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## REVIEW ARTICLE

**WRIGHTIA TINCTORIA: AN OVERVIEW**Anusharaj<sup>1</sup>, \*Chandrashekar R<sup>2</sup>, Prabhakar Adake<sup>2</sup>, SN Rao,<sup>2</sup> Santanusaha<sup>1</sup><sup>1</sup>Dept of Pharmacognosy, Nitte Gulabi Shetty Memorial institute of Pharmaceutical Science, Derlakatte, Mangalore 575018<sup>2</sup> Dept of Pharmacology, Yenepoya Medical College, Derlakatte, Mangalore 575018\*Corresponding Author's Ph. No: +919483787982, Email id:[chandymoon47@gmail.com](mailto:chandymoon47@gmail.com)**ABSTRACT**

Since from ancient times plants have always been used as a source of medicine since from olden days and play a very important component of the health care system in India. *Wrightia tinctoria* is also known as the jaundice curative tree which is useful for various diseases especially in south India. In this review, we have tried to discuss its general description and distribution, microscopy, chemical constituents, traditional uses, and their pharmacological action on the body, the morphological and anatomical aspects. *Wrightia tinctoria* has been assigned to have good analgesic, anti-inflammatory, anthelmintic, antiulcer, antidiabetic, anticancer, antipyretic activities and also effective in the treatment of psoriasis. We hope that this review will help all the people dealing with *Wrightia tinctoria* to know its proper usage and their therapeutic uses, as this herb seems to be highly valuable. It will also create interest in development of new formulations with more therapeutic and economic value in future.

**Keywords:** Jaundice curative tree, *Wrightia tinctoria***INTRODUCTION**

The genus of *Wrightia* is named after a Scottish physician and botanist William Wright (1740 - 1827). The leaves of this tree yield a blue dye called pala indigo.<sup>1</sup> *W. 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.<sup>2</sup> *Wrightia tinctoria* R. Br. is considered to be therapeutically very effective jaundice plant in Indian indigenous system of medicine. 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. In order to make ensure the use of only genuine and uniform material in preparation of herbal formulation, standardization are still being carried out. Morphological and anatomical aspects as well as differential micro-chemical response have been worked out to identify the characteristic features of the leaf. Physical constant values involving moisture content, ash and extractives as well as qualitative and quantitative estimation of various phytochemicals have been extensively studied. *Wrightia tinctoria* R. Br has shown the presence of lipid, saponin, tannin, alkaloid, phenol, steroid, flavonoid, and some other chemical constituents.<sup>3-7</sup> Oil 777 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.<sup>8, 9</sup> Leaves of this plant showed the presence of flavonoids, glycoflavones-iso-orientin and phenolic acids.<sup>10, 11</sup>

**GENERAL DESCRIPTION AND DISTRIBUTION**

*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 sagittate, 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.<sup>12, 13</sup> It is widely distributed in India and Burma. In deciduous forests, especially in Rajasthan, Madhya Pradesh and peninsular India. Ascending to an altitude of 1300m.<sup>14, 15</sup>

**BOTANICAL STUDY**

Kingdom: Plantae

Order: Gentianales

Family: Apocynaceae

Genus: *Wrightia*Species: *Wrightia tinctoria***MICROSCOPY**

**Transverse section of leaf:** The leaf is dorsiventral and transcurrent. Following tissues are present in midrib and lamina:

**Midrib:** The midrib of *Wrightia tinctoria* is broadly hemispherical on the abaxial side with short lump on the adaxial side. There are multicellular unbranched trichomes, which consists of single rows of cells lying on both sides of the midrib. Below the epidermis there are five to seven layers of compact angular collenchyma cells on both the sides of the midrib. The ground tissue is parenchymatous and compact. Vascular strand of midrib occur as an arc shaped on the abaxial side which has tannin cells at all sides.

**Lamina:** Epidermal cells of the lamina are square shaped with outer convex wall and thin cuticle. Single layered or double layered palisade tissue which is cylindrical, compact and occupies one-third thickness of lamina is present. The spongy parenchyma cells are lobed and loosely arranged as shown in the figure. Presence of stomata on both epidermis, upper epidermis has lesser number when compared to the lower epidermis and they are parasitic. Thick walled, uniseriate, 3-7 celled trichomes are present.<sup>16</sup>

#### CHEMICAL CONSTITUENTS

The mature powdered pods of *Wrightia tinctoria* showed co-occurrence of  $\beta$ -amyirin, ursolic acid and oleanolic acid along with  $\beta$ -sitosterol. Methanolic extract of immature seed pods contain cycloartenone,  $\beta$ -amyirin, cycloeucaleanol,  $\beta$ -sitosterol and a new terpene wrightial. A new sterol 14  $\alpha$ -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  $\beta$ -amyirin, lupeol, wrightiadione,  $\beta$ -sitosterol and a new triterpenoid.<sup>17, 18</sup>

#### TRADITIONAL USES

Bark and seeds are used in bilous infections.<sup>19</sup> Flowers are used as vegetable. The wood is used for all classes of turnery. The leaves are a fodder for the cattle, goat and sheep. In south India the plant is used for green manuring rice fields. Leaves when chewed with salt relieves tooth ache. In Nepal milky juice is used to stop bleeding. The leaves are pounded with water for the treatment of fever.<sup>20</sup> The leaves are applied as a poultice for mumps and herpes. In folk medicine, the dried and powdered roots of *Wrightia* along with *Phyllanthus amarus* (keezhanelli) and *Vitex negundo* (nochi) is mixed with milk and orally administered to women for improving fertility. The bark and seeds are effective against psoriasis and non-specific dermatitis. It has anti-dandruff properties and hence is used in hair oil preparations.<sup>21</sup>

#### PHARMACOLOGICAL ACTION

##### WOUND HEALING

The ethanolic extract of *Wrightia tinctoria* exhibited significant wound healing activity. In the Ayurvedic

literature it was mentioned that decoction and poultices which has been prepared from the bark were used for cleaning wounds.<sup>9</sup> Triterpenoids possess an ability to increase the collagen content, which is one of the factors of promoting wound healing activity.<sup>22</sup>

##### ANTI-INFLAMMATORY ACTIVITY

One of the studies has shown that the petroleum ether and methanolic extracts of *Wrightia tinctoria* woody stems possess potential pharmacologically active constituents capable of inhibiting inflammation.<sup>23</sup> Even in cotton pellet induced granuloma there was suppression of the proliferative phases which is due to the decrease in granuloma weight. This might be due to flavanoid present in the chloroform extract of *Wrightia tinctoria* bark.<sup>24, 25</sup> 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.<sup>26</sup>

##### ANTIDIABETIC ACTIVITY

Studies has shown antidiabetic activity extracts of *Wrightia tinctoria* in alloxan induced diabetic rats which could be due to presence of steroids, flavanoids and tannins in methanolic and ethyl acetate extract.<sup>27</sup>

##### ANTIVIRAL ACTIVITY

The methanolic extract of *Wrightia tinctoria* has shown the presence of alkaloids and flavanoids. The instrumental analysis of Methanolic extract of *Wrightia tinctoria* was carried out using various analytical techniques such as UV, TLC and HPLC which has shown the presence of indole derivatives such as isatin and indurubine exhibiting potential anti-viral activity.<sup>28</sup>

##### ANTINOCICEPTIVE ACTIVITY

Methanolic, ethyl acetate and acetone extracts of *Wrightia tinctoria* bark has shown anti-nociceptive activity on acetic acid induced writhing test in mice, their effects being comparable to that of acetyl salicylic acid proving its peripheral analgesic action.<sup>29</sup>

##### ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY

Leaf extract was shown to inhibit the growth of *Klebsiella pneumoniae* and *Escherichia coli* exhibiting antibacterial activity. The water extract of air dried leaves of *Wrightia tinctoria* shown to possess both antibacterial as well as antifungal activity.<sup>30</sup> The chloroform extract of the leaf is active against dermatophytes, non dermatophytes and yeasts.<sup>31</sup> One of the studies revealed that methanolic and petroleum ether extracts of *Wrightia tinctoria* possesses both antibacterial and antifungal activity.<sup>32</sup>

##### 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.<sup>33</sup>

##### ANTI CANCER ACTIVITY

In one of the study the methanolic extract of *Wrightia tinctoria* has showed some cytotoxic activity in lymphocyte (MT-4) cells proving its potential as an effective anti-cancer agent in near future.<sup>34</sup>

## DISCUSSION

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 have are yet to be completely discovered. 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. The stems bark of *W. tinctoria* has shown to contain  $\beta$ -amyrin, lupeol,  $\beta$ -sitosterol. Triacontanol and tryptanthrin which have been isolated from *W. tinctoria* leaves. Immature seed pod of *W. tinctoria* gives cycloartenone, b-amyrin, cycloeucaenol,  $\beta$ -sitosterol and wrightial. A new sterol 14 $\alpha$ -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.<sup>35</sup> Based on above findings, we hope that this review will be help people in near future to create interest towards *Wrightia tinctoria* and may also be useful in development of new formulations of this plant with more potential therapeutic and good economical value.

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