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A Review on Ethnomedicinal Claims of *Solanum Trilobatum* Linn.

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ABSTRACT:

Introduction: Plants play an important role in the health of millions of people's life in many villages of India in their day-to-day life by its traditional usage. *Solanum trilobatum* Linn. from family Solanaceae is an important Indian medicinal plant. It is well known for its medicinal values in Siddha and Ayurvedic system of medicine. This plant is acknowledged in *Ayurveda* as '*Agnidamini', 'Valli Kantakarika', 'Alarka'* & Thdhuvalai in siddha systems. Present review was carried out to collect all available information on ethnomedicinal claims & research updates pertaining of *Solanum trilobatum* Linn. from published literatures & books.

Materials and Methods: Information regarding ethnomedicinal claim were reviewed by using the available books with special reference to medicinal plants compiled from books on ethnobotany and research articles available on internet till date. The obtained information was categorized as per vernacular names, locality, used parts, therapeutic claims, type and mode of administration along with ingredients and dosage forms of the preparations.

Results: *Solanum trilobatum* Linn. has been widely used by Siddha traditional system & some folklore groups in cough, cold, asthma and many respiratory diseases. In addition, it is also reported for its anti-inflamatory, hepato-protective, anti-diabetic, anti-oxidant, analgesic, anti-microbial, immunomodulatory, anti-tussive, mosquitocidal, anti-bacterial properties. This plant is used as traditional medicine for various disease condition. All parts of plants are used for internal administration.

Conclusion: Scientific studies (pharmacological and clinical) on *Solanum trilobatum* Linn are needed to establish its multiple ethnomedicinal claims.

Keywords: *Dashmoola, Kantakari, Laghupanchmoola Agnidamini, Solanum xanthocarpum, Solanum trilobatum*

INTRODUCTION

Dashmoola is an ancient Ayurvedic formulation. It is being used as a broad-spectrum medication for the treatment of all three *Doshas*. *Kantakari* is one of the constituents of *Dashmoola*. It is also included in *Laghupanchmoola*.[1] The established botanical source for *Kantakari* is *Solanum xanthocarpum* Schard. & H. Wendl,[2] which belongs to family Solanaceae. *Kantakari* is widely used as single drug therapy in different diseases. Attributed to its broad-spectrum utility & overexploitation & increased urbanization day by day, it is difficult to get the genuine

raw material of *Kantakari.* Above cited reason makes it hardly available in almost all raw drug markets of India in large quantities. So, it is the need of hour to find out the alternative drug of *Solanum xanthocarpum* Schard. & H. Wendl.

Raja Nighantu has mentioned *Kantakari*, *Bruhati* and *Agnidamini* as "*Trikantaka"* under *Mishraka Varga*.[3] Renowned Vaidhya Bapalala Shah coined *Solanaum trilobatum* Linn. as an botanical source of *Agnidamini* in Adarsh Nighantu and mentioned[4] it can be used instead of *Kantakari*".[5] in his book named "SOME CONTROVERSIAL DRUGS IN INDIAN MEDICINE".

Rasa Panchaka of *Agnidamini* (*Solanum trilobatum* Linn.) has mentioned in Raj Nighantu as per table no -1.

Plant description

Solanum trilobatum Linn. is an undershrub 6-12 ft long, trailing or sub scandent by its numerous hooked prickles; stems slender; branches long, divaricate, the young ones sometimes with a few stellate hairs, the older glabrous; prickles from abroad triangular base, very sharp, compressed, hooked, decurved. Leaves ovate or rotund-ovate obtuse, irregularly sinuate or 3-5 lobed, sparsely stellately hairy glabrous with or without 2 or 3 prickles on the midrib, base not cordate. Petioles-0.5-1.5 inch long, prickly -flowers large and showy, violet-purple ,in extraaxillary racemose cymes. Peduncles-very short, almost 0; Pedicles 0.5-1 inch long often prickly. calyx cyathiform 1/8-1/6 inch long, stellately hairy, teeth 1/20 inch long, tube 1/12 inch long, triangular, acute. Lobes oblong-lanceolate, acute, stellately hairy outside, usually reflexed. Filaments 1/20 in long; anthers 1/3 inch long, narrowly oblong, opening by small pores. Ovary ovoid or sub globose, glabrous, style glabrous, Berry ¼-1/3 inch in diameter of scarlet when ripe. seeds 1/8 diameter, slightly pitted.[6]

MATERIALS AND METHODS

Collection of plant material

The *Solanum trilobatum* Linn. was identified with the help of different flora and authenticated by the Pharmacognosy expert and its fresh leaf sample were collected from its natural habitat (Longitude: 79 ° 58' 32.3882" and Latitude: 12 ° 41' 38.1558"), Chengalpattu Tamil Nadu. Samples were collected in mature condition during September 2022., 40-48 41 herbarium specimen was deposited at the institute museum with the reference number (ITRA Phm/6364/2023-2024**).** The material was also preserved in FAA-Formaldehyde Alcohol Glacial Acetic Acid (90:5:5) for botanical studies (fig. 5). The collected leaves were washed with potable water and dried under shade, powdered through a mechanical grinder and sieved (60 mesh). The coarsely powdered sample was kept in an airtight glass container for its Pharmacognostical and analytical evaluation.

In the present study, information was collected for the drug *Kantakari* and *Solanum trilobatum* Linn. regarding ethnomedicinal claims by using the books with special references from various flora, books of medicinal plants, complied from books on ethnomedicinal which are available and related articles from the internet were referred.

Data collection

In the present study, information was collected for the drug *Kantakari* and *Solanum trilobatum* Linn. regarding ethnomedicinal claims by using the 41 books with special references from various flora, books of medicinal plants, complied from books on Ethnomedicinal which are available and related articles from google scholar, PubMed, etc were referred. Botanical description, chemical constituents and folklore claims were found from 15 books.

Study Selection

1. Inclusion criteria:
   Publications that described the use of to treat many disease conditions either human or animal used as food i.e. having any economic value were included in the review. This includes both external and internal applications with no language restrictions and date limitations.
2. Exclusion criteria:
   Other species of *Solanum* were excluded from the present review.

RESULTS AND DISCUSSION

Local Name:

Solanum trilobatum Linn.is known by 15 names in 7 languages (Table 3).

Area of reporting:

Solanum trilobatum Linn. can be located in selected habitats only which refers black clayey soils found along the roadsides. It Globally distribution to Indo -Malesia. In India distributed throughout the southern part of India like Tamilnadu, Kerala, Karnataka etc and in Saurashtra region Gujarat. The plant can be identified by dark green foliage in the month of November. Flowering is observed from Sept.to January. Fruiting is observed from November to March. During summer the plant can be seen with small

leaves or without leaves and perennates by means of rootstocks.

Parts used:

The Leaves have maximum applications in 20 disease conditions. (Table 2).

It is observed that various parts like flower, fruit, leaf, root, whole plant, of *Solanum trilobatum* Linn. are used to combat several diseases through internal and external administrations.

Total 7 claims for external applications like powder, paste and juice etc. and 32 claims for internal administration in which 14 claims for root, 3 claims for flowers, 7 claims for fruits ,10claims for leaves,2 claims for seed and 3 claims for whole plant have been reported.

Dosage forms:

It is observed that root are used in two dosage forms decoction and ghee; powder for whole plant, leaves as a paste, decoction and juice, for flowers decoction; and for fruits oil forms are mentioned.

Mode of administration:

Total 7 claims for external application which includes Leaf juice is applied to treat painful swellings, syphilis, lesions and sore eyes etc. seed paste for leukoderma and fruit paste for ringworm and scabies etc. Root powder indicated in wound healing other 32 claims stands for various internal administration.

Therapeutic uses:

Solanum trilobatum Linn. was reported to have hepatoprotective activity, antimicrobial activity, antioxidant activity, cytotoxic activity, haemolytic activity, hepato-protective, anti- diabetic, anti-oxidant, analgesic, anti-microbial, immunomodulatory, anti-tussive, mosquitocidal, anti-bacterial and anti-inflammatory properties (Table 2)

Previous research work:

1)Methanolic extract of whole plant suggests the hepatoprotective & anti-oxidant activities of whole plant of Solanum trilobatum Linn.[7]

2)Methanolic extract of root indicates significant anti-inflamatory activity support to use of this plant in folk medicine.[8]

3)The methanolic extract of dried leaf powder indicates inhibition of mast cell degranulation.[9]

4)The methanolic extract of whole plant shows Anti-microbial, Anti-diabetic & Anti-oxidant action of leaf extract.[10]

5)Methanolic extract of whole plant suggests, anti-inflamatory activity of S. trilobatum but supplementary comprehensive pharmacological study is required for specified molecular mechanism.[11]

Details of Patented drugs containing as *Solanum trilobatum*[12]

1.Thoothuvelai Herbal Chocolate
2.Thoothevelai Ghee
3.Thoothuevelai Legiyam
4.Likaplex Herbal cough syrup
5.Spasmonil capsule
6.Asthease capsule
7.Subhravati

Method of administration of *Solanum trilobatum* Linn.

1. The juice of green leaves with sugar candy is used for cough, cold, asthma and ear diseases.[13]
2. Decoction of flowers used for vitality and strength.
3. 1 to 5 grams of whole plant powder is taken with water or honey for the treatment of cold, cough, prolonged deafness to protect body from viral and bacterial infections, all kinds of respiratory diseases, nervous problems and to control cancer.
4. Ripe fruits are eaten to relieve cough, leaves and fruits of this plant are eaten continuously for 40 days for cure of eye disorders, nose problems and cold.
5. Root is cut into 3cm length and used to induce abortion up to 3 months of pregnancy.[14]
6. Root decoction is given along with black pepper to treat leucorrhoea.
7. Root is boiled with milk and given to treat wounds and inflammation.
8. Leaf juice is applied to treat painful swellings, syphilis, lesions and sore eyes.
9. Root powder is boiled with milk given as galactagogue.it is given to women during pregnancy or after delivery to strengthen the body.
10. Root powder mixed with honey and given to treat giddiness, shivering and also used as Aphrodisiac.
11. Root is boiled with milk and given to the child to increase growth and weight.
12. Prepare a decoction of solanum leaves and add 1 gram of *Pippali* powder. This is given as a medicine for cold and fever. It is also promoting expectoration. Add ghee or milk in the diet to avoid constipation while taking this medicine.[15]
13. Young fruits are cooked and given to treat bronchial disorders.
14. Preserved fruits are roasted in coconut oil and given as laxative.

15. Root decoction is mixed with honey to treat Bronchitis.

Comparative ethnomedicinal claims of *Solanum trilobatum* Linn. action and *Solanum xanthocarpum* Schard. & H Wendl.

Among the 25 claims of *Solanum xanthocarpum* Schard. & H Wendl and 24 claims of *Solanum trilobatum* Linn. Out of the 24, 10 similar claims were found. They are-

1. Anti-inflamatory
2.Expectorant
3.Immuno-modulatory
4. Laxative
5. Anti-viral
6.Anti-bactrial
7.Anti-pyretic.
8.Anti-oxidant
9.Anti-fungal
10.Carminative

DISCUSSION

Various ethnomedicinal claims regarding *Solanum trilobatum* Linn. were found in different literatures. Individual uses of leaves, roots, flowers, fruits were found, whereas uses of the whole plant were also observed. Maximum uses of leaves and root of *Solanum trilobatum* Linn are found in comparison to other plant parts. The whole plant is used for anti-bacterial & anti-viral property. Paste of leaves are used in chest congestion and chronic cough. Juice of leaves are used for asthma and decoction of leaves useful in deafness. Fruit juice of *Solanum trilobatum* Linn. is helpful in snake-bite. Decoction of roots is also used for chronic cough and tuberculosis. Flowers are indicated for immunomodulation and expectoration. Ghee cooked from root & leaves are useful in tuberculosis. *Solanum trilobatum* Linn. has been widely used by siddha traditional system and some folklore groups in cough, cold, asthma etc respiratory disease in addition to its stated properties like anti-inflamatory, hepato-protective, anti- diabetic, anti-oxidant, analgesic, anti-microbial, Immunomodulatory, anti-tussive, mosquitocidal, anti-bacterial, anti-viral. In this study 14 claims for root,10 claims for Leaves, 7 for fruits, 3 claims for whole plant & flowers and 1 claim for seed were reported. Among the 25 claims of *Solanum xanthocarpum* Schard. & H Wendl and 24 claims of *Solanum trilobatum* Linn. Out of the 24, 10 similar claims were found. Acharya Vagbhatta also mentioned the same that, in case of non-availability of any particular drug in the preparation of a compound one should try to get another similarly potent drug having similar Rasa, Guna, Virya and Vipaka. Both plants are *Katu* in *Rasa*, *Laghu Ruksha* in *Guna* and *Ushna Veerya* in addition to the found ethnomedicinal claims of *Solanum trilobatum* Linn. Hence *Solanum trilobatum* Linn. can be alternative for *Solanum xanthocarpum* Schard. & H Wendl

CONCLUSION

The herb if is unfamiliar for its botanical source, morphology & properties or if known by these 3 aspects but uninformed about its uses, is of no use to the clinician [16] To avoid these complications proper identification, collection, storage and processing of the drugs are necessary. Hence identification tools of a particular drug play a very important role in therapeutic effect. For *Solanum trilobatum* Linn. petiole and pedicle prickly & ovate, obtuse, rotund-ovate 3-5 lobed leaves are characteristic, which is helpful for the identification of this species. As per ethnomedicinal claims *Solanum trilobatum* Linn. used in various disease conditions and also has a good therapeutic effect. Use of the whole plant was seen repeatedly. Due to different geographical distribution and seasonal variations, they are not abundantly available. *Solanum trilobatum* Linn. is having same species and family as the botanical source of *Kantkari (Solanum xanthocarpum* Schard. & H Wendl.) and can be substituted after a detailed investigation.

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Table 1. *Rasa Panchaka* of *Agnidamini* (*Solanum trilobatum* Linn.) are as follows.[17]

Rasa	*Katu*
Guna	*Laghu, Ruksha*
Veerya	*Ushna*
Vipaka	-

Table 2. Ethnomedicinal claims of different useful parts of *Solanum trilobatum* Linn.

Sr. No	Name of disease	Part used	Dosages form	Int /Ext.
1.	Chest congestion[18]	Leaves	Paste	Int
2.	Cough	Leaves	Paste	Int
3.	Deafness	Leaves	Decoction	Int
4.	Antiviral	Whole plant	Powder	Int
5.	Antibacterial	Whole plant	Powder	Int
6.	Asthma[19]	Leaves	Juice	Int
7.	Immunomodulatory[20]	Flowers	Decoction	Int
8.	Snake bite	Fruit	Juice	Int
9.	Eye and Nasal disorders	Ripe fruits	-	Int
10.	Cough[21]	Flowers	-	Int.
11.	Bronchitis[22]	Roots	Decoction	Int
12.	Laxative	Fruits	Oil	Int
13.	Diarrhea	Leaves	Paste	Int
14.	Fever[23]	Leaves	Decoction	Int
15.	Tuberculosis[24]	Root & leaf	Ghee	Int
16.	Leukoderma[25]	Seed	Paste	Ext
17.	Ringworm	Fruit	Paste	Ext
18.	Scabies	Fruit	Paste	Ext
19.	Diuretic	Seed	Decoction	Int
20.	Leucorrhea	Root	Decoction	Int
21.	Abortifacient	Root	-	Ext
22.	Wound	Root	Powder	Ext
23.	Anti-Inflammatory	Root	Powder	Ext
24.	Aphrodisiac	Root	Decoction	Int

Table 3. Local Name of *Solanum trilobatum* Linn.[26]

Sr.no	State name	Local name
1.	English name	Red pea eggplant, Thai nightshade
2.	Telugu	Alarkpatramu, Kondavuchinta, Mullamusti
3.	Oriya	Bryhoti
4.	Tamil	Thdhuvalai , Nittidam, Surai, Sandunayattan
5.	Kannada	Kakamunji, Ambusondeballi
6.	Marathi	Mothiringnee, Thoodalam
7.	Malayalam	Thuthuvalam or Puttacunta

Table 4. Previous research work:

Sr. no	Part used	Dosage form	Study
1.	Whole plant	Methanol extract	Hepatoprotective
2.	Root	Methanolic extract(100mg/kg)	Anti-inflammatory
3.	Dried leaf powder	Ethanolic extract.	Mast cell stabilization
4.	Whole plant	Methanol extract	Anti-diabetic Anti-microbial Hemolytic Anti-oxidant
5.	Leaf	Methanol	Anti-inflammatory

Fig-1 Whole plant of *S. trilobatum*

Fig -2 Stem of *S. trilobatum*

Fig.3 Prickles of *S. trilobatum*

Fig-4 Leaves of *S. trilobatum*

Fig-5 fruits of *S. trilobatum*

Fig-6 Roots of *S. trilobatum*

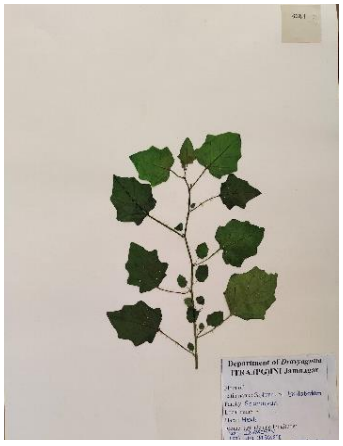

Fig-5 Herbarium of *S. trilobatum*