

A REVIEW ON GLYCOSMIS PENTAPHYLLA (RETZ.) DC

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ABSTRACT

Glycosmis pentaphylla (Retz.) is plant with major ethnobotanical importance since ancient times. It finds its application in a myriad of diseases like bilious complaints, cough, worms, jaundice, fever, inflammation, rheumatism, anaemia etc. It is an easily available plant found growing throughout the plains especially in Southern India. Documenting such drugs used in folklore practices is extremely important not only to conduct further researches on the drug but also to reduce the stress on available resources. But till date, no in depth literary analysis of this drug has been done. Hence this study presents a critical literary review on *Glycosmis pentaphylla* Retz. by surveying through all available modern and classical literature.

KEYWORDS: *Glycosmis pentaphylla*, Folklore practices, Literary analysis.

1. INTRODUCTION

According to the World Health Organization, about 70–80% of the world populations rely on non-conventional medicines mainly of herbal sources in their health care (Wise et al, 2013). India has a rich treasure of biodiversity which is serving as the backbone of Ayurvedic treatment. With its wide variety of climatic and soil conditions India has ample scope of gaining a foothold in the global plant based pharmaceutical market. Out of more than 25000 plants of medicinal value, only 10 % are used for their medicinal value. Around 1800 species are systematically documented in the codified Indian systems of medicine. These herbal

products are preventive, protective, nutritive and curative (Sheth et al, 2005). There is a rising need for exploring this rich biodiversity for development of new novel medicines.

Glycosmis pentaphylla (Retz.) DC belonging to family Rutaceae is very commonly found as a weed growing throughout India and especially in its Southern part. *G. pentaphylla* has been used in folklore medicine since ancient times. The plant finds its application in diseases like bilious complaints, cough, worms, jaundice, fever, inflammation, rheumatism, anaemia and vermifuge. Alkaloids, flavonoids, terpenes and sterols have been isolated from the plant. Recent researches have shown promising results such as hepatoprotective, anti-inflammatory, anti-tumour, antioxidant, antibacterial, anti-viral, anti-ulcer, chemo protective and antiseptic properties (Sreejith *et al*, 2012). Thus it is highly essential to document these commonly found medicinal plants so that they can serve as potential leads for future researches. This study was an earnest effort to document all the available literature till date on *Glycosmis pentaphylla* by doing an in depth survey of the drug from all the available sources including classical textbooks of Ayurveda, modern botanical literature and authentic websites.

2. MATERIALS AND METHODS

The study was conducted by surveying the classical textbooks of Ayurveda and Botany. The knowledge available from authentic websites were also documented. It was then arranged in the order most appropriate for further references and studies on the same.

3. RESULTS AND DISCUSSION

3.1 Etymology

The word *Glykys* means sweet and *Ostne* means smell. Thus the plant got its name due to the presence of sweet scented flowers.

3.2 Historical background

History of any drug gives insight into its morphology, properties, therapeutics or dietary utility as conceived by various authors at different stages of the history. The evolution of Dravyaguna vijnana can be classified into three namely Vedic period, Samhitha period and the Nighantu period. No description regarding the plant is available in the Vedic, Samhitha and Nighantu period. In the Modern Era literature, descriptions regarding Morphology, properties and therapeutic uses are found in “Indian Medicinal Plants” by Kirtikar.K.R and Basu. B. D (Kirtikar *et al*, 1993). Botanical description and plant distribution are mentioned in “Flora of British India” by Hooker J.D (Hooker, 1990). Information regarding Sanskrit name,

Vernacular names, Synonyms, Botanical description, Therapeutic uses and Chemical constituents are found in “The Wealth of India” (Anonymous, 1999). Habitat, Synonyms, Actions, Ayurvedic and Folk names mentioned in “Indian Medicinal Plants An Illustrated Dictionary” by Khare.C.P (Khare 2007). Newly coined Sanskrit name along with indications mentioned in “Medicinal Plants Used in Ayurveda”, edited by Dr. S. K .Sharma (Sharma 1998). Botanical description, distribution, properties and therapeutic uses are mentioned in “Ayurvedic Drugs and Their Plant Sources” by Sivarajan.V.V. and Indira Balachandran (Sivarajan *et al*, 1999). Plant description, properties, synonyms and therapeutic uses are mentioned in “Indian Medicinal Plants”, edited by Warriar. P.K, Nambiar.V.P.K, and Ramankutty. C (Warriar *et al*, 2004). Botanical description, distribution and synonyms with vernacular names are mentioned in “Flora of Udupi”, by Bhat Gopalakrishna. K (Bhat Gopalakrishna 2003).

3.3 Vernacular names (Sharma 1998)

Bengali	: Ashshoura
English	: Gin berry, Orange berry
Hindi	: Ban nimbu
Indo China	: Buoibung
Malayalam	: Panal, Panchi
Punjabi	: Potali
Sanskrit	: <i>Asvasakotah</i>
Tamil	: Kuru panal
Tulu	: Pandel

3.4 Rasapanchaka (Umayamma 2011)

Rasa –	Tikta, Kashaya.
Guna –	Laghu, Ruksha
Virya –	Ushna
Vipaka –	Katu
Doshagnata:	Kapha vata Shamana
Prayogyanga:	Leaf, Root, Root bark.
Matra:	Powder – 1-3 gm; Decoction – 50-100ml

3.5 Therapeutic uses (Warriar *et al*, 2004) (Sivarajan *et al*, 1999) (Anonymous, 1999)

- The juice of leaves, which is bitter, is used in fever, liver complaints.

- Leaf juice along with gingili oil is used internally as vermifuge.
- Paste of leaves with ginger used in Eczema and skin affections.
- Decoction of root is given for facial inflammation.
- The twigs are fibrous and astringent they are used as tooth brush in parts of Bengal.
- It is used in the vitiated conditions of vata inflammations, cough and bronchitis.
- Roots are used to treat anemia.

3.6 Botanical synonyms (Magadi 2002)

The botanical synonyms of the plant are *Glycosmis mauritiana*, *Glycosmis triphylla*, *Glycosmis arborea*.

3.7 Taxonomical classification

Kingdom: *Plantae*
Division: *Phanerogams*
Sub Division: *Angiosperms*
Class: *Magnoliopsida*
Sub Class: *Rosidae*
Order: *Salpindales*
Family: *Rutaceae*
Genus: *Glycosmis*
Species: *pentaphylla*

3.8 Family characteristics (Bhat 2003)

3.8.1 Rutaceae

- Trees or shrubs, rarely herbs, sometimes climbing, frequently armed with spines or prickles, often strong-smelling.
- Leaves alternate or opposite, simple or palmately or pinnately compound, estipulate, with pellucid dots.
- Inflorescence of axillary or terminal panicles, racemes or cymes, rarely of solitary flowers.
- Flowers bisexual or unisexual, regular, hypogynous. Sepals 4-5, rarely 3. Distinct or basally connate. Petals 4-5, rarely 3. Free, valvate or imbricate. Disc annular, crenate or lobed.

- Stamens as many or twice as many as petals, sometimes more. Filaments free or more rarely connate or united to form a staminal tube, inserted around the disc, anthers introrse, 2-celled.
- Ovary superior, usually of 4 or 5, rarely of 2 or 3 or many carpels. Carpels are free or connate. Ovules 1 or 2 in each cell, sometimes more. Styles as many as carpels, free or more or less connate.
- Fruit a capsule, berry, drupe, follicular or hesperidium. Seeds usually one per carpel, ovoid to fusiform, sometimes winged, with or without endosperm.

3.9 Genus characteristics

3.9.1 Glycosmus

- Shrubs or trees, unarmed, with rust-colored villosulous indumentum (sometimes becoming bleached) on terminal and axillary buds and usually on young inflorescences. (Fig. 1a)
- Leaves alternate [rarely opposite], odd-pinnate, 1-foliolate, or simple. Inflorescences terminal and/or axillary, paniculate, compoundly racemose, or reduced to 1 or a few flowers.
- Flowers bisexual, globose to ellipsoid in bud. Sepals 4 or 5, basally connate. Petals 4 or 5, imbricate in bud. Stamens 8 or 10, distinct, alternately \pm unequal in length: filaments \pm straight.
- Disc annular, pulvinate, columnar, conic, or bell-shaped. Gynoecium 2-5-loculed, syncarpous; radial walls of locules straight; ovules 1 (or 2) per locule; style to nearly as long as ovary, persistent in fruit.
- Fruit a berry, with mucilaginous pulp or dry, without pulp vesicles; endocarp membranous.
- Seeds with membranous seed coat: endosperm lacking; embryo straight; cotyledons elliptic, plano-convex, neither convolute nor folded; hypocotyl partly included between cotyledons.

3.10 Morphological description

- *Glycosmus pentaphylla* belonging to the family Rutaceae. grows in tropics and sub-tropics.
- It is a large evergreen shrub.
- Distributed in India, Andaman Islands, Bangladesh, and Malaysia. Fairly common in shady places. Large shrubs to small trees up to 4m tall (Bhat 2003).

- Leaves compound, imparipinnate, alternate, rachis pulvinate, terate, glabrous. Leaflets 1-7, Usually 3 or 5. Up to 23*7cm. elliptic or oblong-lanceolate, entire or crenulate, glabrous, secondary nerves 7-13 pairs. Petioles : Petioles up to 5.5cm long(Fig. 1b).
- Flowers in dense axillary panicles. Small, lobes ovate. Petals white, broadly Obovate or sub orbicular. Filaments flattened, apex narrowed. Ovary on a short thick disc, covered with mammillary glands.
- The roots of the plant are brown coloured, having characteristic odour and bland taste(Fig. 1d).
- Fruits berry, sub globose. up to 0.5cm in diameter(Fig. 1c).



A



B



C



D

Fig. 1: Morphology of *Glycosmis pentaphylla* (Retz.) DC., a. *Glycosmis pentaphylla* (Retz.) DC., b. Leaf of *Glycosmis pentaphylla* (Retz.) DC., c. Fruit of *Glycosmis pentaphylla* (Retz.) DC., d. Root of *Glycosmis pentaphylla* (Retz.) DC.

3.11 Chemical Constituents (Anonymous, 1999)

- The leaves contain a glycoside namely Glycosmin which on hydrolysis yields Veratric acid and Salicyl aldehyde. The Glycoside which is slightly bitter to taste is distributed throughout the plant but in highest concentration (0.2%) in tender leaves and buds. In mature leaves it varies from 0.08% to 0.1%.
- Besides the presence of sugar the leaves also contain a Tannin, a Phlobaphene traces of Salicin, two Fluroquinoline bases, Kokusaginine.
- Quinoline and Skimmianine have been isolated from air dried plant material.
- Carbazole and 3-methyl carbazole have been isolated from the root bark.

3.12 Recent researches

- Antitumour alkaloid. Arborinine. a acridone alkaloid obtained from *Glycosmis pentaphylla*, exhibited significant inhibition of crown gall tumours produced by *Agrobacterium tumefaciens* in Potato disc bioassay (Quader *et al*, 1999).
- Hepatoprotective activity is observed in Methanol extract of *Glycosmis pentaphylla* against Carbon tetra chloride induced Hepatotoxicity in Rats. Anthelmintic activity study showed a significant effect by Chloroform and Mclhanolic extracts of *Glycomis pentaphylla* roots (Ahsan *et al*, 2009).
- Chemopreventive potential of *Glycosmis pentaphylla* on Hepatic carcinogen metabolizing enzymes and Antioxident defense mechanisms in mice (Rekibul *et al*, 2007). The findings indicate the possible chemopreventive role was deduced from the efficacy of the plant extract to induce the carcinogen metabolizing enzymes.
- A Novel Naphthoquinone and a Acridone alkaloid called glycoquinone and glycocitrine 3 respectively were isolated from extract of *Glycosmis pentaphylla* stem (Kondo 1999).
- Anthelmintic effect studied successfully by using chloroform and methanolic extracts of *Glycosmis pentaphylla*.(Kamal 2018).
- A quinazolone alkaloid, glycophymne and an amide, glycomide have been isolated from *Glycosmis pentaphylla*.(Ahmed 2014).

4. CONCLUSION

This study has provided an insight into details like etymology, historical background, Vernacular names, Rasapanchaka, therapeutic uses, botanical synonyms, taxonomical classification, family characteristics, Genus characteristics, Morphological description, Chemical constituents and Recent researches on the drug. Although there are scarce

references regarding the drug in Ayurvedic classical literature, the therapeutic efficacy of *Glycosmis pentaphylla* has been well established through folklore practises. It is a very common plant which is easily available and has a multitude of uses. Researches on the drug has also shown positive results in various arenas like hepatoprotective, anti-inflammatory, anti-tumour etc. Documenting and standardising such ethnic medicines are utmost important for future. This study has codified and documented all the available literature regarding *Glycosmis pentaphylla* both from Ayurvedic and Modern perspectives. Such studies and documentations can go a long way in understanding the biodiversity of various regions and it can also provide leads for further explorations and scientific researches.

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