



Review Article

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Therapeutic Potency of a Siddha Formulation Kandhaga Rasayanam: A Review

Meena R^{1*}, Ramaswamy RS²

¹PhD Research Scholar, Sirappu Maruthuvam Department, National Institute of Siddha, Chennai, India

²Director General, Central Council for Research in Siddha, Chennai, India

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*Corresponding author

Dr. Meena R, PhD Research Scholar, Sirappu Maruthuvam Department, National Institute of Siddha, Chennai, India
E-mail: meena_r83@yahoo.com

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ABSTRACT

Siddha system of medicine is one of the oldest systems of medicine practised among Tamil speaking community. The medicines in this system are prepared from raw materials like herbs, minerals/metals and animal products. Kandhaga Rasayanam is a herbo mineral formulation with 16 ingredients. It is used for treating skin diseases, arthritis, leucorrhoea, urinary diseases etc. This review is aimed to bring out scientific evidence for the therapeutic usage of Kandhaga Rasayanam and focussed on the pharmacological activity responsible for the curative nature of the drug. Most of its drugs have antimicrobial, anti-inflammatory activity hence justifying its usage in above mentioned diseases.

Keywords: Siddha system, Kandhaga Rasayanam, antimicrobial, anti inflammatory, skin diseases, arthritis.

INTRODUCTION

Siddha system is the foremost of all medical systems and is practised in South India, especially in Tamil Nadu, India. It is also called as Dravidian system of medicine, since it evolved along with Dravidian's culture. Siddha drugs are known for its safety and efficacy. The reason for the popularity of the system is attributed to its effective cure with minimal side effects¹. Siddhars, the founders of this system of medicine possessed Siddhic powers (supernatural power). They have left their imprints in many disciplines like medicine, alchemy, philosophy, yoga, varma, and other external therapies. Kandhaga Rasayanam (KR) is a classic Siddha compound drug which is in practice since 50 years. The drug chosen for review is mentioned in the Siddha text, Siddha Vaidhya Thirattu. This drug is used for skin diseases, arthritis, venereal diseases and urinary disorders. The drug review of Kandhaga Rasayanam, a herbo mineral drug gives sound evidence for its therapeutic action mentioned in literatures. The major ingredients are Sulphur, Ashwagandha and Parangipattai. This review is focussed on the pharmacological activities of each ingredient which supports the traditional claim and the literature search is confined to that area. The search was made from the textbooks in the library of National Institute of Siddha, Journals, internet databases etc.

Literatures on Kandhaga Rasayanam

The test drug Kandhaga Rasayanam is chosen from the text Siddha Vaidhya Thirattu. Apart from this there are few preparations by the name Kandhaga Rasayanam in various texts. The name of the texts and drug name is given below.

- Gandhaga Rasayanam² in the text Maruthuva Asiriyam

- Gendhaga Rasayanam³ in the text Therayar Vaidhya Kaaviyam 1500.
- Ganthaga Rasayanam (confection for skin diseases)⁴ in the text Pulipaani Vaidhyam 500.
- Kandhaga Rasayanam⁵ in the text Gunapadam Thathu Jeeva vaguppu.

Standard operating procedure for preparation of Kandhaga Rasayanam Sugar, Honey and Ghee

The mentioned ingredients in Table 1 are powdered separately and mixed together. Sufficient quantity of Sugar, honey and ghee are then added.

Purification of raw drugs

All the raw drugs are purified as per the methods defined in Siddha literature.

Sulphur

Other names: Kaarilayin naadham, Parai veeriyam, Atheedha prakasam, Peejam, Selvivindhu, Sakthi, Sakthi peesam, Sendhoorathadhi, Dhanam, Deviuram, Nadham, Natram, Parai nadham, Ponvarni, Rasa suronitham. Types according to colour:

- White coloured gandhagam
- Red as that of beak of parrot
- Golden coloured (nelli kai gandhagam)
- Colour of crow

Nellikai gandhagam is used in medicines.

Occurrence

Nepal, Kashmir, Afghanistan, Burma etc. It is found in combination with other metals/minerals, herbal and

animal products. Pagai sarakku: Copper, Natpu sarakku: Mercury, Suvai (taste): Bitter and Astringent, Actions: Cholagogue, laxative, tonic.⁷

Pharmacological activities of the ingredients of Kandhaga Rasayanam

Withania somnifera

Ashwagandha is used in the treatment of tuberculosis, rheumatism, inflammatory conditions and cardiac diseases⁸. It acts as antitumor, antibiotic, anticonvulsant and CNS- depressant agent⁹. Steroidal lactones isolated from the leaves of *Withania somnifera* exhibit antibacterial, antifungal and anti tumour properties^{10,11}. 10 µg/ml of Withaferin A inhibits various gram positive bacteria, acid- fast and aerobic bacilli and pathogenic fungi. It is active against vaccine virus and *Entamoeba histolytica*¹²⁻¹⁴. The steroidal content in ashwagandha is very much higher than that of hydrocortisone. This is proved in experimental rats^{15,16}.

Smilax china

Smilax china has anti-inflammatory activity. Its decoction (90 and 180 mg/kg; p.o) could significantly inhibit inflammatory swelling on adjunctive arthritis mouse¹⁷. Shu et al 2006 has studied the anti inflammatory activity¹⁸. Sieboldogenin, isolated from ethyl acetate fraction of *Smilax china* has potent anti-inflammatory activity¹⁹. In Traditional Chinese Medicine, it is used in the management of chronic pelvic inflammatory disease¹⁸, syphilis, acute bacterial dysentery and chronic nephritis²⁰. The methanol extract of *Smilax china* exhibit antimicrobial activity²¹. *In vitro* antimicrobial activity of *Smilax china* was reported by Shu Xiao-Shun et al²².

Terminalia chebula

Kannan et al. has reported that the ethanol extract of *Terminalia chebula* shows inhibitory activity on *Salmonella typhi*, *Staphylococcus aureus*, *Bacillus subtilis* etc²³. Malekzadeh et al. reported that the water extract (1-2.5 mg/ml) inhibits the increased action of *Helicobacter pylori*²⁴. Ethanedioic acid from *Terminalia chebula* has strong and moderate inhibitory activity against intestinal bacteria (*Clostridium perfringes* and *E. coli*)²⁵. Saheb Shinde et al. has studied the effectiveness of aqueous, alcoholic, ethyl acetate extract of *Terminalia chebula* against *Aspergillus niger*, *Aspergillus flavus*, *Alternaria alternata* etc²⁶. 70 % of methanol, ethyl acetate, hexane, chloroform extract of Haritaki was found to be active against *Fusarium oxysporum*, *Phytophthora capsici*, *Fusarium solani* etc.²⁷ Aqueous extract of *Terminalia chebula* have anti dermatophytic activity against *Epidermophyton floccosum*, *Microsporum gypseum* and *Trichophyton rubrum* and yeast *Candida albicans*²⁸⁻³⁰.

Phyllanthus emblica

Ethanollic extracts of the leaves of *Phyllanthus emblica* show good antibacterial properties and mild antifungal

properties^{31,32}. Dutta et al 1998 have also reported the antibacterial and antifungal activity^{33,34}. The minimum inhibitory concentration of extract of *Phyllanthus emblica* against *Staphylococcus aureus* and *Klebselia pneumonia* ranges from 0.261 to 0.342³⁵. Moazzem Hossen et al has concluded that the ethanolic extract of the fruits of *Phyllanthus emblica* (Linn) possess significant analgesic, anti-inflammatory and anti diarrhoeal effect³⁶. The anti inflammatory activity of amla was also reported by Dang et al 2011³⁷.

Terminalia bellerica

Badrul Alam et al (2011) have reported the antioxidant and antibacterial activity of *Terminalia bellerica* both *in vitro* and *in vivo*³⁸. Chloroform and ethyl acetate extract of *Terminalia bellerica* fruit shows maximum zone of inhibition against *E. coli*, *B. subtilis* and *Staphylococcus aureus*³⁹. Valsaraj R and Nyman U have also reported the antimicrobial activity of *Terminalia bellerica*⁴⁰. Elizabeth K M et al (2005) have concluded that *Terminalia bellerica* fruit possess broad spectrum antimicrobial activity⁴¹. Crude extract of *Terminalia bellerica* show analgesic activity⁴².

Zingiber officinale

The hexane and ethyl acetate extract of *Zingiber officinale* was found to be effective against *Colliform bacillus*, *Staphylococcus epidermis* and *Streptococcus viridians*⁴³. 100 g/100 ml concentration of water extract of ginger leaf and root showed 30 and 32 mm zone of inhibition against *Staphylococcus aureus* and *Streptococcus pyogenes*⁴⁴. Dry ginger oil was found to be active against *Pseudomonas aeruginosa*. Fresh ginger oil was found to be active against *Aspergillus niger*, *Candida* and *Pseudomonas aeroginasa*⁴⁵. Experiments were also conducted to study the antifungal activity of ginger and it was found to be a good antifungal agent⁴⁶. Gingerol proved to be an active inhibitor of *Mycobacterium avium* and *Mycobacterium tuberculosis*⁴⁷. Gingerol, an active ingredient of ginger rhizome shows antibacterial activity against periodontal bacteria⁴⁸. The result of a double blind comparative clinical trial showed that ginger was equally effective to mefenamic acid and ibuprofen in relieving pain in patients with primary dysmenorrhoea⁴⁹.

Piper nigrum

Aqueous decoction of black pepper showed antibacterial activity against periodontal bacteria⁵⁰. Singh and Duggal have reported the anti-inflammatory action of piperine. The pro-inflammatory cytokine GM-CSF, IL-6, TNF-α and IL-1β was decreased by administration of piperine⁵¹. Black pepper possess anti inflammatory activity. β caryophyllene from black pepper exhibits anaesthetic activity⁵². *Piper nigrum* has anti pyretic activity⁵³.

Piper longum

Piper longum showed potent antibacterial activity against *Bacillus subtilis*. Piperine was found to be more effective

against *Staphylococcus aureus*⁵⁴. The anti tubercular activity of *Piper longum* was also reported^{55,56}. Ethanol, hexane, n- butanol extract of *Piper longum* was effective against *Entamoeba histolytica*. Piperine and the ethanol extract of long pepper cures ceacal amoebiasis in rats⁵⁷. In carrageenan induced rat oedema model decoction of *Piper longum* showed marked anti inflammatory activity⁵⁸.

Emblia ribes

Embelin, isolated from *Embelia ribes* have non narcotic orally effective analgesic property. It acts on the CNS⁵⁹. Potassium embelate, isolated from *Embelia ribes* possess analgesic activity⁶⁰. Narang et al 1961 has reported the antibacterial activity of *Embelia ribes*⁶¹. The aqueous and ethonolic extracts of *Embelia ribes* were found to be active against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*^{62,63}. The ethanol, methanol, water, petroleum ether extract of *Embelia ribes* show antifungal activity against *Candida* species⁶⁴. The seeds of *Embelia ribes* show antifungal activity against *Colletotricum crassipes*, *Cladosporium*, *Armillaria mellea*, *Colletotricum capsici*, *Aspergillus niger*, *Rhizopus oryzae*, *Aspergillus terreus* and *Candida*⁶⁵. Embelin isolated from ethanol extract of *Embelia ribes* at the dose of 30 mg/ml showed significant wound healing activity⁶⁶. The ethanol extract of the fruits of *Embelia ribes* also possess wound healing property⁶⁷.

Elettaria cardamomum

The *Elettaria cardamomum* seeds possess anti inflammatory, analgesic and anti-spasmodic activity. The oil from *Elettaria cardamomum* seeds (175 µl/kg and 280 µl/kg) were found to show anti inflammatory activity in carrageenan induced rat paw oedema⁶⁸. The essential oil of cardamom showed antimicrobial activity^{69,70}. K. R. Aneja and Radhika Joshi in their research study have concluded that the ethanol and acetone extract of *Elettaria cardamomum* can be used as a novel anti microbial agent against periodontal micro organisms⁷¹. It is found from the study of Hero F. Salah Akyari that methanol, ethanol and aqueous extract of *Elettaria cardamomum* shows strong inhibitory activity against *Staphylococcus aureus* and *Proteus mirabilis*⁷². Ethanol extract of *Elettaria cardamomum* (512 mg/ml) exhibits antibacterial activity⁷³.

Santalum album

The result of an *in vitro* study has reported sandalwood oil as an effective antibacterial agent against Methicillin resistant *Staphylococcus aureus* and anti mycotic resistant *candida* species⁷⁴. α and β santalol exhibit antibacterial activity against *Helicobacter pylori*⁷⁵. Sandal wood oil also shows activity against *Herpes simplex* virus Type 1⁷⁶. β santalol shows anti influenza activity against H₃N₂ virus. The methanol extract of *Santalum album* was effective against *Bacillus subtilis*, *Salmonella typhi*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. It is highly active against *Candida albicans*⁷⁷. Sandal wood oil showed anti dermatophytic activity against

Microsporum canis, *Trichophyton rubrum* and *Trichophyton mentagrophytes*⁷⁸.

Cicer arietinum

Methanol and ethanol extract of *Cicer arietinum* showed anti inflammatory activity in carrageenan and histamine induced inflammation⁷⁹. The crude aqueous extract of *Cicer arietinum* showed anti fungal activity against *Drechslera tetramura* and *Drechslera hawaiiensis*⁸⁰. The pure chick pea saponin showed inhibitory activity against filamentous fungi and *Penicilium digitatum*⁸¹. Ozcelik et al 2010 has found that chick pea seed extract exhibited antifungal activity against *Candida albicans* at the concentration of 8 µg/ml⁸². Chick pea extract have potent antimicrobial property against *E. coli*, *P. aeruginosa*, *K. pneumonia*, *B. subtilis* and *E. faecalis*.

Cinnamomum zeylanicum

Cinnamomum zeylanicum is effective against *Aspergillus* species, *Candida* species, *Cryptococcus neoformans*, *Epidermophyton floccosum*, *Hisioplasma capsulatum*, *Malassezia furfur*, *Microsporum audouini*, *Microsporum canis*, *Microsporum gypseum*, *Trichophyton mentagrophytes*, *Trichophyton rubrum* and *Trichophyton tonsurans*. *Cinnamomum zeylanicum* has also demonstrated activity against the human rota-virus. It is effective against *Mycobacterium tuberculosis* strains H₃₇Rv and H₃₇Ra, *Clostridium difficile*, *Bacillus cereus*, *B. coagularis*, *B. subtilis*, *S. aureus*, *E. coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Proteus vulgaris*, *Pseudomonas* spp., *S. aureus*, *S. pneumonia*, *Helicobacter pylori*, *Salmonella typhi* and *S. albus*⁸³⁻¹¹². *Cinnamomum zeylanicum* have antinociceptive and anti inflammatory activity. It also possesses analgesic activity¹¹³. The extracts of *Cinnamomum zeylanicum* accelerate the process of wound healing. It specifically increases epithelialisation¹¹⁴.

Semecarpus anacardium

Ramprasath et al 2006 has reported the anti inflammatory activity on carrageenan induced paw oedema and cotton pellet granuloma model¹¹⁵. The petroleum ether extract of marking nut extract (150 µl) show anti bacterial activity against *Escherichia coli*, *Bacillus subtilis*, *Micrococcus luteus*, *Klebsiella pneumonia*, *Streptococcus aureus*, *Proteus vulgaris*, *Salmonella typhi*¹¹⁶. Alcohol extract of dried marking nuts show antifungal activity against *Aspergillus fumigates* and *Candida albicans*.

Plumbago zeylanica

The acetone extract of *Plumbago zeylanica* exhibited significant anti inflammatory activity. The acetone and petroleum ether extracts of the plant significantly (p < 0.01) decreased the pain stimulus¹¹⁷. Research studies suggest that *Plumbago zeylanica* has a potential to be developed into an anti-inflammatory agent¹¹⁸. Ethanolic extract *Plumbago zeylanica* root was active against Methicillin-resistant *Staphylococcus aureus* (MRSA).

Table 1: Method of preparation of Kandhaga Rasayanam

S. No.	Tamil name	Botanical name/ Chemical name	Part used	Quantity
1.	Kandhagam	Sulphur		350 grams
2.	Amukkara kizhangu	<i>Withania somnifera</i> Dunal	Root tuber	175 grams
3.	Parangi chakkai	<i>Smilax china</i> . Linn	Root	70 grams
4.	Kadukkai	<i>Terminalia chebula</i> . Retz	Fruit	35 grams
5.	Nellikai	<i>Phyllanthus emblica</i> Linn	Fruit	35 grams
6.	Thandrikkai	<i>Terminalia bellerica</i> Roxb	Fruit	35 grams
7.	Chukku	<i>Zingiber officinale</i> . Roscoe	Rhizome	35 grams
8.	Thippili moolam	<i>Piper longum</i> . Linn	Root	35 grams
9.	Milagu	<i>Piper nigrum</i> . Linn	Fruit	35 grams
10.	Vaividangam	<i>Embelia ribes</i> . Burm	Seeds	35 grams
11.	Ealam	<i>Elataria cardamomum</i> . Linn	Seeds	35 grams
12.	Kirambu	<i>Cinnamomum zeylanicum</i> . Breyn	Inflorescence	35 grams
13.	Chandhanam	<i>Santalum album</i> . Linn	Wood	35 grams
14.	Kadalai	<i>Cicer arietinum</i> . Linn	Seeds	35 grams
15.	Senkottai	<i>Semecarpus anacardium</i> . Linn	Nut	35 grams
16.	Chithiramoolam	<i>Plumbago zeylanica</i> . Linn	root bark	35 grams ⁹

Table 2: Information on herbal ingredients as per the text Gunapadam Mooligai vaguppu

S. No.	Botanical name	Vernacular names				Part used
		Tamil	English	Hindi	Sanskrit	
1	<i>Withania somnifera</i> Dunal	Amukkiri, Asuvam, varagakarni, Amukinakizhangu	Winter cherry		Aswagandha	Leaf, seeds, root tuber
2	<i>Smilax china</i> . Linn	Parangichakka, Madhusmigam, Seenapattai	China root	Chobchini	Madhusnuhi	Root tuber
3	<i>Terminalia chebula</i> . Retz	Kadukkai, Akkodam, Amudham	Chebulic myrobalan, Ink nut	Pile Hara	Pathya, Sudha, Bishak Priya, Haritaki	Unripe fruit, Fruit
4	<i>Phyllanthus emblica</i> Linn	Nelli, Aamalayam, Ambal, Korangam	Indian Gooseberry	Amlika	Amalaki	Leaf, flower, bark, root, unripe fruit, seed.
5	<i>Terminalia bellerica</i> . Roxb	Thandri, Amudham, Erikatbalam, Boothanasam	Belleric myrobalans	bhaiirah	Vebeethaki	Leaf, fruit, seed
6	<i>Zingiber officinale</i> . Roscoe	Chukku, Arukkan, Adhagam, Vidamoodiya Amirtham	Dried ginger	Sonth	Nagaram	Rhizome
7	<i>Piper longum</i> . Linn	Milagu, Kalinai, Kari, Malayali	Black pepper	Kalimirsch	Maricha	Seed, climber
8	<i>Piper nigrum</i> . Linn	Thipilli, Aargadhi, Ambu, Aadhimarundhu	Long pepper		Pipalli	Unripe fruits, rice
9	<i>Embelia ribes</i> . Burm	Vaivilangam, Keralam, Varnanai	Embelia	Bal-badang	Vidanga	Fruit, seeds
10	<i>Elataria cardamomum</i> . Linn	Elam, aanji, thudi, korangam	Cardamom seeds	Elachi	Ela	Seeds
11	<i>Cinnamomum zeylanicum</i> . Breyn	Lavangam, karuvai kirambu, sosam	Cloves	Long	Lavangam	Flower (inflorescence), bark, leaf
12	<i>Santalum album</i> . Linn	Chandhanam	Sandal wood	Chendan	Shri-gandha chandanam	Tree oil
13	<i>Cicer arietinum</i> . Linn	Kadalai, sooram	Bengal gram, chicken pea		Chanasa	Leaf, seed, whole plant
14	<i>Semecarpus anacardium</i> . Linn	Serankottai, vallathi, nandhivithu	Marking nut tree	Bhilwan	Bhallathaki-Bijam	Nut, seed, fruit
15	<i>Plumbago zeylanica</i> . Linn	Venkodiveli, venchiramoolam	Ceylon leadwort	Chita, chitra	Angi-Shika, Chitraka, Vrikschaka	Root

The inhibition zone size ranged from 11 to 44 mm and minimum inhibitory concentration (MIC) varied from 0.32 to 3.25 mg/ml. The ethyl acetate, acetone and methanol fractions of *Plumbago zeylanica* demonstrated antibacterial activity¹¹⁹. Plumbagin and chloroform extracts of *Plumbago zeylanica* L. root were found to possess antibacterial activity against *Escherichia coli*, *Salmonella typhi* and *Staphylococcus aureus*. *Salmonella paratyphi*, *Escherichia coli*, *Shigella dysenteriae* and a R-plasmid-harboring standard strain, *E. coli*^{120,121}. Alcoholic extracts of *Plumbago zeylanica* showed strong

antifungal activity against the pathogenic yeast, *Candida albicans* and dermatophytes, *Epidermophyton floccosum*, *Microsporum gypseum* and *Trichophyton rubrum*. Minimum inhibitory concentration (MIC) was found to be 4 mg/ml^{29,122}. Sulphur is a known anti fungal, antibacterial agent. It is a well known broad spectrum antibiotic. Siddha literatures have mentioned the use of sulphur in skin diseases and arthritis⁷.

CONCLUSION

From this literature review it is evident that the ingredients of Kandhaga Rasayanam has pharmacological activities like antibacterial, antifungal, antiviral, analgesic and anti-inflammatory activity which are responsible for its therapeutic activity claimed in literatures.

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