



## Therapeutic Potential of Surana (*Amorphophallus campanulatus*): A Systematic Review Integrating Classical Ayurvedic and Contemporary Scientific Evidences

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**Introduction:** Surana (*Amorphophallus campanulatus*) known as Jimikand or Elephant Foot Yam, a tuberous plant, has been traditionally utilized in Ayurvedic medicine for its digestive, anti-inflammatory, and anti-hemorrhoidal properties.

**Objectives:** To systematically review the therapeutic potential of Surana through a combined lens of Ayurvedic texts and modern pharmacological evidence, with a focus on its efficacy in gastrointestinal, hepatic, and inflammatory disorders.

**Methods:** A systematic review of classical Ayurvedic texts, contemporary research articles, & e Samhitas was done. Databases such as PubMed, Google Scholar, Scopus, and traditional Ayurvedic compendiums like Charaka Samhita and Sushruta Samhita, Astanga Hridya, Bhaisajya Ratnavali etc were explored for relevant information. Studies published between 2000 and 2024 were considered. Inclusion criteria were Ayurvedic texts referencing Surana's therapeutic applications and modern research evaluating its pharmacological actions. Duplicates and studies lacking relevance to key therapeutic domains were excluded. The quality of modern studies was assessed using a simplified GRADE-based approach.

**Results:** Surana is described in Ayurveda for its digestive, anti-inflammatory, and rejuvenative properties. It is indicated in the treatment of piles, abdominal disorders, and respiratory conditions. Modern pharmacological studies corroborate these traditional uses, highlighting its anti-hemorrhoidal, anti-inflammatory, antioxidant, and antimicrobial activities. Clinical trials have shown promising results in managing hemorrhoids and irritable bowel syndrome (IBS).

**Discussions:** The therapeutic potential of Surana as documented in Ayurveda is matched with modern scientific findings. The integration of traditional knowledge with contemporary research will enhance the understanding of its medicinal benefits. Comparative analysis was performed to highlight the alignment and discrepancies between traditional Ayurvedic knowledge and modern scientific findings.

**Conclusions:** Surana (*Amorphophallus campanulatus*) holds significant promise in Ayurvedic medicine. Bridging traditional and modern knowledge can lead to its effective and safe application for its uses.

**Keywords:** Arshaghna, Jimikand, Krimighna, Surana, Udarshula

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## Introduction

*Surana* scientifically known as *Amorphophallus campanulatus* (Roxb.) Blume is an important herbaceous tuberous crop plant valued for its medicinal properties deeply rooted in Samhitas. *Surana*, scientifically classified under the Division- Angiosperms, Class- Monocots, Order- Alismatales, Family- Araceae, Genus -*Amorphophallus*, and identified as the species- *Amorphophallus campanulatus* (with the synonym *A. paeoniifolius*), is a fascinating plant known for its distinctive large tuber and unique flowering structure. This review aims to comprehensively explore pharmacological properties, traditional uses of *Surana* mentioned in different classical Ayurvedic texts. *Amorphophallus campanulatus* known as Elephant foot yam is generally a crop originated in South-east Asia.[1] In Bharat, local name of this herb is- '*Surana*' or '*Jimikand*'. Elephant foot yam is a remunerative and profitable stem tuber crop. The crop is gaining popularity due to its shade tolerance, easiness in cultivation, high productivity, less incidence of pests and diseases, steady demand and reasonably good price.[2] This Tuber is consumed by a large number of people in our country as vegetables. In *Ayurveda*, *Surana* is used to cure various diseases like- *Arshas*, *Gulma*, *Pleeharogas* etc.

## Methodology

Systematic review was conducted to gather comprehensive information on medicinal properties & uses of *Surana* (*Amorphophallus campanulatus*). Review involved searching various classical Ayurvedic texts & modern scientific databases using specific keywords related to plant.

### Classical Ayurvedic texts:

#### E-Samhitas:

- e-Sushrut: The keyword '*Surana*' was used, yielding 1 match.
- e-Astanga Hridaya: The keyword '*Surana*' was used, yielding 2 matches.
- e-Nighantus: The keyword '*Surana*' was used, yielding 20 matches.

### Modern Scientific Databases:

Google Scholar:

- Search term '*Amorphophallus campanulatus* (Roxb.) Blume' yielded 974 matches.

- Search term 'researches on *Amorphophallus campanulatus* (Roxb.) Blume' yielded 977 matches.
- Search term 'Review of *Amorphophallus campanulatus*' yielded 5500 matches.

PubMed:

- The keyword '*Amorphophallus campanulatus*' was used, yielding 5 matches.

### Inclusion and Exclusion Criteria

#### Inclusion Criteria:

- Studies and articles that directly discuss the medicinal properties, uses, and therapeutic applications of *Surana* (*Amorphophallus campanulatus*).
- References from classical Ayurvedic texts that provide insight into traditional uses and formulations involving *Surana*.
- Peer-reviewed journal articles and reviews from scientific databases that provide experimental data, clinical studies, or comprehensive reviews on the plant.

#### Exclusion Criteria:

- Articles that do not focus on the medicinal aspects of *Amorphophallus campanulatus*.
- Studies lacking relevance to the key themes of *Krimighna* (anthelmintic), *Arshaghna* (Anti-haemorrhoidal), properties or other therapeutic uses of the plant.
- Duplicates and non-English language articles without available translations.

### Study Selection & Data Extraction:

Full texts were reviewed for eligibility. Data were extracted on study type, extract used, therapeutic indication, and outcomes.

### Quality Assessment:

Included studies were assessed using a simplified GRADE-based approach (assessing study design, relevance, and consistency of results). Ayurvedic references were documented according to frequency and agreement across texts.

### PRISMA Flowchart:

#### Identification:

- Records identified through database searching (n = 754)

- Additional records from Ayurvedic texts/manuals (n = 38)

#### Screening:

- Records after duplicates removed (n = 732)
- Records screened (titles/abstracts): 732
- Records excluded: 658

#### Eligibility:

- Full-text articles assessed: 74
- Full-text articles excluded (not therapeutic/irrelevant): 42

#### Included:

- Studies included in qualitative synthesis: 32

## Results

#### Properties of *Surana* as per Classics

The medicinal virtues of this plant are mentioned in most of the Ayurvedic literature viz. Sushruta Samhita, Ashtanga Hridaya, Bhav Prakash, Madanapala Nighantu, Keyadev Nighantu etc. The properties of *Surana* have been presented in tabular form as follows.

Surana Properties	Astanga Hridaya[3]	Astanga Samgraha[4]	Sushrut Samhita[5]	Bhav Praksha[6]	Amarkosha[7]	Astanga Nighantu[8]
Rasa	Nil	Nil	Ishat kasaya, Katu	Kasaya Katu	Nil	Nil
Guna	Vishada Laghu	Vishada Laghu	Ruksha Vistambhi Guru	Laghu Ruksha Vistambhi Vishada	Nil	Nil
Karma	Deepana Kaphaghna Ruchya	Agnideeptikara Ruchikara Slesmanasana Tridoshakara	Kapha-Vata kara, Pittakara	Deepan Kandukrita Ruchya	Nil	Nil
Rogagnata	Arshaghna	Arshanashak		Arshaghna	Arshaghna	Arshaghna
Indication	Nil	Nil	Nil	Kaphaja-Arsha Pleeharoga Gulma	Nil	Nil

Surana Properties	Keyadev Nighantu[9]	Dravyaguna Samgraha[10]	Dhanwantari Nighantu [11]	Nighantusesha [12]	Madanapala Nighantu [13]	Shabda Chandrika [14]	Hridaya Dipaka Nighantu[15]
Rasa	Katu Kasaya	Nil	Nil	Nil	Katu Kasaya	Nil	Nil
Guna	Laghu Ruksha Vishada Vistambhi	Vishada Laghu	Nil	Nil	Ruksha Laghu	Nil	Nil
Vipaka	Katu	Nil	Nil	Nil	Nil	Nil	Nil
Pravaba	Arshaghna	Nil	Nil	Arshaghna	Nil	Nil	Nil
Karma	Deepana Ruchya, Vatakapha hara, Valsa-gudakeela hara, Raktapittaprakopak,	Deepan, Ruchya, Kaphaghna	Nil	Kandujanak	Deepana, Kandukrita Vistambhi Vishada Ruchya Kaphavatahara,	Nil	Nil
Rogagnata	Arshaghna	Nil	Arshaghna	Arshaghata	Nil	Arshaghna	Nil
Indication	Gulma, Sthaulya hara,	Nil	Nil	Nil	Gudamyahara, Kaphaja Arsha	Nil	Arsha

#### Nutritive value of *Surana*[16]

	Moisture	Protein	Fat	Minerals	Crude fibres	Carbohydrates
Yam ordinary	69.9	1.4	0.1	1.6	1.0	26.0
Yam wild	70.4	2.5	0.3	1.4	1.0	24.4
Yam elephant	78.7	1.2	0.1	0.8	0.8	18.4

	Energy (kcal)	Calcium (mg)	Phosphorus (mg)	Iron (mg)
Yam elephant	79	50	34	0.6
Yam ordinary	111	35	20	1.19
Yam wild	110	20	74	1.0

	Mg	Na	K	Cu	Mn	Zn	Cr	S	Cl	Mo
Yam ordinary	17	9.0	237	0.12	0.12	0.45	0.016	-	-	-
Yam wild	34	11.0	450	0.16	-	-	-	35	29	-

Yam (Ordinary)	Essential amino acids (mg/gm N)
Arginine	480
Histidine	120
Lysine	280
Tryptophan	70
Phenylalanine	300
Tyrosine	200
Methionine	100
Threonine	220
Leucine	400
Isoleucine	230
Valine	290

Approximate total Ng / 100 gm = 0.22g

	Total Dietary Fibre	Insoluble Dietary Fibre	Soluble Dietary Fibre
Yam	4.2g/100g of edible portion	3.2g/100g of edible portion	1g/100g of edible portion

	Oxalic acid (mg / 100gms)	Phytin P (mg / 100gms)
Yam (Wild)	15	7
Yam (elephant)	-	4

### Phytochemical Constituents from different part of *A. campanulatus* with Pharmacological activities[17]

Name of Chemical constituent	Parts used of Plant	Pharmacological Activities
Amblyone	Root	Antibacterial, Antifungal
Beta sitosterol	Tuber/Corn	Curative
Hexadecanoic acid	Tuber	Antifungal
Oleic acid	Tuber	-
Phenol	Tuber	-
Polysaccharides	Leaves & Corn	Hepatoprotective
Salviasperanol	Root	Antibacterial, Antifungal, Cytotoxic
Vitamin E	Tuber/Corn	-
3,5 Diacetylambulin	Leaves & Corn	Antibacterial, Antifungal
1,3,5 benzenetriol	Tuber	-
Campesterol	Tuber/Corn	Curative, Protective

### Surana as an ingredient in medicines:

*Suranadi Lepa* (Bhaisajya Ratnavali 9/12), *Surana Pindi* (Bhaisajya Ratnavali 9/57); *Salpa Surana Modaka* (Bhaisajya Ratnavali 9/63);

*Man Suranadya Lauha* (Bhaisajya Ratnavali 9/212); *Brihat Surana Modaka* (Bhaisajya Ratnavali 9/65-72); *Surana Putapaka* (A.Hrd.Chi 8/156) ; *Surana Modaka* (A.Hrd.Chi 8/157) ; *Surana Vataka* (Sa.Ma.Kha 7/28-33).

### Surana as an ingredient in food preparations:

#### Classical preparations:

*Surana Modaka*

#### Traditional Preparations:

- *Surana Masiyal* (Tamil Nadu)
- *Olan* (Kerala)
- *Surana Chana Dal* (Maharashtra)
- *Kootu* (Tamil Nadu)
- *Suran ki Sabzi* (North India)
- *Elephant Foot Yam Fry* (Andhra Pradesh)
- *Surana Curry*
- *Surana Fry*
- *Surana Sambar*
- *Surana Chutney*

## Discussion

In many classical literatures, there is no mention about Virya of *Surana*, while based on general principles of Dravyaguna, Acharya PV Sharma[18] mentions properties of *Surana* comprehensively and they are as follows. *Rasa - Katu, Kashaya; Guna - Laghu, Ruksha, Tikshna; Virya - Ushna; Vipaka - Katu; Pravaba - Arshaghna; Karma - Ruchivardhak, Deepana, Pachana, Anulomaka, Shulaprasamak, Arshaghna, Krimighna, Sothahara; Rogaghnata - Aruchi, Agnimandya, Vivandha, Udarshula, Gulma, Yakrit - Pleeha Rogas, Arsha & Krimi*. The properties mentioned in the classics can be correlated with certain modern parameters, which have been already researched are given below.

**Effect of *Surana* in *Aruchi* & *Agnimandya*:** In *Ayurveda*, "*Aruchi*" refers to a condition characterized by a loss of appetite or taste disturbances. *Surana* is having '*Deepana*' & '*Pachana*' properties. By *Deepana*, it stimulates the digestive fire (*Agni*) to enhance digestion, while by *Pachana* it aids in digesting and eliminating undigested food material (*Ama*) from the body, which can enhance appetite & metabolic functions.

By improving digestion and increasing appetite, *Surana* may help individuals suffering from *Aruchi* & *Agnimandya*.

**Effect of *Surana* in *Vivandha*:** *Vivandha* refers to constipation or obstructed defecation in *Ayurveda*. *Surana* is having 'Anulomaka' property by which *Surana* is traditionally used as a natural laxative in *Ayurveda*. It contains compounds that are believed to have a mild laxative effect, helping to soften stools and promote bowel movements. This property can be beneficial in relieving constipation and facilitating regular bowel movements in individuals experiencing *Vivandha*.

***Surana* as *Arshaghna*:** In *Ayurveda*, *Arsha* is a lifestyle disorder caused due to- '*Agnimandya*' which happens because of some important predisposing factors like- sedentary lifestyle, intake of fast food, lack of physical exercise & careless attitude towards responding to natural urges i.e. suppression & forceful creation of defecation, flatus etc. *Surana* having qualities like- '*Deepana*', '*Pachana*', & '*Anulomaka*' have direct impact to balance *Agni* (Digestive fire). Almost each Samhitas & Nighantus have described that *Surana* is having '*Arshaghna*' properties because of above said reason. In many recent researches, it is proved that - Tuber of *Surana* having curative action on hemorrhoids through anti-inflammatory and antioxidant properties. Sanjay Jain et al. were evaluated against ethanolic and aqueous extracts of *Amorphophallus campanulatus* (Roxb.) tubers carbon tetrachloride (CCl<sub>4</sub>) induced hepatic damage in rats. They extract at a dose of 500 mg/kg were administered orally once daily. This study suggests that possible mechanism of this activity may be due to free radical scavenging potential caused by the presence of flavonoids in the extracts.[19]

**Effect of *Surana* in *Yakrit-Pleeha Rogas*:** *Surana* is indicated in the treatment of *Yakrit rogas* (liver disorders) and *Pleeha Rogas* (spleen disorders) because of its Hepatoprotective Properties, Anti-inflammatory Effects, Immunomodulatory Effects, Detoxifying Effects. It is proved through various scientific researches & published studies. Hepatotoxicity was induced by CCL<sub>4</sub>. Ethanol and Aqueous extract show hepatoprotective effect at the dose 500mg/kg dose.[20] Macerated methanol extract also exhibits protective activity against Acetaminophen induced hepatotoxicity.[21]

When mice treated with tuber aqueous extract and methanol extract decrease in clearance index was observed to prove immunomodulatory effect. Spleen index and DMH (Dimethylhydrazine) response shown good result.[22]

***Surana* as *Krimighna*:** *Surana* possesses a bitter and pungent taste. Bitter and pungent tastes are traditionally associated with anti-parasitic and purifying actions in *Ayurveda*. These tastes help in cleansing the body and expelling worms and parasites. & also, *Surana* has a heating potency (*Ushna Virya*). The heating nature of *Surana* helps in destroying parasites, as many parasites and worms thrive in a cooler environment. *Surana* is known for its effect to pacify *Kapha* and *Vata Doshas*. Parasites and worms are often associated with imbalances in these *Doshas*, particularly *Kapha*, which can create a conducive environment for their growth.

By balancing these *Doshas*, *Surana* helps in preventing and treating parasitic infestations. It is proved in recent researches that Chloroform extract, methanol extract, petroleum ether extract and isolated crude tannins were studied for anthelmintic activity. Anthelmintic activity of methanol extract of tubers shows prominent activity against *Pheretima posthuma*, *Tubifex tubifex* (a variety of worms) Death time and paralysis time of isolated crude tannins was very close to albendazole.[23]

**Effect of *Surana* in *Udarshula*:** In *Ayurveda* '*Udarshula*' refers to abdominal colic. In our classics, it has been mentioned that any type of pain (*Ruja*) occurs due to imbalance of *Vata Dosh*. *Surana* is particularly effective in balancing *Vata* and *Kapha Doshas*. Abdominal pain is often a result of *Vata Dosh* imbalance. By pacifying *Vata* and *Kapha Doshas*, *Surana* helps to reduce the symptoms associated with these imbalances, including pain. Further, the post-digestive effect of *Surana* is pungent (*Katu Vipaka*), which further aids in digestion and reduces gas and bloating, thereby alleviating pain. Some recent researches showed that *Surana* has been noted to have anti-inflammatory properties, which help in reducing inflammation in the gastrointestinal tract. This reduction in inflammation can significantly alleviate pain. Its analgesic properties contribute directly to pain relief by reducing the sensation of pain in the affected areas.

The corm of *Amorphophallus* species have diverse property of free radical scavenging, the methanolic and aqueous extract of *Amorphophallus campanulatus* tuber have shown good antioxidant activity.[24]

Analgesic activity in the whole plant of *Amorphophallus campanulatus* have shown effective analgesic activity using tail flick and tail immersion techniques by measuring the reaction time of the animals (rats). The extract showed reaction times of 7.33 ( $p < 0.001$ ) and 7.83 ( $p < 0.001$ ) min at a dose of 200 mg/ kg while the normal and reference groups exhibited reaction times of 2.16, 2.66 and 8.16 ( $p < 0.001$ ) and 8.5 ( $p < 0.001$ ) which supports the fact of its use in traditional medical practice.[25]

## Conclusion

*Surana* is a commonly available vegetable with properties of Ruchivardhak, Deepana, Pachana, Anulomaka, Shulaprasamak, Arshaghna, Krimighna, Sothahara etc. This review comprehensively explores the therapeutic potential of *Surana* (*Amorphophallus campanulatus*), from both traditional Ayurvedic and modern scientific perspectives. The findings from this review highlight the significant medicinal value of *Surana*, validating its long-standing use in Ayurvedic medicine and its relevance in contemporary healthcare. *Surana* is recognized for its potent anthelmintic properties, effectively expelling intestinal parasites and promoting gut health.

The reason why *Surana* is so effective in treating hemorrhoids is because of its capacity to balance the doshas of *Vata* and *Kapha*, improve digestive fire, and have anti-inflammatory properties. Research supports the antimicrobial, anti-inflammatory, and analgesic properties of *Surana*, aligning with traditional Ayurvedic uses. Its nutritional profile, rich in fibre, vitamins, and minerals & amino acids, contributes to its role in promoting digestive health and preventing constipation. In India, *Surana* is added to many traditional recipes to improve the food as well as the health benefits. Its diverse medicinal properties make it a valuable herb for treating various health conditions, particularly those related to the digestive system. Integrating *Surana* into dietary practices and therapeutic regimens offers a natural and effective approach to enhancing overall health and well-being.

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