1cm thick, greyish to pale brown, curved, rough due to presence of rhytidome, and scattered dark brown spots of exudate; rhytidome 0.2 cm. thick usually peels off, exposing light brown surface, exfoliation of cork

and presence of shallow longitudinal and transverse fissures; fracture, laminated in outer part and fibrous in inner part; internal surface rough, pale brown; taste, slightly astringent.

RESEARCH ON PHARMACOLOGICAL PROPERTIES OF PALASH

Various parts of *Butea monosperma* possess several pharmacological actions. We have segregated multiple medicinal properties of different parts *Butea monosperma* of such as leaves, flower, seed, bark and fruits. The actions of various parts of *Butea monosperma* are as follows.

Leaves

Antifilarial: Aqueous extract of *Butea monosperma* significantly inhibited the motility of microfilariae (*Brugia malayi*). This effect was seen in a dose dependent manner with IC₅₀ value at 83ng/ml.

Antidiabetic: Alloxan was used to induce diabetes in male rat. Oral administration of ethanolic extract of BM leaves showed antidiabetic activity. *Butea monosperma* extract significantly lowers the blood glucose level and increased the activities of antioxidant enzymes upon treatment at 300mg/kg dose for continuous 45 days, which suggested that *Butea monosperma* leaves have significant antioxidant and hypoglycemic effects.

Anti-inflammatory and anti-oxidant: Different extracts of *Butea monosperma* leaves showed anti-inflammatory activity in human red blood cells (HRBC) membrane stabilizing method. The petroleum ether and chloroform extract exhibited significant anti-inflammatory effects whereas hexane, ethyl acetate and ethanol extracts showed moderate antioxidant effects and anti-inflammatory activity.

Flowers

Anti-cancer: Aqueous extract of *Butea monosperma* showed anticancer activities by accumulation of cells in G1 phase and inhibiting cell proliferation with significant induction of apoptotic cell death suggesting anticancer properties of *Butea monosperma*.

Anticonvulsant: Petroleum ether extract of has been fractionated with varying polarity such as ethyl acetate, n-hexane and methanol by column chromatography. Fractionated part of petroleum extract of *Butea monosperma* exhibited anticonvulsant activity against seizures induced by maximum electroshock (MES), Pentylene tetrazole (PTZ) and lithium sulfate- pilocarpine nitrate. Additionally, triterpene present in *Butea monosperma* exhibited anti-depressant effect.

Antidiabetic: 50% ethanolic extract of *Butea monosperma* flowers possess significant antidiabetic activity against alloxan-induced

diabetes in wistar rats. The Antihyperglycemic and antioxidant potential ethanolic extract of *Butea monosperma* showed antidiabetic activity by reducing the level of total cholesterol, triglyceride and very low-density lipoprotein cholesterol. The oxidative harm in the various organ like pancreas, liver and kidneys of diabetic mice shown by a remarkable elevation in thiobarbituric acid level and a distinct diminution in glutathione content was abolished by ethanolic extract of *Butea monosperma*. Anti-diabetic and anti-oxidant activity of *Butea monosperma* may be attributed due to the presence of flavonoids, saponins and sterols.

Anti-inflammatory and antioxidant effects

Methanolic extract of *Butea monosperma* (600 mg/kg and 800 mg/kg) showed anti-inflammatory effect which was dose dependent. It inhibited the paw edema and granuloma in carrageenan induced paw edema and cotton pellet granuloma model in rats. This may be due to the presence of various polyphenols like butrin, isobutrin, isocoreopsin, and butein in *Butea monosperma*.

Antimycobacterial activity: *Butea monosperma* flowers contain bioactive flavonoids such as dihydromonospermoside, dihydrochalcone, monospermoside, isoliquiritigenin and butein showed antimycobacterial activity. The study revealed its antifungal activity against various fungal species. Antimicrobial activity 5,7-dihydroxy-3,6,4-trimethoxy, flavone-7-O- α -L xylopyranosyl (1 \rightarrow 3)-O- α -L-arabinopyranosyl-(1 \rightarrow 4)-O- β -D galactopyranoside showed antimicrobial activity. Seed oil of *Butea monosperma* possess antimicrobial potential against pathogenic bacteria and fungi. So the oil has fungicidal and bactericidal properties.

Antimicrobial activity: Isoflavone isolated methanolic extract of *Butea monosperma* which showed antidopaminergic activity and inhibit the foot shock-induced aggression in rats and potentiated haloperidol-induced catalepsy in a dose dependent manner.

Antidopaminergic activity Hepatoprotective: Effect of flowers of *Butea monosperma* aqueous extract (200, 400, 800 mg/kg, p.o.) was examined against CCl₄ (1.5 ml/kg i.p.) induced hepatotoxicity. CCl₄ has the ability to cause liver cirrhosis and necrosis. Therefore CCl₄ administration significantly changed number of biochemical parameters such as albumin, protein, hepatic lipid peroxidation, reduced glutathione and

total protein levels. It was witnessed that *Butea monosperma* has restored all the altered biochemical parameters including histopathological alterations in dose dependent manner.

Free radical scavenging effect- The methanolic extract of flower part of *Butea monosperma* showed free radical scavenging effect which was evaluated followed by 2,2 diphenyl-1-picrylhydrazyl (DPPH) radical, superoxide dismutase (SOD) assay. In addition, inhibition of erythrocytes hemolysis was also evaluated by 2, 2'-azo-bis (amid inopropane) dihydrochloride (AAPH) antioxidant assay. These effect may be due to presence of higher phenolic contents in the extract.

Seeds

Hormone balancing effect: Alcoholic extract of *Butea monosperma* possess antiestrogenic effect and anti-implantation activities. However, the estrogenic activity is due to the presence of active constituents like Butin which also exhibits male contraceptive properties. Methanolic extracts of *Butea monosperma* seed also possess antifertility effect and uterine peroxidase activities.

Anti-implantation activity: Butin is an active compound of *Butea monosperma*. Oral administration of Butin at the doses of 5, 10 and 20 mg/rat showed anti-implantation activity. A dose dependent response was seen during termination of pregnancy. Further, at lower doses, a decrease in the quantity of implantation sites was also noticed. Butin has estrogenic activity at comparable anticonceptive doses observed in ovariectomized young female rats but was devoid of antiestrogenic activity.

Anthelmintic effect: The methanolic extract of *B. monosperma* seeds possess significant anthelmintic activity against *Caenorhabditis elegans*. The anthelmintic activity against *Trichostrongylid* nematodes in sheep strongly corroborate this finding. The methanolic extract of crude powder obtained from the seeds of *Butea monosperma* (1, 2 and 3mg/kg) showed anthelmintic effect. Time and dose dependency was noticed. In addition extract of same solvent also possess significant anthelmintic activity.

Anti-hyperglycemic and Anti-hyperlipidemic: The ethanolic extract obtained from *Butea monosperma* seeds possess antidiabetic, anti-hyperlipidemic and antiperoxidative effects. The ethanolic extract treated for four weeks exhibit significant antihyperglycemic effect with improved

glucose tolerance in non-insulin dependent diabetic (NIDDM) rats.

Antiviral: Flavone glycoside isolated from the seeds possess potential antiviral properties.

• **Antimicrobial activity:** *Butea monosperma* seed oil showed a significant fungicidal and bactericidal effect in vitro which may be due to the presence of active constituents like medicarpin.

• **Anti-inflammatory:** Cotton pellet induced granuloma and carrageenin-induced paw oedema method were used for the evaluation of anti-inflammatory activity. The study revealed that on oral administration of *Butea monosperma* seed extract possess significant anti-inflammatory effects which may be due to presence of fixed oil, mixed fatty acids, and unsaponifiable matter present in the *Butea monosperma* extract.

Wound healing activity: Ethanolic extract of *Butea monosperma* bark possesses wound healing effect in rats. It accelerated the wound healing effect when administered topically on full excision wounds made on the back of rats. The ethanolic extract of *Butea monosperma* increased collagen synthesis as well as cellular proliferation at the wound infected area. The extract increased the wound contraction and decreased epithelialization time in excision wound model, increased the hydroxyproline content, granulation tissue weight and tensile strength of the incision wound area.

Osteogenic and Osteoprotective activity: Cajanin isolated from stem bark methanolic extract of BM possess differentiation-promoting as well as powerful mitogenic effects on osteoblasts. However, isoformononetin was found to have potent anti-apoptotic effect and osteoblast differentiation promoting effects. Stem bark extract of *Butea monosperma* possesses osteogenic and osteoprotective properties.

Anti-inflammatory: The methanolic extract of the stem bark of *Butea monosperma* showed analgesic and anti-inflammatory action against acetic acid induced writhing, hot plate test model and carrageenan induced paw edema in a dose dependent manner comparable to diclofenac sodium.

• **Anti-stress:** Water soluble part of ethanolic extract of *Butea monosperma* showed antistress effect. Ethanolic extract of *Butea monosperma* decreases the elevated level of plasma corticosterone and brain serotonin and this anti-stress effect was comparable to that of diazepam.

Effects on hormone level: Administration of Stigmasterol (2.6 mg/kg), isolated from the bark of methanolic extract of BM for 20 days in the

experimental animals reduced serum triiodothyronine, thyroxin, and glucose concentrations with a concomitant increase in insulin. Moreover, there was significant increase in the level of superoxide dismutase, glutathione and catalase as well as decrease in hepatic lipid peroxidation upon the treatment suggesting promising thyroid inhibitory and hypoglycemic effects of Stigmasterol.

- **Anti-fungal:** Medicarpin had greater antifungal activity than the standard fungicide Benlate against *Cladosporium cladosporioides*.

- **Anti-ulcer:** Methanolic extract of *Butea monosperma* bark at 500mg/kg showed 79.30 and 82.20% healing against ethanol and aspirin induced gastric ulcerations respectively signifying free radical scavenging properties of the extract for anti-ulcer effect.

Hypoglycemic effect: *Butea monosperma* methanolic extract showed significant decrease in blood urine sugar, plasma glycoprotein and glucose levels upon treatment (3g/30ml of water for 30 days). Moreover, there was reduction in lipid profile and the restoration of activities of liver enzymes suggesting potential anti-diabetic effects of *Butea monosperma* fruit extract. The study revealed that herbal formulations consisting of three plant parts; Piper betel, *Butea monosperma* and *Trigonella foenum graecum* have anti-diabetic potential in control and alloxan induced diabetic rats.

Antimicrobial & anti-fungal: Different fractions obtained from *Butea monosperma* possesses significant antimicrobial effects across various bacterial and fungal species.

Anthelmintic effect: Pippali rasayana containing the extract of *Butea monosperma* for the evaluation of immuno stimulatory and anti-giardial activity against *Giardia lamblia* and they has observed about 98% recovery from the infection. However, in vitro study suggested that rasayana had no homicide effect over the parasite which showed significant activation of macrophages which is an indication of elevated level of macrophages migration index (MMI). BM extract (900mg/kg) also exhibited phagocytic activity. In addition, they administered Pippali Rasayana orally 1g, for 15 days duration and they noticed that here was an absolute absence of *Giardia lamblia* from the patients (25 treated, 25 placebo controls).

FORMULATIONS AND MARKET PRODUCT

Palash kshara

Palash wood used for making Palsh kshar. Palash kshar used as natural diuretic & also useful to relieve dysuria and urinary calculi, spleen and liver disorders. Palashkshara is mentioned in various classical texts. It is widely used internally in the treatment of various diseases like renal stones, tumors.

As Gum and Binding agent

Ibuprofen was used as a model medicine while developing the gum from *Butea monosperma* as a tablet binder. The gum was separated from *Butea monosperma* Lam's bark. Wet granulation was used to create several tablet formulations that contained the gum from *Butea monosperma*. Tablet binders with a w/v concentration of 8% produced the best results. The production of tablet dosage form was discovered to benefit from the *Butea monosperma* gum.

Skin protectant

Skin irritancy tests on rabbit skin and healthy volunteers were used to evaluate topical gels and creams that contained *Butea monosperma* flower and leaf extract. According to a human study, none of the volunteers' skin responded negatively to the use of cream and gel with the greatest concentration (1.5 percent). Since *Butea monosperma* formulations may be used safely as topical treatments for a variety of skin conditions or as topical cosmetics.

Herbal hair ointment for Alopecia

The composition for the herbal hair ointment, which includes *Butea Monosperma* and *Trigonella foenum graecum*, has hair-promoting properties. *Butea monosperma* has rich amounts of flavonoids that have the antioxidant activity and prevent hair fall, while *Trigonella foenum graecum* contains rich amounts of protein that aids in hair development.

II. DISCUSSION

Palash Pushpawere reviewed from ancient as well as recent texts. Maximum 8 synonyms are described in Kaidev Nighantu and common synonyms of Palash are Kinshuk, Yadnya, Samidvar and Raktpushpak. Palash have dominance of Kashaya rasa, Katu vipaka and Laghu, Ruksha guna and Kapha shoshan (absorption of Kapha), Pramehaghna (Anti-diabetic), medoghna (Anti-obesity), Shothagna (anti-inflammatory), Vranaropana (wound healing) actions. Review consist of different formulations useful in Prameha as well pharmacological action like Anti-oxidant,

Anti-diabetic, Anti- hyperlipidemic, Anti-obesity, wound healing, Analgesic, Antifungal, Anti-inflammation activities which are useful against diabetes. Butea monosperma under major heads general information, pharmacognostical, chemical, Pharmacological, clinical studies with references. In this review paper maximum 10 no. of formulation are used in various diseases and in pharmacological activities there are more than 30 diseases cure by Palash. The review article focused on new finding on Butea monosperma flower like neautraceutical value of flower, micrometry, microscopy, macroscopy & analytical study.

III. CONCLUSION

The detailed review of Palash (Butea Monosperma) was compiled from ancient as well as recent texts and various researches on pharmacognostical, phytochemistry & pharmacological actions of Palash so it was concluded that the Palash (Butea Monosperma) had many properties and it's very useful in many diseases as it reviewed in detailed in many researches. Palash leaves were used in antifilarial, antidiabetic, anti-inflammatory & anti-oxidant. Flower of Palash were used in anti-cancer, anti-convulsant, antidiabetic, anti-oxidant, antimycobacterial activity, antimicrobial. Seeds of Palash were used in hormone inbalancing effect, anti-implantation activity & antihelminthic effect. This review article helpful for all the Ph.D researcher because all the references are used in this review article from API, Nighnatu, Samhita, Text books of Darvya guna & pharmacognosy and some of previous review & research article.

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