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Original Article

HYDNOCARPUS WIGHTIANA: A PHYTOPHARMACOLOGICAL REVIEW

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Abstract

Medicinal plants have been identified and used throughout human history. Plants have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions. *Hydnocarpus wightiana* is a promising medicinal plant with great economic potential. This plant is used for the treatment of leprosy and skin diseases for many hundreds of years. This research article focuses to study about the phytochemical constituents and pharmacological activities of the plant *Hydnocarpus wightiana*.

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Key words- *Hydnocarpus wightiana*, leprosy, skin disease, pharmacological activities.

INTRODUCTION

Biological diversity forms the basis of life on earth. Biodiversity means the variability among the living organisms from all sources and the ecological complexes of which they are part. It includes diversity within species or between species and of ecosystems.¹ The biodiversity found on earth today is the result of 3.5 billion years of evolution.² Plants form one of the dominant group with about 2, 50,000 species, 70,000 genera and about 400 families and a major portion of this diversity is mainly concentrated in the tropics.^{3, 4} The state Kerala has an exceptional biodiversity. In spite of its small size and high population density, it has forest area of 28.99% which is higher compared to the national forest cover of 21.08%.⁵ The role of traditional medicines in resolving health problems on a global level is invaluable. Medicinal plants continue to provide valuable therapeutic agents, in both modern and traditional medicines. With the associated side effects of modern medicines, traditional medicines are gaining importance and are now being studied to find the scientific basis of their therapeutic actions.⁶

Hydnocarpus wightiana belongs to the family of Flacourtiaceae. The oil obtained from the plant has been widely used in Indian medicine and Chinese traditional medicine for the treatment of leprosy. It entered early western medicine in the nineteenth century before the era of sulphonamides and other antibiotics for the treatment of several skin diseases and leprosy. The oil was prescribed for leprosy as a mixture suspended in gum or as an emulsion.⁷

MORPHOLOGY

This is a tree up to 10m (33 ft) tall. The tree is deciduous and as well as evergreen too. Bark is brownish, fissured; blaze pinkish. Branchlets are rounding, minutely velvet-hairy. Leaves are simple, alternate, carried on 0.7-2.2 cm (0.28-0.87 in) long stalks. Leaves are 8-23 × 3.5-10 cm (3.1-9.1 × 1.4-3.9 in), usually oblong to elliptic-oblong, tip long pointed, often falling off, base narrow, margin toothed, papery, hairless. Midrib is raised above; secondary nerves 5-7 pairs. Flowers are borne in short cymes or solitary, in leaf axils. Petals are white. Berry is woody, round, 6-10 cm (2.4-3.9 in) across usually brown tomentose, black when young; seeds numerous. The flowering takes place from January to April. Flowers are greenish white in colour and grow solitary or racemes. Tree of the species that yield chaulmoogra oil grow to a height of 12-15 m (39-49 ft). The fruits are ovoid some 10 cm (3.9 in) in diameter with a thick woody rind. Internally they contain 10-16 black seeds embedded in the fruit pulp. Seeds are ovoid, irregular and angular, 1 to 1 ¼ inches long, 1 inch wide, and skin smooth, grey, and brittle, kernel oily and dark brown.⁸ The seeds account for some 20% of the fruit weight. A typical tree produces 20 kg (44 lb) of seed/ annum. The kernels make up to 60-70% of the seed weight and contain 63% of pale yellow oil. The oil is unusual in not being made up of straight chain fatty acids but acids with a cyclic group at the end of the chain.⁹

PHYTOCHEMISTRY

The oil obtained from the seed contain many fatty acid components like hydnocarpic acid, chaulmoogric acid, gloric acid, myristic acid, palmitic acid, stearic acid, oleic



acid.¹⁰ Cole & Cardoso (1939) analysed the chemical constitution of chaulmoogra oil of *H. wightiana* and reported the presence of alepric, aleprylic and aleprolic acids in it.¹¹ Mitra & Misra (1967) identified amino acids in the processed seed meal proteins of *Hydnocarpus wightiana*.¹² Nair & Ramiah (1971) isolated the flavanoid compound, Leucopelargonidin, from *H. wightiana*.¹³ Ranganathan & Seshadri (1973, 1974) isolated new flavanolignans and minor phenolic compound namely hydnocarpin, isohydnocarpin, methoxyhydnocarpin and chrysoeriol from the seed hulls of *H. wightiana*.¹⁴ In 1979, Parthasarathy, Ranganathan, Sharma, Bhushan and Seshadri conducted extensive phytochemical research based on CNMR of flavanolignans and elucidated the structure of hydnocarpin, isohydnocarpin, hydnowightin, neohydnocarpin and methoxyhydnocarpin.¹⁵ Sharma in 2006 reported the presence of flavonoids, apigenin, chrysoeriol, luteolin, fi-sitoserol, lupeol fi-amyryn, betulinic acid and siterol-fi-D-glucoside in the seed hull of *Hydnocarpus wightiana*.¹⁶ Reddy et.al (2013) reported compounds such as flavonoids, glycosides, carbohydrates, amino acids, luteolin and hydnocarpin in the ethanolic extract of *Hydnocarpus wightiana* Blume.¹⁷

PHARMACOLOGICAL ACTIVITIES

Whole part of the plant is useful. Roots, leaf, bark. Seed, flowers are having medicinally active components. The major use of *Hydnocarpus* species is in the treatment of leprosy from centuries ago. Oil of *Hydnocarpus* has been replaced by other chemotherapeutic agents who have a better mycobacterial effect. However, none of the currently used antileprosy drugs has been reported to have a positive effect in wound healing. Anecdotal reports claim that leprosy patients who have taken capsules containing oil of *Hydnocarpus* orally have shown more rapid wound healing than those not receiving it.¹⁸ It may be noted that chaulmoogra oil is obtained by compressing the seeds of the Chaulmoogra trees. This oil is thought to possess antibacterial properties and has been used for ages for treating various health conditions including eczema, skin inflammations, sprains, arthritis and bruises. Several researches undertaken with chaulmoogra oil have demonstrated that this magical oil has the potential to be an effectual remedy for leprosy. In addition, chaulmoogra oil may be included as an active ingredient in several lotions, creams, balms, ointment, massage oil, lip balm as well as balm formulation for wound care.¹⁹ Ethanolic extract of *H. wightiana* seeds shows antidiabetic activity.

Hydnocarpus wightiana showed strong inhibitory activity against α -glucosidase in vitro and in vivo.¹⁷ The flavanolignans isolated from the *Hydnocarpus wightiana* seeds shows the hypolipidemic, anti-inflammatory, anti-neoplastic and cytotoxicity²⁰.

CONCLUSION

The plant with genus *Hydnocarpus* has several species propagated in different areas of the world. *Hydnocarpus wightiana* is a herbal with lots of pharmacological activities. The usefulness of this plant has been noted since centuries particularly treating leprosy and skin diseases. This plant is easily available in various parts of India particularly in the western region. The studies on this plant reveal the ability of this plant for various pharmacological activities.

REFERENCES:

1. Biological Diversity Act 2002 and Biological Diversity Rules (2004). National Biodiversity Authority. India.
2. Shenoy, Yeshwanth (2013). Biological Diversity Act 2002: India's lost decade. *J. Traditional and Folk Practices* (1):73-77.
3. Groombridge, B. Ed (1992). *Global Biodiversity Status of the Earth's Living Resources*. Chapman and Hall. London.
4. Primarck, R. B. (2006). *Essentials of Conservation Biology*. Sinauer Associates Inc. Publishers, U.S.A
5. State of Forest Report (2011). *Forest survey of India (Ministry of Environment and Forest)*, Dehra Dun.
6. Kshirsagar AD, Ingale KG, Vyawahare NS and Thorve VS. *Hygrophilaspinoso: A comprehensive review*. *Phcog Rev.* 2010; 4: 167-171.
7. Norton, SA (October 1994). "Useful plants of dermatology. *Hydnocarpus* and chaulmoogra". *Journal of the American Academy of Dermatology* (4): 683-86.
8. A Modern Herbal/Chaulmoogra, Botanical.com, Retrieved 2013-11-21
9. "Minor oil crops – Individual monographs (Allanblackia- Almond - Chaulmoogra – Cuphea spp. – Jatropacargas)". *Fao.org*. Retrieved 2013-11-21
10. "The component fatty acids of chaulmoogra oil – Sengupta – 2006 – *Journal of the Science of Food and Agriculture-Wiley Online Library*" *Onlinelibrary.wiley.com*. Retrieved 2013-11-21
11. Cole HI Cardoso HT. Alepric, Aleprylic, Aleprestic and Aleprolic acids, New Homologs of Chaulmoogric acid. *J. Am. Chem. Soc.* 1939; 1: 2349-2350.

12. Mitra CR, Misra PS. Amino acids of Processed Seed Meal Protein. J. Agric. Food Chem. 1967, 1: 697-700.
13. Nair K A & Ramiah N (1971). Leucopelargonidin from *Hydnocarpus wightiana*. Curr. Sci. 1971; 8: 187.
14. Ranganathan KR, Seshadri TR. A New Flavono-lignan from *Hydnocarpus wightiana*. Tetrahedron Lett: 1973; 1: 3481-3482.
15. Parthasarathy MR, Ranganathan KR & Sharma DK. ¹³C NMR of Flavonolignans from *Hydnocarpus wightiana*. Phytochemistry, 1979; 1: 506-508.
16. Sharma DK. Pharmacological Properties of Flavonoid Including Flavonolignan – Integration of Protocrops with Drug Development from Plants. Journal of Scientific & Industrial Research. 2006; 1: 477-484.
17. Reddy , Kondal J, Sushmitha Rao B, Shravani Reddy T, Priyanka B. Antidiabetic Activity of Ethanolic Extract of *Hydnocarpus wightiana* Blume using STZ Induced Diabetes in Sd Rats. IOSR Journal of Pharmacy. 2013; 1 : 2920-2923.
18. Shanthakumar Thomas Oomen, Mallikarjun Rao, Chintalapati Venkata Narashima Raju. Effect of oil of *Hydnocarpus* on wound healing. Int. J. Lepr. 1999; 67(2): 154-58.
19. Chaulmoogra. <http://www.herbs2000.com/herbs/herbs-chaulmoogra.htm> accessed on (20/06/2015).
20. Hall IH, Sharma DK. Hypolipidemic, anti-inflammatory, anti-neoplastic and cytotoxicity of flavanolignans isolated from *Hydnocarpus wightiana* seeds. journal of natural products. 1991; 54(5): 1298-1302.

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