



International Journal of Research in Pharmacology & Pharmacotherapeutics



ISSN Print: 2278-2648

IJRPP | Vol.5 | Issue 3 | July - Sep - 2016

ISSN Online: 2278-2656

Journal Home page: www.ijrpp.com

Research article

Open Access

Wrightia tinctoria (Indrajav)-Apocynaceae: Overview

Sunita Verma*

Maharaja Ganga Singh University, Bikaner, Rajasthan, India

*Corresponding author: Sunita Verma

Email: vermas.bot@gmail.com

ABSTRACT

Wrightia tinctoria is a perennial ornamental woody plant; belong to Apocynaceae family available throughout India. Various parts of this plant like stem bark, leaves, flowers and seed have been known to possess medicinal properties like anti-inflammatory, antiviral, antibacterial, wound healing, anticancer, antiulcer etc. The present paper is an attempt to provide a detailed botanical description, classification, phytochemical and pharmacological study of the plant.

Keywords: Phytochemical, Medicinal, Anticancer, Antibacterial

INTRODUCTION

Wrightia tinctoria belongs to family Apocynaceae. It is known by common name as "Indrajav". It has got very important place traditional healing and also is widely recognized medicinal plant. The medicinal value of this plant for the treatment of a large number of human ailments is mentioned in Ayurveda, Siddha, Unani and folk medicine. The seeds are claimed to be useful as anthelmintic, antidiarrhoeal, antidyenteric, astringent, febrifuge, seminal weakness and as an aphrodisiac. The leaves and bark (decoction) are used, as febrifuge, in toothache, stomachic and tonic in bowel complaints. The bark is used as an antidyenteric, especially useful in piles, to treat skin diseases and biliousness in Ayurveda [1].

GEOGRAPHICAL DISTRIBUTION

The plant of *W. tinctoria* is widely distributed in Asia, Africa and Australia and are known to be the native of Australia, India, Myanmar, Nepal and Vietnam [2]. The plant mostly occurs in the Western, Central and Peninsular India [3]. The plant grows well in arid, semi-arid and moist regions with a wide range of soil types. The timber i.e. white wood is of high quality and value for turnery, carving, toy making, matchboxes, small boxes and furniture. Leaves, flowers, fruits and roots constitute the source of an indigo-yielding glucoside, which produces a blue dye or an indigo dye [Agarval, 1986].

CLASSIFICATION

Kingdom: Plantae
Order : Gentianales
Family : Apocynaceae

Genus : Wrightia
Species : Wrightia tinctoria

BOTANICAL DESCRIPTION

Wrightia tinctoria is a small and deciduous tree which grows up to 10m with milky latex, scaly, smooth and ivory colored bark. Leaves are about 8 - 15 cm, opposite, variable, elliptic lanceolate or oblong lanceolate. 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. 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 is seen between March to November [5].



Figure 1: Seed of *Wrightia tinctoria*

PHYTO-CHEMICAL CONSTITUENTS

Phytochemical studies help in standardizing the herbal preparations so as to get the optimal concentrations of these active constituents, as well as in preserving their activities [6]. The mature powdered pods of *Wrightia tinctoria* showed co-occurrence of β -amyrin, ursolic acid and oleanolic acid along with β -sitosterol [7]. Methanolic extract of immature seed pods contain cycloartenone, β -amyrin, cycloeucaleanol, β -sitosterol and a new terpene wrightial. A new sterol 14 α -methylzymosterol in addition to four rare plant sterols, desmosterol, cholesterol, 24-methylene-25-

methylcholesterol and 24-dehydropollinastanol have also been isolated from seeds. Studies have shown that the stem bark of *W. tinctoria* contains β -amyrin, lupeol, wrightiadione, β -sitosterol and a new triterpenoid. [8], [9]. Triacantanol and tryptanthrin which have been isolated from *W. tinctoria* leaves [10].

PHARMACOLOGICAL STUDIES

Anti inflammatory activity

The bark of *W. tinctoria* was investigated for anti-inflammatory activity by carrageenan- induced rat

paw oedema and cotton pellet induced granuloma method; the extract of the species showed inhibition of rat paw oedema and percent granuloma changes at dose of 200 mg/kg as compared to control group [11]. Petroleum ether and methanol wood stem extracts of the species was investigated for its antiinflammatory effect on animal models using carrageenan- and histamine-induced paw edema test method. The extract was found to possess significant dose dependent anti-inflammatory activity [12]. The preliminary phytochemical investigation *Wrightia tinctoria* extracts indicated the presence of steroids, triterpenoids and flavonoids which could be the possible reason for its anti-inflammatory action [13].

Anti-cancerous Activity

In-vitro cytotoxic activity of alcoholic extracts of the bark of five different plants, Artocarpusheterophyllus, Alangiumsalvifolium, Buchanania lanzan, Sesbaniagrandiflora and *Wrightia tinctoria* which are traditionally used in Chhattisgarh was studied against human breast cancer (MCF-7) and human leukemia (HL-60) tumor cell lines using the thiazolyl blue test (MTT) assay. *Wrightia* was found to be effective on MCF-7 and moderately effective on HL-60 cell line [14].

Anti-diabetic activity

The investigation has been carried out to evaluate the effect of the different extracts of the leaves of *Wrightia tinctoria* on alloxan induced diabetic rats of wistar strain. The experiment was carried out using six groups of albino rats. Chloroform extract showed a significant anti-diabetic activity when compared to the standard drug glibenclamide [15].

Antiulcer activity

The methanolic and ethanolic extract of *Wrightia tinctoria* leaves has shown antiulcer activity by aspirin induced pylorus ligation method using famotidine as standard [16].

Anti- anxiety activity

Experimental study reported the Effect of *Wrightia tinctoria* on anxiety patterns in rats. Experimental study reported the Effect of *Wrightia tinctoria* on the brain monoamines and metabolites in rats. The effect of acute administration of *Wrightia tinctoria* (Wt) (leaves) methanolic extractives, constituting indigotin (HPTLC, relative abundance 21.97 %), indirubin (27.13 %), tryptanthrin (21 %),

isatin (2.70 %) and rutin (14.24 %), was studied on the rat brain concentrations of monoamines and their metabolites in five different brain regions, viz. hypothalamus, hippocampus, striatum, pons medulla and frontal cortex [17].

Wound healing activity

Wound healing activity was evaluated by 70% ethanolic and methanolic extracts of leaves of *Wrightia tinctoria* (Roxb.) R. Br (Apocynaceae) using incision and excision wound models on Wistar rats. Wound contraction and period of epithelization were assessed in excision wound model whereas wound tensile strength was determined in case of incision wound model. 4% *Wrightia tinctoria* methanolic leaf extract phytosome exhibited significant wound healing potential when compared with standard 0.2% nitrofurazone ointment [18].

Antibacterial Activity

Leaf extract was effective against Gram negative, Gram positive bacteria and drug-resistant *S. aureus*. Efflux pump inhibition of indirubin constituent of leaves of *Wrightia* synergistically increases the activity of ciprofloxacin against *Staphylococcus* [19].

Antiviral activity

Experimental study reported the antiviral activity of chloroform extract of *Wrightia tinctoria* and *Morinda citrifolia* leaves and fruit powder respectively. The chloroform extract of *Wrightia tinctoria* and *Morinda citrifolia* showed the potent antiviral activity against cytopathic effect of HIV-1 (III B) in MT-4 cells [20].

Anti-dandruff activity

The antidandruff efficacy of the oil (Dano) prepared from the bark of *Hibiscus rosasinensis*, *Wrightia tinctoria* (Indrajau), *Cassia alata* (Dadmari) and bitter fraction of *Azadiracta indica* (Neem or Nimba) in Oleum cocos nucifera oil. Microbiological and clinical efficacy of Dano, a Siddha hair oil preparation was studied using in vitro assay, Methylene blue reductase test and reduction of severity of dandruff symptom- scaling post use. The study findings showed that Dano is the best drug of choice for the management of dandruff [21].

Antipyrosum activity

Krishnamoorthy and Rangarajan reported the anti-pyrosum activity of a herbal drug

combination of *Wrightia tinctoria* and *Hibiscus rosasinensis* was tested in vitro against the isolates of *pyrosporum ovale* recovered from dandruff. The drug combination exhibited fungicidal activity at a concentration ranging between 500 to 1000ug/ml [22].

Anthelmintic activity

Latha et al reported the anthelmintic activity in crude petroleum ether and chloroform extracts of leaves of *Wrightia tinctoria* using *Pheretima posthuma*. Three different concentrations (2.5, 5.0, 7.5mg/ml) of each extracts were studied in this activity, which involved the determination of time of paralysis and time of death of the worms. Piperazine

citrate is used as standard reference and normal saline as control. The present study proves the potential usefulness of leaves of *Wrightia tinctoria* as comparable anthelmintic agent [23].

CONCLUSION

Wrightia tinctoria have many pharmacological activities such as Wound healing, Antiinflammatory, Antidandruff, Anthelmintic, Antibacterial, Antioxidant, Diuretic, Antiviral, Cytotoxicity and Antiulcer activity. Phytochemical and Pharmacological reviews on plants will give valuable information which will assist the scientists in getting more advanced knowledge about a plant species.

REFERENCES

- [1]. **Asima Chatterjee**, Satyesh and Chandra Pakrashi. The Treatise of Indian Medicinal Plant, National Institute of Science and Communication and Information Resources, New Delhi, 4, 2003, 125 - 127.
- [2]. **Anonymous**. The wealth of India. New Delhi: Publication and Information Directorate, CSIR; 1976, 588-590.
- [3]. **Sivarajan VV**, Balachandran I. Ayurvedic drugs and their sources. New Delhi: Oxford and IBH Publishing Co.; 1994.
- [4]. **Agarwal VS**. Economic plants of India. Calcutta: Kailash Prakashan; 1986, 406.
- [5]. **Daniel M**, Sabnis SD, A chemotaxonomic appraisal of the status of Apocynaceae and Asclepiadaceae. *Indian Bot. Repr.*, 1(2), 1982, 84-90.
- [6]. **Brijesh, S.**, P.G. Daswani, P. Tetali, S.R. Rojtkar, N.H. Antia and T.J. Birdi, Studies on Pongamiapinnata (L.) Pierre leaves: Understanding the mechanism(s) of action in infectious diarrhoea, *Science B*, 7, 2006, 665-674.
- [7]. **Rao MN**, Rao EV, Rao VS. Occurrence of oleanolic acid in the pods of *Wrightia tinctoria* R. Br. *Curr Sci*. 37, 1968, 645.
- [8]. **Mahendra S**. Khyade, Nityanand P. Vaikos. Pharmacognostical and Physio-Chemical Standardization of Leaves of *Wrightia tinctoria* R.Br. *International Journal of Pharma Research And Development*. 8, 2005, 1-10.
- [9]. **Nadkarni K.M.**, Indian Materia Medica, 1(3), 1954, 1296
- [10]. **Papiya** Bigoniya; Rana, A. C. Pharmacological Screening of *Wrightia tinctoria* Bark Hydro- Alcoholic Extract. *Asian J. Exp. Sci.* 22(3), 2008, 235-244.
- [11]. **Tharkar**, P.R., A.U. Tatiya, S.J. Surana, N.S. Bhajipale and S.R. Deore, Anti-inflammatory study of *Wrightia tinctoria* R. Br stem bark in experimental animal models, *Int J Pharm Tech Res.*, 2, 2010, 2434-2437.
- [12]. **Jain P.S.** and S.B. Bari, Anti-inflammatory effects of wood stem extracts of *Wrightia tinctoria*. *Asian J Trad Med.*, 5, 2010, 132-137.
- [13]. **Groves**, J.K, Experiments in pharmacy and pharmacology, C B S Publishers and distributors, New Delhi. 1990, 176.
- [14]. **Jain R.** and S.K. Jain, Screening of in vitro cytotoxic activity of some medicinal plants used in traditionally to treat cancer in Chhattisgarh state, India, *Asia Pac J Trop Med*, 1(2), 2011, 147-50.
- [15]. **Sridhar S**, Kamalakannan P, Elamathi R, Deepa T, Kavitha R. Studies on antimicrobial activity, physio-chemical and phytochemical analysis of *Wrightia tinctoria*. *Int J Pharm Res Dev.* 3 (8), 2011, 139-144.
- [16]. **Madhu C** Divakar and Lakshmi Devi S, Antiulcer activity of *Wrightia tinctoria* (Roxb) R.Br, *Der Pharmacia Sinica*, 2(2), 2011, 355-360.
- [17]. **Muruganandam**, A.V., A. K. Jaiswal, S. K. Bhattacharya, S. Ghosal. Effect of *Wrightia tinctoria* bark on anxiety patterns in rats, *Indian Journal of Pharmacology*. 30(2), 1998, 124.

- [18]. **Veerapur VP**, Palkar MB, Srinivasa H, Kumar MS, Srinivasan KK. The effect of ethanol extract of *Wrightia tinctoria* bark on wound healing in rats. *J Nat Rem.* 4 (2), 2004, 155 - 159.
- [19]. **Ponnusamy, K.**, M. Ramasamy, I. Savarimuthu and M.G. Paulraj, Indirubin potentiates ciprofloxacin activity in the NorA efflux pump of *Staphylococcus aureus*, *Scandinavian Infec Dis.* 42, 2010, 500-505.
- [20]. **Sathyanarayanan S**, Selvam P, Asha J, George RM, Revikumar KG, Neyts J. Preliminary phytochemical screening and study of antiviral activity and cytotoxicity of *Wrightia tinctoria*. *Int J Chem Sci.* 7, 2009, 1.
- [21]. **Dhanabal SP**, Baskar Anand Raj, Muruganatham N, Praveen TK, Raghu PS. Screening of *Wrightia tinctoria* leaves for Anti Psoriatic activity. *Hygeia J D Med.* 4(1), 2012, 73-78.
- [22]. **Krishnamoorthy JR**, Antipyrosporom ovale activity of a herbal drug combination of *Wrightia tinctoria* and *Hibiscus rosasinesis*. *Indian J Dermatol*, 45(3), 2000, 125-126.
- [23]. **Shruthi, A.**, C. Shwetha, In vitro Anthelmintic Activity of leaves extract of *Wrightia tinctoria*, *International Journal of ChemTech Research*, 2(4), 2010, 2043-2045.