



Kantakari in Respiratory Disorders – A Physiological Review

Varshida J. Marwadi¹, Vaidehi V. Raole², Gaurav Gairola³

1.PG Scholar, Department of Kriya Sharir, Parul Institute of Ayurveda, Vadodara

2. Professor, Department of Kriya Sharira, Parul Institute of Ayurveda, Vadodara

3. Associate Professor, Department of Kriya Sharir, COER Medical College & Hospital, Roorkee, Uttarakhand

Correspondence Email: vaidehi.raole@paruluniversity.ac.in

ABSTRACT

Medicinal plants are commonly used for the treatment of different diseases by conventional medical practitioners. Kantakari is one of the most widely used medicines in ayurveda, included under dashamoola (group of 10 drugs). Individual parts, such as leaves, stem, flower, root, seeds and the plant as a whole, are used in traditional medicine systems. Emphasis on plant research has increased globally and a large body of evidence has been gathered to prove the tremendous potential of the kantakari drug used in the Ayurvedic systems of medicine for various respiratory disorders. The drug has wonderful uses as antibacterial, anti-fungal, anti-asthmatic, hypoglycemic, anti-inflammatory, anti-tumor, anti-spasmodic, anti-histamine, hypotensive, and cytotoxic activity. Since there are limited numbers of publications on this plant, the current analysis is to summarize the available data and compile all the updated details on its phytochemical and pharmacological activities. The current review aims to record the potential prospects for further scientific study of the Kantakari plant for the production of effective therapeutic compounds.

Keywords: *Kantakari, Solanum xanthocarpum, Pharmacological properties, Respiratory disorders, Solanaceae*

Received 23.12.2021

Revised 16.02.2022

Accepted 17.02.2022

INTRODUCTION

Ayurveda has thousands of years of knowledge as a long-established Indian Medicinal System. Nearly 80% of the global population, especially in developed countries for primary health care, utilize herbal medicines. The medical term "respiratory disorders" refers to the numerous forms of infections, allergies, and other disorders that affect the different organs, tissues and specialized cells of the human respiratory system. Respiratory system disorders affect millions of people worldwide. The selection of a detailed and coordinated approach to the biological assessment of plant products forms the basis for the production of new plant drugs. Kantakari is one of the most widely used medicines in Ayurveda, called dashamoola. Literally, Dashamoola means combining ten plant roots together. Dasamoola is an effective compound formulation of Ayurveda and has been advocated for numerous diseases with positive results [1]. Dashamoola includes the roots of five large trees (Brihatpanchamoola) and the roots of five small herbs (Laghu panchamoola). Kantakari is widely used to treat respiratory diseases in Ayurveda [2]. It is especially used for the treatment of kasa, shwasajwara, Hikka, Angamarda, etc. This plant was classified by Ayurvedic classics under Kasahara, Sotha hara, Hikkanigrahana, Kanthya, Angamardaprasamana, Sheetaprasamana Dashemaanis [3]. Kantakari is used as a single medicine and also as an ingredient in multiple compound preparations for different diseases. i. e. Kantakari Avaleha, Vyaghri Haritaki Avaleha, Ajamamsa Rasayana, Khadiradi Gutika etc.

DESCRIPTION OF THE PLANT :-

Latin Name :- *Solanum xanthocarpum* Schrad. & Wendl

Family:- Solanaceae

Synonyms :- *Solanum virginianum*, *Solanum surettense* Burm.

Sanskrit names :- Kantakari, Duhsparsa, Vyaghri, Kshudra, Nidigdika, Kantakarika, Dhavani, Kantalika [4]

Geographical Source :-It is available in India, growing to 2,200 m in the Himalaya, mainly as a weed on roadsides and wastelands in dry areas [5].



Fig 1 : Plant of Kantakari

Morphology :- *Solanum xanthocarpum* is a very prickly perennial herb about 1.2 m tall, generally with a woody base; densely branched stem; younger ones usually remain clothed with thick, stellate and tomentose hairs; straight, glabrous and shiny compact prickles, sometimes 1 to 3 cm long; ovate or elliptic leaves, sinuous or subpinnatifid, obtuse or subacute, stellate on both sides of the leaves, Flowers purple in color, small, with lateral chymes [6], The unripe berries, with white lines and globular berries, are green in color and turn yellow when ripe [7]. Smooth, compact, reniform seeds; bitter-taste.



Fig 2 Fruits of Kantakari

Chemical Constituents: -

The plant includes alkaloids, sterols, saponins, glycosides and flavanoids, as well as carbohydrates, fatty acids, amino acids, etc. The primary alkaloid is the steroidal alkaloid solasodine. Solasonine, solasodine, solamargine, betasolamargine, solanocarpine, and solanocarpidine are present in fruits. There are traces of isochlorogenic, neochronogenic, chronogenic and caffeic acids in dried fruits. Apigenin yielded petals. Quercetin diglycoside and sitosterol is delivered by Stamens. Cumarins, scopolin, scopoletin, esculin and esculetin are found in the plant parts of *S. xanthocarpum*. In plant species, fruits have more alkaloids than other organs, and alkaloid productivity varies with various organic solvents. In addition to the alkaloid material, apart from the presence of tolerable amounts of heavy metals including Cu, Fe, Pb, Cd and Zn, the presence of flavanoids and saponin was also determined [8-10].

Rasa (taste) :-Katu (pungent) , Tikta (bitter)

Guna(properties):-Laghu (light) ,Ruksha (dry) , Teekshna (piercing)

Virya (potency) :-Ushna (hot)

Vipaka :-Katu (undergo pungent taste conversion after digestion)

Parts Used:- Whole Plant [11]

Dose:- 50 ml as decoction [12]

Karma:

Vedanasthapana (pain reliever), Shothahara (reduces swelling), Swedajanana (increases sweating), Jwaraghna (Anti-pyretic), Deepana [4]

Effect on Tridosha :- Balances Kapha & Vata Dosha . it increases Pitta Dosha.

PHARMACOLOGICAL ACTIONS :-**Antiasthmatic action:-**

Bronchial asthma is the most prevalent debilitating condition of many respiratory disorders affecting men. Bronchial asthma is a serious global health problem. 5% to 10% of persons of all ages suffer from this chronic airway disorder. It is an airway inflammatory condition with several obstructions of the airway, irritation and bronchial hyper-reactivity. Therapeutic effect of *Solanum xanthocarpum* Schrad & Wendl ethanolic extract is evaluated i.e. asthma-relieving or antihistaminic, antiallergic property, is measured. *Solanum xanthocarpum* is commonly used to treat respiratory disorders by practitioners of the Siddha system of medicine in southern India. For this reason, a powder or a decoction of a whole dried plant is used. In patients with mild to severe asthma, *Solanum xanthocarpum* has increased pulmonary function to a significant extent. It was suggested that relief from the bronchial asthma symptoms produced by *Solanum xanthocarpum* Schrad and Wendl could be due to a bronchodilator effect, decreased bronchial mucosal edema, reduced secretions inside the lumen of the airway [13-15].

Anti-inflammatory action :-

In order to explore the anti-inflammatory activity of tomatidine and solasodine, the LPS-stimulated macrophage was used as an inflammation model, whereby tomatidine was found to have a more potent anti-inflammatory effect than solasodine at the tested concentration. Ear inflammation caused by many applications of tetradecanoyl-phorbol 13-acetate was greatly reduced by topical administration of solasodine. In acute and chronic inflammatory animal models, solasodine isolated from *Solanum trilobatum* has been tested for anti-inflammatory action [16-18].

Antibacterial action :-

Solanum xanthocarpum methanolic and acetone leaf extracts have been very effective in inhibiting the growth of *Staphylococcus aureus*, a significant human pathogen causing wound infections. The presence of alkaloids, phenolics and flavanoids in its leaves are potential explanations for the antibacterial action of *Solanum xanthocarpum* [17-19].

Anti-Fertility action :-

Antispermato-genic activity is found in Solasodine, an alkaloid of *Solanum xanthocarpum*. Chronic administration of solasodine (20 mg/kg every other day orally for 60 days) made male rats and dogs infertile in the Dixit VP 1980 report. In rats, the mating test revealed 87 percent infertility, which returned to normal after 60 days of drug-feeding cessation. Solasodine is well absorbed, inhibiting the motility of sperm & spermatogenesis. Solasodine can be formulated as a plant-origin male pill [18-20].

Antifungal Action :-

The antifungal activity of *Solanum xanthocarpum* (Kantakari) against *Aspergillus niger* and *Candida albicans* was documented on the basis of the Agar Well method of diffusion in PDA media and Growth inhibition in PDB media with Distil water and *Solanum xanthocarpum* leaf Hexanic extract [10,21].

Hypoglycemic activity :-

The aqueous extract of *Solanum xanthocarpum* showed a major hypoglycemic effect in the 100 and 200 mg/kg doses of normal and streptozotocin-induced diabetic rats. The activity shown by the aqueous extract was comparable to that of the typical glibenclamide oral hypoglycemic agent. The experimental findings revealed that both normal and streptozotocin-induced diabetic rats expressed a potent blood glucose lowering property. It was observed that the extract's LD₅₀ was high, suggesting a high safety margin [8,13,22].

Anthelmintic activity :-

Anthelmintic behavior of the fruity extract of *Solanum xanthocarpum* is reported after the analysis [23]. In various fields of pest management, the plant *Solanum xanthocarpum* has been used [24].

DISCUSSION

Herbal medications are gaining popularity due to their eco-friendly and beneficial properties. Kantakari is regarded as a valuable plant because of its numerous medicinal applications. Kantakari is used in treating kasa, shwasa, jwara, swarabheda, Karnamoolasotha, Gulma, kushta, shophya, Hrdroga, etc. In the treatment of catarrhal fever, cough, asthma and chest pain, roots are used as expectorant and diuretic and seeds are useful as expectorant in cough and asthma. It was stated in a clinical trial that the oral administration of *Solanum xanthocarpum* At a dosage of 300 mg of dry powder thrice a day for 3 days, found to be very effective in managing mild to severe bronchial asthma and its bioactivity is equal to that

of 200 mg of deriphylline [14-23]. Solasodine is used for the production of steroidal drugs in pharmaceutical industries [24].

CONCLUSION

Kantakari is one of the important drug included under Dashamoola. It is non-toxic and safe for human consumption and is considered a valuable plant for its versatile medicinal applications in both Ayurvedic and modern drug manufacturing fields. Kantakari can be used as a single drug and also as an ingredient in different compound formulations for various diseases such as kasa, shwasa, jwara, swarabheda, Karnamoolasotha, Gulma, kushta, shopha, Hrdroga, etc. There are lots of formulations containing kantakari as an ingredient in different dosage types. It is used in the form of swarasa (fresh juice) as a single agent and as a decoction for the treatment of shwasa. This plant is being studied extensively for its hepatoprotective, hypoglycemic, anti-asthmatic, anti-microbial, and numerous other pharmacological properties. More research on other phytochemical compounds may lead to the development of a novel method for more therapeutic application.

REFERENCES

1. Sharma PV (2006). Dravyagunavijnana, Vol.1. Varanasi: Chaukhamba Bharti Academy; p. 125
2. Chunekar KC, Pandey GS (1999). Bhavaprakash Nighantu. 10 ed. Varanasi: Chaukhamba Bharati Academy; p.290-292.
3. Charakasamhitha (1994) (Ayurveda dipika commentary), JadavjiTrikamji Acharya, editor. Varanasi: Chaukhamba Sanskrit Sansthan; p.33-34.
4. Anonymous (2001). The Ayurvedic Pharmacopoeia of India, Part-I, Vol. I, 1st ed. New Delhi: Govt. of India, Ministry of Health and Family Welfare, Dept. of I.S.M. & H., p.59-60.
5. Anonymous (1998). Indian Herbal Pharmacopoeia, vol. I. Jammu Tawi: Indian Drug Manufacturers 'Association Regional Research Laboratory; 139-146.
6. Anonymous (1998). Indian Herbal Pharmacopoeia, Revised ed. Mumbai: IDMA; 1998.
7. Ghani A (1998). Medicinal plants of Bangladesh-chemical constituents and uses. Bangladesh: Asiatic society of Bangladesh; p.290.
8. Reddy, N. M., & Reddy, R. N. (2014). *Solanum xanthocarpum* chemical constituents and medicinal properties: A review. *Sch Acad J Pharm*, 3(2), 146-9.
9. Rita, P., & Animesh, D. K. (2011). An updated overview on *Solanum xanthocarpum* Schrad and Wendl. *Int J Res Ayurveda Pharm*, 2(3), 730-5.
10. Singh, O. M., & Singh, T. P. (2010). Phytochemistry of *Solanum xanthocarpum*: an amazing traditional healer. 69: 732-740.
11. Sharma PC, Yelne MB, Dennis TJ (2001). Database on Medicinal Plants used in Ayurveda, Vol. 4. New Delhi: C.C.R.A.S, Dept. of I.S.M. & H., Ministry of Health and Family Welfare, Govt. of India; 2001.p.269-287.
12. Anonymous (1978). Pharmacopoeia of India. 2nd ed. New Delhi: Govt. of India, Ministry of Health and Family Welfare; 1978.p.650.
13. Parmar, S., Gangwal, A., & Sheth, N. (2010). *Solanum xanthocarpum* (yellow berried night shade): a review. *Der Pharm Lett*, 2(4), 373-383.
14. Govindan, S., Viswanathan, S., Vijayasekaran, V., & Alagappan, R. (1999). A pilot study on the clinical efficacy of *Solanum xanthocarpum* and *Solanum trilobatum* in bronchial asthma. *Journal of ethnopharmacology*, 66(2), 205-210.
15. Mohan, L., Sharma, P., & Srivastava, C. N. (2007). Comparative efficacy of *Solanum xanthocarpum* extracts alone and in combination with a synthetic pyrethroid, cypermethrin, against malaria vector *Anopheles stephensi*. *Southeast Asian journal of tropical medicine and public health*, 38(2), 256.
16. Patel, K., Singh, R. B., & Patel, D. K. (2013). Medicinal significance, pharmacological activities, and analytical aspects of solasodine: A concise report of current scientific literature. *Journal of Acute Disease*, 2(2), 92-98.
17. Dalvi, Y. V. (2018). The Comprehensive Review on Kantakari Plant. *Asian Journal of Research in Pharmaceutical Science*, 8(3), 140-144.
18. Anwikar, S., & Bhitre, M. (2010). Study of the synergistic anti-inflammatory activity of *Solanum xanthocarpum* Schrad and Wendl and *Cassia fistula* Linn. *International journal of Ayurveda research*, 1(3), 167.
19. Rana, S., Prakash, V., & Sagar, A. (2016). Antibacterial activity of *Solanum xanthocarpum* leaf extract. *Int. J. Curr. Microbiol. Appl. Sci*, 5, 323-328.

20. Dixit, V. P., Gupta, R. S., & Gupta, S. (1989). Antifertility Plant Products: Testicular Cell Population Dynamics following Solasodine (C₂₇ H₄₃ O₂ N) Administration in Rhesus Monkey (*Macaca mulatta*). *Andrologia*, 21(6), 542-546.
21. Gaherwal, S., Shiv, G., & Nageshwar, W. (2014). Anti-fungal activity of *Solanum xanthocarpum* (Kantkari) leaf extract. *World journal of Zoology*, 9(2), 111-114.
22. Gupta, S., Mal, M., & Bhattacharya, P. (2005). Evaluation of hyperglycemia potential of *S. xanthocarpum* fruit in normal and streptozin induced diabetic rats. *Eur Bull Drug Res*, 13, 51-55.
23. Gunaselvi, G., Kulasekaren, V., & Gopal, V. (2010). Anthelmintic activity of the extracts of *Solanum xanthocarpum* Schrad and Wendl fruits (Solanaceae). *International Journal of PharmTech Research*, 2(3), 1772-1774.
24. Singh, K. V., & Bansal, S. K. (2003). Larvicidal properties of a perennial herb *Solanum xanthocarpum* against vectors of malaria and dengue/DHF. *Current Science*, 84(6), 749-751.

CITATION OF THIS ARTICLE

Varshida J. Marwadi, Vaidehi V. Raole, Gaurav Gairola. Kantakari in Respiratory Disorders – A Physiological Review. *Bull. Env. Pharmacol. Life Sci.*, Vol 11[4] March 2022 : 285-289.