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An Overview of Pharmacologically and Phytochemical Significant Plant *Wrightia tinctoria*

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ABSTRACT

Wrightia tinctoria is also known as jaundice curative tree, which is especially useful for the treatment of various diseases. In the present review, we have tried to discuss its general morphological description, chemical constituents, traditional uses, and their pharmacological actions. *Wrightia tinctoria* is considered effective in the treatment of good analgesic, anti-inflammatory, antidiabetic, anticancer, antipyretic activity and antipsoriasis. We hope that this review will help public dealing with the use of herbs for therapy because we believe that *Wrightia tinctoria* in the near future will be highly valuable herb with significant therapeutic and economic value.

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INTRODUCTION

The genus of *Wrightia* is named after a Scottish physician and botanist William Wright. The leaves of this tree yield a blue dye called pala indigo. *Wrightia tinctoria* belongs to family Apocynaceae. It is known by common name as "indrajav"[1-3]. The botanical classification of *Wrightia tinctoria* is detailed in Table 1. It has a very important place traditional healing and also is a widely recognized the medicinal plant. *Wrightia tinctoria* R. Br. is considered to be therapeutically very effective jaundice plant in Indian indigenous system of medicine[1-3]. The juice of the tender leaves is used efficaciously in jaundice. The crushed fresh leaves when filled in the cavity of decayed tooth relieve toothache. In Siddha system of medicine, it is known to be used for psoriasis and other skin diseases[1-3]. In order to make ensure the use of only genuine and uniform material in the preparation of herbal formulation, standardization is still being carried out.

PHARMACOLOGICAL USES

Ethnomedically, the bark of this plant is used as a galactagogue to treat abdominal pain, skin diseases, and wounds, as anti-pyretic, anti-dysenteric, anti-diarrheal- and anti-hemorrhagic agents, and as an antidote for snake poison[1-3]. Various ethnomedicinal uses of *W. tinctoria* are summarized in Table 2. Seeds of this plant are also used as an aphrodisiac. In view of the reported severe health hazards of estrogen, such as the increased risk of endometrial hyperplasia and carcinoma, breast cancer, and thromboembolic diseases[4-7]. A large number of natural products showing promising anti-fertility activity in preliminary studies could not be pursued due to their associated estrogen-agonistic activity[4-7].

The leaves are applied as a poultice for mumps and herpes. Sometimes, they are also munched to relieve toothache. In folk medicine, the dried and powdered roots of *Wrightia* along with *Phyllanthus amarus* (keezhanelli) and *Vitex negundo* (nochi) are mixed with milk and orally administered to women for improving fertility[4-5]. The bark and seeds are effective against psoriasis and non-specific dermatitis. It has anti-inflammatory and anti-dandruff properties and hence is used in hair oil preparations[4-7]. Studies have shown that the oil emulsion of *W. tinctoria* pods is used to treat psoriasis. *W. tinctoria* bark has also shown anti-nociceptive, immunomodulatory and wound healing effect as already mentioned[4-7].

GENERAL DESCRIPTION AND DISTRIBUTION

Wrightia tinctoria is a small and deciduous tree, which grows up to 10m with a milky latex, scaly, smooth and ivory colored bark. Leaves are about 8 -15 cm, opposite, variable, elliptic-lanceolate or oblong-lanceolate. The whole plant of *Wrightia tinctoria* in its natural habitat is photographed in Figure 1.

Leaves are acute or rounded at the base, acuminate at the apex, petioles 5mm long. Flowers are usually seen at the tip of branches with 6 cm long cymes, white with fragrance. Flowering twig of *Wrightia tinctoria* is depicted in Figure 2. Calyx and corolla with 5 lobes. Anthers are sagitate, ovary bilocular and stigma bifid. Fruits are long follicles up to 50 cm with adhered tips. Seeds are many, linear 1-2 cm long, pointed at the apex.The seeds are released as fruit dehisces. Flowering and fruiting are seen between the months of March to November. It is widely distributed in India and Burma. In deciduous forests of Rajasthan, Madhya Pradesh and other parts of peninsular India[1-3].

Morphological and anatomical aspects, as well as a differential micro-chemical response, have been worked out to identify the characteristic features of the leaf[6-7]. Physical constant values involving moisture content, ash and extractives as well as qualitative and quantitative estimation of various phytochemicals have been extensively studied[6-11]. The various phytochemical constituents from different parts and extracts of *Wrightia tinctoria* are tabulated in Table 3. While the list of phytocompounds isolated from *Wrightia tinctoria* and its occurrence in different parts of the plant is summarized in Table 4.

Wrightia tinctoria has shown the presence of lipid, saponin, tannin, alkaloid, phenol, steroid, flavonoid, and some other chemical constituents[6-11]. Oil prepared out of the fresh leaves of the plant has been assigned to analgesic, anti-inflammatory, and antipyretic activities and to be effective in the treatment of psoriasis[6-8]. Leaves of this plant showed the presence of flavonoids, glycoflavones-isoorientin and phenolic acids. The stems bark of *W. tinctoria* has shown to contain β-amyrin, lupeol, β-sitosterol. Triacontanol and tryptanthrin which have been isolated from *W. tinctoria* leaves[6-11]. The immature seed pod of *W. tinctoria* gives cycloartenone, b-amyrin, cycloeucalenol, β-sitosterol, and wrightial[9-11]. A new sterol 14α-methylzymosterol in addition to four rare plant sterols, desmosterol, clerosterol, 24-methylene-25-methylcholesterol, and 24-dehydropollinastanol have also been isolated from *W. tinctoria* seeds[6-11].

SUMMARY

Our nature has provided a very good source of drugs and especially plants have contributed most of these potential therapeutic agents. Plant kingdom still holds a very good potential medicinal value, which has are yet to be completely discovered. Based on above findings, we hope that this review will help people in near future to create interest towards *Wrightia tinctoria* and may also be useful in the development of new formulations of this plant with more therapeutic potential.

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Table 1. Botanical classification of *Wrightia tinctoria*

Kingdom:	**Plantae**
Order:	**Gentianales**
Family:	**Apocynaceae**
Subfamily:	**Apocynoideae**
Genus:	**Wrightia**
Species:	***Wrightia tinctoria***

Table 2. Ethnomedicinal uses of *W. tinctoria*.

Plant part	Method of preparation	Use
Leaf	Paste	Skin diseases; external and internal application
	Paste	Toothache and swelling gums
	Pounded leaves mixed with coconut oil	Eczema, psoriasis and other skin diseases
	Juice mixed with lime and turmeric powder	Swellings
	Juice	Jaundice
	Half a teaspoon of dried leaf powder	Respiratory ailments
Bark	Stem bark crushed with those of Ailanthus excelsa	, paste applied daily once for 3 d Boils, wounds
	Powdered and mixed with coconut oil	Wounds
	Decoction	Antidysenteric, antidiarrhoeal and antihaemorrhagic agent
	Paste	Skin diseases, ringworm and in leprosy
Stem	Decoction	Cure stomach disorder
Latex	Unspecified	Skin disease wound healing
Root	Decoction	Epilepsy
	Decoction	Cure stomach disorder
Whole plant	Unspecified	Antioxidant, Antinociceptive
Seed	Powdered and mixed with coconut oil	Wounds
	Juice	Indigestion

Table 3: Biochemical constituents from different parts and extracts of *Wrightia tinctoria*

Different parts and extracts of *Wrightia tinctoria*	**Biochemical Constituents**
Bark	
Methanol	Glycosides, Steroids, Triterpenoids, Saponins, Tannins, Phenols, Carbohydrates, Flavonoids
Ethanol	Steroids, Tritepenoids, Saponin, Alkaloid, Reducing Sugar, Tannins, Flavonoids, Polyphenol
Ethyl Acetate	Steroids, Triterpenoids, Saponin, Tannin, Phenols, Flavonoids
Chloroform	Steroids, Triterpenoids
Leaf	
Petroleum Ether	Steroids, Triterpenoids
Chloroform	Phenols, Flavonoids
Ethyl Acetate	Proteins, Tannin, Saponin, Flavonoids, Carbohydrates, Alkaloids, Flavanones, Carbohydrates, Steroids, Phenols, Sugar
Ethanol	Steroids, Tritepenoids, Saponin, Alkaloid, Reducing Sugar, Tannins, Flavonoids, Polyphenol
Stem, Seed, and Flower	
Petroleum Ether	Steroids, Triterpenoids, Flavonoids
Chloroform	Carbohydrate, Glycoside, Tannin, Steroids, Triterpenoids
Methanol	Alkaloid, Steroid, Flavonoids
Ethyl Acetate	Tannin, Triterpenoids
Water	Alkaloid, Saponin, Flavonoids, Triterpenoids
Ethanol	Phenol, Flavonoids

Table 4: List of phytocompounds isolated from *Wrightia tinctoria* and its occurrence in different parts of the plant

GROUP	COMPOUNDS	PLANT PART OF *W. TINCTORIA*
Terpene	Lupeol	Bark, leaves, seeds, pods, stem
	α-and β-amyrin	Bark, Immature Seed pod, mature Seed pod, leaves, seeds
	Cycloartenone, Cycloartenol, Cycloeucalenol, Wrightial	Immature Seed pod
	Ursolic acid, Oleanolic acid	mature Seed pod
	Chlorogenic acid, Dihydrocanaric acid	Seeds
Flavonoids	Indigotin, Indirubin, Tryptanthrin, Isatin, Rutin	Leaves
Polysaccharides	Glycerol, Erythritol, Thritol, D-galactose, D-mannose	Seeds
Sterols	β-sitosterol	leaves, seeds
	Stigmasterol, Campesterol	Stem
	14 α-methyl zymosterol, Desmosterol, Clerosterol, 24-methylene-25-methyl cholesterol, 24-dehydropollinastanol, 24 methylcholesterol, 24 methylene cholesterol, 24 ethylcholesterol, 24 ethyl 22 E -dehydrocholesterol, Isofucosterol, cholesterol	Seeds
Lipids/Fixed oils/fatty acid	Triacontanol (fatty alcohol)	Leaves
	Myristic acid, Palmitoleic acid	Leaves, seeds
	Palmitic acid, Stearic acid, Behenic acid, Arachidic acid	Leaves
	Hexadecanoic acid	Flowers

Figure 1. Plant *Wrightia tinctoria* in its natural habitat.

Figure 2.Flowering twig of *Wrightia tinctoria*.