


Review Article
NILAVAAGAI CHOORANAM – A SIDDHA HERBAL MEDICINE
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ABSTRACT

Siddha system is mainly experienced in the Southern part of India. It is one of the most primitive traditional medicines in the world which treats not only the body but also the mind and the soul. The word Siddha derived from Tamil words “Siddhi” which means “An object to be Attained “or “perfection” or “heavenly bliss”. The aim of this review article is to explore the scientific literary evidences for the therapeutic usage of “*Nilavaagai chooranam*” for respiratory illness (*Swasakasam, Iya noi*) as mentioned in Siddha literature *Siddha vaidaya Thirattu* and to focus on the Pharmacological activity for the healing nature of the drug. Most of the raw drugs used for the preparation of *Nilavaagai chooranam* have Broncho dilatory activity, Anti-microbial activity, Anti-inflammatory activity, Immunomodulatory activity, Anti-histamine activity hence justifying its usage in respiratory ailments.

KEYWORDS: Siddha medicine, *Nilavaagai chooranam*, Respiratory disorder, Pharmacological activity.

INTRODUCTION

The Siddha system of medicine is experienced in some parts of south India especially in state of Tamil Nadu. This system has come to be closely recognized with Tamil civilization. The term ‘Siddha’ has come from ‘Siddhi’ which means Achievement. Siddhars were the main who achieved supreme knowledge in the field of medicine/ yoga (Tapa) (Meditation)^[1]. According to the traditions 18 Siddhars were supposed to have contributed to the development of Siddha medicine, yoga, philosophy. As per Siddha concept the matter in energy are the two dominants entities. They are Shiva and Sakthi in Siddha system.^[2] *Nilavaagai chooranam* is a Siddha poly herbal formulation containing important plant material such as *Nilavaagai- Cassia angustifolia* Vahl (syn.*Cassia senna*), *Milagu- Piper nigrum*, *Chukku – Zingiber officinale*, *Omam – Trachyspermum ammi*,

Vayu vidangam- Embelica ribes and sugar. It is commonly used Siddha medicine especially for laxative, worm infestation, and this article describes various aspects like the morphological character, active constituents and pharmacological properties of each Ingredients used in *Nilavaagai chooranam* and to evaluate their therapeutic effect in treating respiratory diseases.

MATERIALS AND METHOD

It is prepared based on the formula Mentioned in the Textbook of *Siddha vaidaya Thirattu*. Preparation of *Nilavaagai chooranam* is a compound drug formulation prepared by powdering and shifting of all the ingredients separately and mixed with equal parts of white sugar and preserved in a tightly closed container.

Table 1: Composition of *Nilavaagai chooranam*^[3]

S.No	Tamil name	Botanical name	Parts used	Quantity
1.	<i>Nilavaagai</i>	<i>Cassia angustifolia vahl (syn.C.senna)</i>	Leaves & pods	1 palam
2.	<i>Milagu</i>	<i>Piper nigrum</i>	fruits	1 palam
3.	<i>Chukku</i>	<i>Zingiber officinale</i>	Rhizome	1 palam
4.	<i>Omam</i>	<i>Trachyspermum ammi</i>	Fruit	1 palam
5.	<i>Vaivilangam</i>	<i>Embelica ribes</i>	Fruits	1 palam

Cassia angustifolia Vahl. (syn *Cassia senna*) in commerce is known as Indian or Tinnevelly Senna, is a well known traditional medicinal plant belonging to family Leguminosae.

Taxonomical classification: Nilavaagai⁴

Kingdom: Plantae
Subkingdom: Tracheobionata
Division: Magnoliophyte
Class: Magnoliopsida
Family: Fabaceae
Genus : *Cassia*
Species: *angustifolia*

Botanical description

A small shrub about 1m in length with pale substrate or obtusely angled erect or ascending branches. Leaves usually 5-8 jugate, leaflets overall, lanceolate, glabrous, axillary erect, waxy many flowered, usually considerably exceeding the subtending leaf. Bracts membranous, ovate, or obovate, caducous. The pods are 1.4 to 2.8 in long, about 0.8 in wide, greenish brown in color, and contain 5-7 obovate dark brown and smooth seeds⁵.

Chemical constituents

In the leaf; sennosides A and B, sennosides C & D which are glycosides of heterodianthrones of aloemodin and rhein are present. Others include palmidin A, rhein anthron & aloemodin glycosides, some free Anthroquinones and some potent, novel compounds of as yet undetermined structure. *C.senna* usually contains more of the sennosides. In the fruit; sennosides A and B and a closely related glycoside sennoside A1. Naphthalene glycosides; tinnevellin glycoside & 6-hydroxymusizin glycoside miscellaneous; mucilage, flavonoids, volatile oil, sugars, resins etc⁵.

Anti-microbial activity

The extracts of *Cassia angustifolia* showed Anti-microbial activity. Different extracts (ethanol, methanol, petroleum ether and aqueous solutions) of *Cassia angustifolia* plant are extracting out. Anti-microbial efficacy of various extracts was assessed by disc diffusion method against Gram positive-staphylococcus aureus, Gram negative- *Pseudomonas aeruginosa* and *Escherichia coli*, fungi-*Aspergillus flavus*, *Fusarium oxysporum*, and *Rhizopus stolonifera*. Phytochemical screening of the extract showed the presence of alkaloids, flavonoids, carbohydrate, proteins, tannins and triterpenoids in *Cassia angustifolia*⁴.

Uses in Respiratory system

It also helps to improve the absorption of oxygen for the Respiratory system by promoting drainage of mucus from the lungs by thinning the

mucus from the Respiratory tract⁵. senna is used as an expectorant and used for bronchitis⁶.

Taxonomical classification: Milagu⁷

Kingdom: Plantae
Class: Equisetopsida
Sub class : Magnoliidae
Super order: Magnoliana
Order: Piperales
Family: Piperaceae
Genus: *Piper*
Species : *nigrum*

Botanical description⁸

A stout climber grows to a height of 8 meters or more, Stems: Stem have knots where leaves, adventitious roots and fruits emerge. Leaves: leaves are alternate, petiolate, dark green in colour on upper side and whitish-green on underside of the leaves, leathery texture, almond shape, 6 to 10 cm long. Flower: Whitish or yellowish green seen in clusters along stalk (Pendulous spikes). Fruits: Round, 40 to 60 fruits on each spike, green in color turns to red when they ripen, each fruit contain single seed.

Chemical constituents

Black pepper contains moisture - 13.2%, protein - 11.5%, carbohydrate - 49.2%, Mineral matter - 4.4%, fat -6.8%, fiber-14.9%, phosphorus-198mg/100g; calcium-460mg/100g; phytin phosphorus -5mg/100g; Vitamin A value - 1800IU/100g, Iron - 16.8 mg/100g. The presence of oxalic acid (0.4-3.4%) has been reported starch is the predominant constituents oh black pepper it accounts 34.1% in it. The alkaloid piperine (C₁₇ H₁₉ O₃ N₁) is considered to be the major constituents responsible for the bitter taste of black pepper. Other pungent alkaloids, occurring in pepper in smaller quantity are chavicine, piperdine & piperettine. Oil of the pepper is an important colorless to slightly greenish liquid with a characteristics odor of pepper & also of phellandrene⁹.

Anti - asthmatic

Many old people and herbal practitioners believed that the addition of little amounts of powdered peppercorn in a green tea significantly reduces asthma¹⁰.

Antitussive and Bronchodilator

Many traditional practices prove it as well. *P. nigrum* is widely used in many herbal cough syrups due to its potent antitussive and bronchodilator properties¹¹.

Anti-microbial activity

Piperine an alkaloid the major constituents of piperamides present in the skin and seed of the black pepper is responsible for the anti-microbial

activity. The extracts of black pepper can be used as anti-microbial agents¹².

Antihistaminic activity

Oral administration of piperine in different proportion to Mice suppressed and reduced the infiltration of eosinophil, hyper responsiveness and inflammation due the suppression of the production of histamine, interleukin- 5, immunoglobulin E and interleukin-4¹³.

Immuno modulator activity

In vitro immunomodulatory activity of piperine was evaluated to enhance the efficacy of rifampicin in a murine model of *Mycobacterium tuberculosis* infection. Mouse splenocyte were used to evaluate in-vitro immunomodulation of piperine for cytokine production, macrophage activation and lymphocyte proliferation. Piperine treated mouse splenocytes demonstrated an increase in the secretion of Th-1 cytokines (IFN- and IL-2), increased macrophage activation and proliferation of T and B cell. Protective efficacy of piperine and rifampicin (1mg/kg) combination against *Mycobacterium tuberculosis* was reported due to immunomodulatory activity¹⁴.

Taxonomical Classification: omam

Kingdom: Plantae Plant

Division Mangnoliophyta -Flowering plants

Class : Mangnoliopsida Dicotyledons

Order: Apiales

Family: Apiaceae

Genus : *Trachyspermum*

Species : *ammi*

Botanical description

Ajwain is an erect, hairless or minutely pubescent, branched annual herb. The stems are grooved. The leaves are rather distant, 2-3-pinnately divided in narrow linear segments. Flowers are borne in terminal or seemingly-lateral stalked, compound umbels, white and small. The fruits are ovoid, aromatic, greyish brown. The mericarps, which are the components of the fruit, are compressed, with distinct ridges and tubercular surface, 1-seeded. This is what is used as the spice Ajwain, in cooking¹⁵.

Chemical constituents

Essential oil 2% to 4% brownish colour and have-thymol (35% - 60%), non-thymol fractions called thymene contains p-cymene (50%-55%), β -pinene (4%-5%), limonene with γ -pinenes and β -pinene (30%-35%)¹⁶. Fiber (11.9%), moisture (8.9%), fat (18.1%), carbohydrates (38.6%), protein (15.4%), mineral matter (7.1%), glycosides, saponins and flavones, calcium, phosphorous, iron and nicotinic acid¹⁷. Thymol (35%-60%), p-menth-3-ene-

1 β , 2 β , 5 β -triol, Two new glucosides identified as 1-deoxy-L-erythritol (C₄H₁₀O₃) and 1-deoxypentitol (C₅H₁₂O₄)¹⁸. Carvone (48%), limonene (38%) and dillapiole (9%)¹⁹.

Antihistaminic activity

The essential oil, ethanolic, aqueous and macerated extract of *Trachyspermum ammi* were studied on guinea pig tracheal chains. The results showed clear rightward shift in histamine response curves which indicated a competitive antagonism effect of *T.ammi* at histamine H₁-receptors²⁰.

Antitussive effects

The antitussive effects of aerosols effects of two different concentrations of aqueous and macerated extracts and carvacrol, codeine and saline were tested by counting the number of coughs produced. The results showed significant reduction of cough number obtained in the presence of both concentrations of aqueous and macerated extracts and codeine (p < 0.001 for extracts and p < 0.001 for codeine)²¹.

Anti microbial activity

Ajwain were reported to be carvacol and thymol. Thymol kills the bacteria resistant to even prevalent third generation antibiotics and multi-drug resistant microbial pathogens and thus work as a plant based generation herbal antibiotic formulation²². Methanolic extract of seed of *T.ammi* were tested against 11 bacterial species *pseudomonas aeruginosa*, and *bacillus pumilus*; *staphylococcus aureus* and *staphylococcus epidermis*; *E.coli*, *klebsiella pneumonia* and *Bordetella bronchiseptica* respectively and showed significant anti-bacterial activity.²³

Broncho dilatory effect

The bronchodilatory effect of decocted extract of Ajwain on the asthmatic patients airways was examined in a subsequent trial study. According to the results, the extract has a relatively bronchodilatory effect on asthmatic airways compared to the effect of Theophylline at concentrations used. In another study, in the field of respiratory, bronchodilatory effects of different fractions of *Ajwain* essential were examined. Results showed that the relaxant and bronchodilatory effect of essential oil fractions may be due to the amount of Carvacrol²⁴.

Taxonomical classification: vaivilangam²⁵

Kingdom : Plantae

Phylum : Angiosperms

Order : Ericales

Family : Myrsinaceae

Genus : *Embelia*

Species : *ribes*

Botanical description

The fruits are brownish black on ageing, globular to sub-globular, 2-4 mm in diameter & style at apex. In a few fruits the pedicle along with persistent calyx is present. Surface is warty, pericarp brittle, enclosing a single seed, speckled with yellowish brown or white spots. Most of the seeds are striate. Transverse section of fruits shows epicarp consisting of single row of tabular cells of epidermis, generally not distinct due to deposition of colouring matter²⁶.

Chemical constituents

Embelia ribes berries contain several chemical constituents like embelic acid, volatile oil, fixed oil, resin, tannin, christembin (alkaloid), phenolic acids like caffeic acid, vanillic acid, chlorogenic acid, cinnamic acid, o-coumaric acid. 4.33% of the embelin content is observed in the berries of *Embelia ribes*. Embelin is water insoluble, but forms a water soluble, violet colored complex, in alkaline medium. Plant contains potassium embelate, 2, 5-dihydroxy, 3-undecyl-1, 4-benzoquinone, embelin, quercitol, fatty ingredients, vilangin. Phytochemical investigation of the seeds revealed 3 new compounds identified as 3 - (4"-hydroxyoctadecanyloxy)-p-quinonyl-5-methylene-8-(10-pentanyloxy)-p-quinone (embelinol), n-pentacosanyl-nnonadeca-71-en-91-alpha-ol-11-oate (embeliribyl ester), 1, 2, 4, 5-tetrahydroxy 3-undecanyl benzene (embeliol) and a known compound embelin²⁷.

Anti-histaminic activity

In the isolated goat tracheal chain preparation, histamine produced dose dependent contraction of goat tracheal chain preparation while there was right side shift of dose response curve of histamine in the presence of *Embelia ribes* indicating antihistaminic activity²⁸.

Anti-histaminic drug chlorpheniramine maleate and *Embelia ribes* significantly protected the guinea pigs against histamine induced bronchospasm. *E.ribes* has significantly prolonged the latent period of convulsions as compared to control following the exposure to histamine aerosol. This indicates the utility of the *E.ribes* in the treatment of Asthma and bronchitis by virtue of its H1-receptor blocking or Broncho dilating activity. This *E.ribes* have anti-histaminic by blocking H1-receptor or Broncho dilating activity which suggestive of its potential in prophylaxis and management of Asthma²⁹.

Anti-microbial activity

The ethanolic extract of *Embelia ribes* fruits showed highest zone of inhibition against *Pseudomonas aeruginosa* while the lowest activity was demonstrated by the water extract showed lower activity against test organisms compared to the ethanolic extract³⁰.

Anti bacterial activity

Embelin showed bactericidal activity (MIC index is 4 or less than 4) against Gram +ve organisms, whereas against Gram -ve organisms it showed bacteriostatic activity (MIC index values greater than 4 and less than 32). With regard to antibacterial activity, embelin showed bactericidal activity against Gram +ve organisms, and bacteriostatic against Gram -ve organisms. Thus, embelin finds application as potent antibacterial agent³¹.

Anti-inflammatory activity

Anti-inflammatory activity of fruits of *Embelia ribes* as well embelin is reported in carrageenan-induced paw edema³².

Experimental evidence

In this study demonstrate that in an in vivo condition, Embelin can effectively ameliorate LPS-induced ARDS by inhibiting lung edema, infiltration and activation of neutrophils in to the BAL fluid, pro-inflammatory cytokines, Mye-lo peroxidase in the lung. Pretreatment with embelin markedly prevented pO₂ down-regulation and pCO₂ augmentation.

The study demonstrates the effectiveness of *Embelia ribes* Burm. f.(Fam.Myrsinaceae) seeds in acute respiratory distress syndrome possibly related to its anti-inflammatory and protective effect against LPS induced airway inflammation by reducing nitrosative stress, reducing physiological parameters of blood gas change, TNF- α and mono nucleated cellular infiltration indicating it as a potential therapeutic agent for acute respiratory distress syndrome.³³

Taxonomical classification: chukku³⁴

Kingdom :Plantae
Division : Magnoliophyta
Order: Zingiberales
Family:Zingiberaceae
Genus:Zingiber
Species:*Z.officinale*

Botanical description

Ginger is herbaceous rhizomatous perennial, reaching up to 90 cm in height under cultivation. Rhizomes are aromatic, thick lobed, pale yellowish, bearing simple alternate distichous narrow oblong lanceolate leaves. The herb develops several lateral shoots in clumps, which begin to dry when the plant

matures. Leaves are long and 2 - 3 cm broad with sheathing bases, the blade gradually tapering to a point. Inflorescence solitary, lateral radical pedunculated oblong cylindrical spikes. Flowers are rare, rather small, calyx superior, gamosepalous, three toothed; open splitting on one side, corolla of three sub equal oblong to lanceolate connate greenish segments.³⁵

Chemical constituents

Chemical analysis of ginger shows that it contains over 400 different compounds. The major constituents in ginger rhizomes are carbohydrates (50-70%), lipids (3-8%), terpenes, and phenolic compounds. Terpene components of ginger include zingiberene, β -bisabolene, α -farnesene, β -sesquiphellandrene, and α -curcumene, while phenolic compounds include gingerol, paradols, and shogaol. (These gingerols (23-25%) and shogaol (18-25%) are found in higher quantity than others. Besides these, amino acids, raw fiber, ash, protein, phytosterols, vitamins (e.g., nicotinic acid and vitamin A), and minerals are also present.³⁶

Anti-inflammatory activity

The anti-inflammatory activity of the *Z. officinale* extract was performed in the carrageenan-induced rat paw odema in Wistar strain albino rats. The rhizome extract (50 and 100 mg/kg body weight) significantly reduced the carrageenan-induced rat paw odema in rats³⁷. Some other reports have also mentioned about the anti-inflammatory properties of ginger which may be of help in controlling the exaggerated immune and inflammatory response in asthma³⁸.

Antibacterial and anti-cough forming effects

In this study the antibacterial activity was screened for three microorganism; *Proteus mirabilis*, *Klebsiella pneumoniae*, *Streptococcus aureus*. The data was compared to that of standard antibiotics. To antibacterial activity of *Zingiber officinale* data revealed the sensitizing quality of extract against *Proteus mirabilis*, *Klebsiella pneumoniae*, *Streptococcus aureus* 250 and 500 mg/kg concentration of extract were having good activity, showing zone of inhibition after 12 hour time interval. In the another set of experiment anti cough forming activity of *Zingiber officinale* extract shows the expiratory effort due to an end tracheal mechanical stimulus was reduced by *Zingiber officinale* extract shows the dose response in SGOT and SGPT enzyme as compared to SO₂ treated group. The mortality rate was observed to be nil in all experimental groups. A significant reduction in body weight gain was observed. Serum SGOT and SGPT concentration showed a significant increase as compared to control. We were found the anti-cough

forming activity of *Zingiber officinale* extract as compared to standard (Benadryl) and control liver enzymes was also significant using SGOT and SGPT enzymes. These results obtained in the current study also indicated an increase in activity of the liver enzymes following liver damage. Thus the extract would be a good alternative for broad spectrum antibiotic in addition to the anti-cough forming effect³⁹.

Bronchoprotective effect

Aqueous extract of *Zingiber officinalis* (AZO) produced significant dose dependant broncho proection against histamine induced bronchospasm which might be due to antihistaminic action⁴⁰.

Immunomodulatory activity

The beneficial effects of ginger in treating coughs, colds and flu is probably linked to immune-boosting properties of the plant⁴¹. Few studies have examined the potential immunomodulatory activity of ginger. Non-specific immunity was increased in rainbow trout eating a diet containing 1% of a dried aqueous ginger extract for three weeks⁴². Mice fed a 50% ethanolic ginger extract (25 mg/kg) for seven days had higher haemagglutination antibody titre and plaque-forming cell counts, consistent with improved humoral immunity⁴³. One in vitro study found that ginger suppressed lymphocyte proliferation; this was mediated by decreases in IL-2 and IL-10 production⁴⁴.

That ginger and its bioactive constituents, including 6-gingerol, 8-gingerol, 6-shogaol, citral, and eucalyptol, have protective effects against respiratory disorders, at least mediating them through the induction of relaxation in airway smooth muscle and the attenuation of airway resistance and inflammation⁴⁵.

CONCLUSION

From this literature review it is evident that the most of the ingredients of *Nilavaagai chooranam* have pharmacological activities like Broncho dilatory activity, Antimicrobial activity, Anti-inflammatory activity, Immunomodulatory activity, Antihistamine activity. Pharmacological reviews will give valuable information which will assist the Physician in getting more advanced knowledge about the biological activities of ingredients of the drug. Further clinical trials should be carried out to develop the scientific evidence for the uses of *Nilavaagai chooranam* in treating the above mentioned diseases.

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