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PHYTO-PHARMACOLOGICAL REVIEW ON *SIDDHA* POLYHERBAL FORMULATION *ELAI ERUMAL CHOORANAM* FOR *ERAIPPU ERUMAL* (BRONCHIAL ASTHMA)

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ABSTRACT

The *Siddha* system, an ancient medicinal practice primarily observed in southern India, revolves around the fundamental principles of three humors: *Vadham*, *Pitham*, and *Kapham*. Siddha medicine emphasizes maintaining equilibrium among these humors to prevent illness and promote health. Imbalances, particularly of *Kapham* and *Vadham* in the respiratory system, can alter air passages through the secretion of inflammatory mediators, leading to bronchoconstriction and subsequent breathing difficulties. *Siddha* literature refers to this condition as *Swasakasam* or *Eraippu Erumal*. Bronchial asthma represents a significant global health issue, and *Siddha* medicine offers various treatments for it, including *Elai Erumal Chooranam*, a polyherbal formulation known for its cost-effectiveness, efficacy, and simplicity compared to other medications. This review highlights the phytochemicals, chemical constituents, and pharmacological properties of its ingredients specifically for bronchial asthma treatment.

KEYWORDS: *Siddha*, Asthma, *Elai Erumal chooranam*, *Eraippu.*

INTRODUCTION

Different regions of the world have their own traditional or indigenous healing practices deeply rooted in their cultural and historical backgrounds.[1] In India, there is a wealth of traditional medical systems, some dating back to 5000 years BC. One prominent system is *Siddha* medicine, which thrives in southern India, particularly Tamil Nadu. *Siddha* physiology revolves around maintaining balance among three humours—*Vali*, *Azhal*, and *Iyyam*. Specifically, imbalances in humours such as *kapham* and *vadham* in the respiratory system can lead to inflammation and bronchoconstriction, resulting in breathing difficulties termed "*Swasakasam*" or *Eraippu Erumal* in *Siddha* literature. These symptoms correspond to bronchial asthma in modern medicine, which affects approximately 35 million people in India according to the Global Asthma Report 2022.[2] Asthma is characterized by episodic reversible bronchial obstruction due to hyperresponsiveness of the airways to various stimuli. *Siddha* medicine offers various formulations for treating asthma, including *Elai Erumal Chooranam* (EEC), a polyherbal preparation known for its cost-effectiveness, efficacy, and simplicity. The medicinal uses and therapeutic actions of each ingredient used in this formulation matched with current research findings from various research publications. The ingredients present in this formulation have effective in the treatment of Asthma. Based on this evidence of *Siddha* literature and the modern scientific research studies also provide keyhole which result are Anti asthmatic, Bronchodilator, Anti histamine, Anti inflammatory, Anti spasmodic, Anti oxidant activities most presents in ingredient of EEC as evident from the review.

MATERIALS AND METHODS

SELECTION OF THE DRUG

The polyherbal formulation *Elai Erumal chooranam* was taken as a trial drug. It has been taken from the *Siddha* literature "The Pharmacopoeia of Siddha Research Medicines (Chapter 1)", Page No-111[3] indicated for Bronchial Asthma. Ingredients of EEC were tabulated in Table-1.

INGREDIENTS OF THE *ELAI ERUMAL CHOORANAM*

Table no 1: Ingredients of the *Elai Erumal chooranam* (EEC).

S.No	INGREDIENT	BOTANICAL NAME	QUANTITY
1.	*Chukku*	*Zingiber officinale*	*1 palam* (35 gram)
2.	*Milagu*	*Piper nigrum*	*1 palam* (35 gram)
3.	*Thippili*	*Piper longum*	*1 palam* (35 gram)

4.	*Chittrarathai*	*Alpinia galanga*	*1 palam* (35 gram)
5.	*Elarisi*	*Elettaria Cardamomum*	*1 palam* (35 gram)
6.	*Thalisapathiri*	*Abies spectabilis*	*1 palam* (35 gram)
7.	White sugar	*Saccharum officinarum*	*6 palam* (175 gram)

COLLECTION OF RAW DRUGS

The Raw drugs were purchased from authorized country drug store RNR Traders, Parrys corner, Chennai.

DRUG'S IDENTIFICATION AND AUTHENTICATION

Botanists and experts from the PG Gunapadam (pharmacology) Department of the Govt Siddha Medical College, Arumbakkam, Chennai identified and validated all the drugs. Each Sample has been labelled and maintained in the PG Gunapadam laboratory for future references.

PURIFICATION OF RAW DRUGS

All the ingredients were purified as per classical siddha literature *Sarakkugalin suddhi seimuraigal*.[4]

PREPARATION OF *ELAI ERUMAL CHOORANAM*

Each 1 palam (35 gram) of *Chukku (Zingiber officinale), Milagu (Piper nigrum), Thippili (Piper longum), Chittrarathai (Alpinia galanga), Elarisi (Elettaria Cardamomum), Thalisapathiri (Abies spectabilis)* were taken and pounded into powder and sieved in a thin cloth to get fine powder. Then purified by *Pittaviyal* method (steam cooking). Finally 175 gram of white sugar powder would be added to the above powder and dried and bottled up in an air tight container and labelled as *Elai Erumal chooranam*(EEC).

DRUG PROFILE

Form of the medicine: *Chooranam*

Route of Administration: Oral route

Dose: 650-975mg, twice a day

Adjuvant: Honey

Indication: Bronchial Asthma, Eosinophilic Lungs.

DRUG REVIEW

1. *CHUKKU (Zingiber officinale)*

Fig. No: 1- *Zingiber officinale.*

Botanical classification

Kingdom : Plantae

Division : Magnoliophyta

Class : Liliopsida

Order : Zingiberales

Family : Zingiberaceae

Genus : Zingiber

Species : *Zingiber officinale*

Habitat[5]: It is a herbaceous plant with an underground stem. These herbs possess tuberous, horizontal and aromatic rootstocks. It occurs naturally in Pacific islands and is widely cultivated in different countries.

Parts used: Rhizome.

Chemical constituents: Contains volatile oil in 1-3% of its weight. The sequesterpenes, Bisalpolene, zingiberene, zingiberol are the active components of ginger oil.

Pharmacological Properties

Bronchodilator acitivity[6]

The results obtained in this study show that the aqueous extract of Zingiber officinale Roscoe exhibits strong bronchodilator effect against histamine-induced bronchospasm in guinea pigs. The bronchodilator activity may be directly due to smooth muscle relaxation, inhibition of PDE4D enzyme or anti-inflammatory effect. Thus, 5 % gingerol-based aqueous extract of Zingiber officinale Roscoe has potential for clinical application in asthma treatment.

Anti inflammatory activity

The 95% ethanolic extract of ginger showed stable anti - inflammatory activity.

Ginger anti-inflammatory activity is mediated by inhibiting macrophage and neutrophils activation as well as negatively affecting monocyte and leukocyte migration. This was evidenced by the dose-dependent decrease in pro-inflammatory cytokines and chemokines and replenishment the total antioxidant capacity.[7]

Anti spasmodic effect

Ginger is marketed for its antispasmodic effect which was evident in vitro studies on animal intestine and was revealed to be due to its anticholinergic, antihistaminic, antiserotonergic or calcium channel blocking effect.[8]

Other pharmacological properties

Aromatic, Carminative, stimulant of GIT, antispasmodic, digestive activities, Anti ulcerant, Anti oxidant.

2. *MILAGU (Piper nigrum)*

Fig. No: 2- *Piper nigrum.*

Botanical Classification

Kingdom : Plantae

Division : Magnoliophyta

Class : Magnoliopsida

Order : Piperales

Family : Piperaceae

Genus : Piper

Species : *Piper nigrum*

Habitat[9]: The perennial climbing shrub is indigenous to Malabar and Travancore coasts,i.e, western coasts of India.

Parts Used: Dried unripe fruit.

Chemical constituents: Piper nigrum contains Piperine, pipene, piperidine and piperazine. piperidine, (2E,4E)- Nisobuty- ldecadienamid, isobutyl octadecenamide, Tricholein, Trichostachine, isobutyl eicosatrienoic, Isobutyl-octadecenamide, Piperettine, Pipericide, Piperolein B, Sarmentine, Sarmentosine, Retrofractamide.

Pharmacological Properties

Broncho dilator activity

Black pepper and its principle alkaloid, piperine, possess bronchodilatory activity possibly mediated through dual inhibition of PDE enzyme and Ca^{2+} influx, thus providing an evidence to the folk medicinal function of black pepper in bronchitis and asthma.[10]

Anti Histamine activity

the extracts of P. nigrum showed potent antihistaminic activity and hence can be used in the management of asthma or any other conditions where their role of histamine through H1 receptors is implicated. The study showed that ethanolic extract significantly inhibited histamine induced smooth muscle contraction, decrease in eosinophil and other cell count and histamine release from the lung tissue of guinea pig.[11]

Anti inflammatory activity

P. nigrum L. possess potent analgesic and anti-inflammatory activity.[12]

Other pharmacological properties

Anti Asthmatic, Anti Spasmodic, Anti oxidant, Anti microbial, Anti ulcer, Hepato protective, Immuno modulatory, GI stimulant, bioavailability enhancer, anti inflammatory, Antifungal, antibacterial, insecticidal, hepatoprotective, antidiarrheal, lipid metabolism accelerator, anticancer activities.

3. *THIPPILI (Piper longum)*

Fig. No. 3: *Piper longum.*

Botanical Classification

Kingdom: Plantae

Division : Magnoliophyta

Class : Magnoliopsida

Order : Piperales

Family : Piperaceae

Genus : Piper

Species : *Piper longum*

Habitat[13]: It has slender, aromatic, perennial climber, with woody roots and numerous wide ovate, cordate leaves. The native of plant is considered to be South Asia and is found both wild as well as cultivated, throughout the hotter parts of India from central to the northeastern Himalayas.

Parts used: Fruit.

Chemical Constituents: Fatty acids found in fruit are Palmitic, hexadecenoic, stearic, linoleic, oleic, higher saturated acids, arachidic, and behenic acids. Alkaloids present in the fruit are piperine, together with methyl piperine, iperonaline, piperettine, asinine, pellitorine, piperundecalidine, piperlongumine, piperlonguminine, refractomide A, pregumidiene, brachystamide, brachystamide-A, brachystine, pipercide, piperderidine, longamide and tetrahydropiperine, tetrahydro piperlongumine, dehydropipernonaline piperidine, piperine, tetrahydro piperlongumine and tri methoxy cinnamoyl-piperidine. Volatile oils present in the fruits are caryophyllene and pentadecane (both about 17.8%) and bisabolene (11%).

Pharmacological Properties

Anti asthmatic activity

Th extract of fruits of Piper longum significantly inhibited the histamine induced contraction of isolated guinea pig Ileum preparation indicating its H1 receptor antagonistic activity and supports the anti asthmatic properties.[14]

Anti inflammatory activity

The study has evaluated chemical profile and the anti-inflammatory property fruits methanolic extract of *Piper longum* L in LPS-triggered RAW 264.7 cells. PLE has identified 66 compounds including alkaloid and phenolic which play a role in potential anti-inflammatory and antioxidants effect.[15]

Other Pharmacological Properties

Antiulcer, Antioxidant, Analgesic, Insecticidal and acaricidal, Antifungal, Antiamoebic, Antimicrobial, Anti-inflammatory, Immunomodulatory, Hepatoprotective activities.

4. *CHITTRARATHAI (Alpinia galanga)*

Fig. No. 4 : *Alpinia galanga.*

Botanical classification

Kingdom : Plantae

Phylum : Tracheophyta

Class : Liliopsida

Order : Zingiberales

Family : Zingiberaceae

Genus : Alpinia

Species : *Alpinia galanga* (L.)

Habitat: *Alpinia galanga*, a plant in the ginger family, bears a rhizome used largely as an herb. The plant grows from rhizomes in clumps of stiff stalks up to 2 metres (6 ft 7 in) in height with abundant long leaves that bear red fruit. It is an evergreen perennial.

Chemical Constituents[16]

The rhizome contains essential oils, the constituents of which are methyl cinnamate, p-methane-1,8-epoxy-acethoxychavicol acetate, alpinin, kaempferide, 3-dioxy 4-methoxy flavone, pinene, camphor, pineol, galangin, (1'S)-1'-acetoxychavicol acetate, (1'S)-l'-acetoxyeugenol acetate, 1'-acetoxychavicol acetate, 1'- acetoxyeugenol acetate, D-camphor, chavicol, chavicol acetate, 1,8- cineole, 3-hydroxy-1,8-cineole glucopyranosides, (1R,2R,4S), (1S,2S,4R)-trans-2-hydroxy-1,8-cineole-D-glucopyranosides, (1R,3S,4S)-trans-3-hydroxy-1, 8-cineole-D-glucopyranoside, trans coniferyldiacetate, trans-p-coumaryldiacetate, di-(p-hydroxy-cisstyryl) methane, eugenol acetate, trans β-faranesene, 7-hydroxy-3,5- dimethoxy flavone, 4-hydoxybenzyldehyde, 1 '-hydroxychavicol acetate, p-hydroxycinammaldehyde, isorhamnetin, kaempferol, kaempferol-4'-methylether, methylcinnamate, kaempferol-7'-methylether, methyleugenol, α-thujene, α-pinene, 3-carene, βpinene, camphene, myrcene, p-cymene, borneol, α-terpineol, 4- terpineol, fenchyl acetate, bornyl acetate, α-humulene, zerumbone.

Anti Astmatic activity

In histamine induced bronchospasm model, A. galanga showed dose dependent % protection against PCD, which proved that histamine that antihistaminic activity. The present study also suggest that it significantly decrease the airway inflammation induced by ovalbumin hence the present study proved that essential oil bearing antihistaminic, anti-inflammatory effect which has essential to treat asthma. On the basis of the present study it is concluded that the essential oil of A. galanga possess anti asthmatic activity.[16]

Anti inflammatory activity

Methanolic extract of Alpinia galanga showed maximum inhibition of 79.51 % on carrageenan induced rat paw edema.[17]

Other Pharmacological Properties

Anti oxidant, Hepato protective, Anti ulcer activity, Anti Diabetic, Anti fungal, Anti cancer, Anti platelet, Cardio protective.

5. *ELAKKAI* (*Elettaria cardamomum*)

Fig. 5: *Elettaria cardamomum.*

Botanical Classification

Kingdom: Plantae

Class: Monochlamydeae

Order: Zingiberales

Family: Zingiberaceae

Genus: *Elettaria*

Species: *cardamomum*

Habitat: *Elettaria cardamomum*, commonly known as green cardamom or true cardamom, is a herbaceous, perennial plant in the ginger family, native to southern India. E. cardamomum is called "Queen of Spices" in India. *Elettaria cardamomum* is a pungent, aromatic, herbaceous, perennial plant, growing to about 2–4 m (6 ft 7 in – 13 ft 1 in) in height.

Part used: seeds.

Chemical Constitutions

1, 8-cineole (28.94%), α-terpinyl acetate (26.7%), α-terpineol (14.6%), nerol (5.0%), sabinene (13.5%) and α-pinene (2.4%), 37 α-terpinyl acetate, 1, 8-cineole and α-terpineol α-terpinyl acetate, 1, 8-cineole, sabinene, linalyl acetate, linalool, limonene (2.9%), 4terpineol (1.4%), α-pinene (1.1%), myrcene (0.8%), β-pinene (0.8%), octanal (0.2%), δ-3carene (0.4%), (E)- nerolidol (0.7%), p-cymene (0.7%), cis-sabinene hydrate (0.6%), geranylacetate (0.3%), cis-sabinene hydrate acetate (0.2%), β-selinene (0.2%), βcaryophyllene (0.2%), γ-cadinene (0.2%), translinalooloxide (0.1%), α-tocopherol, γtocopherol, δ-tocopherol, oleic acid, palmitic acid, linoleic acid α-terpinyl acetate, Linalyl acetate, 1,8-cineole, Sabinene, α-

terpinyl acetate, α-terpineol, Linalool, Sabinene, Geraniol, α-terpinyl acetate, Linalool, 1,8 Cineole, β-terpineol 4-terpineol, α-terpene, 1,8-Cineol, Linalool.

Bronchodilator Activity

Khan, et al describes its breath-relaxing potential explaining the possible underlying mechanism. that cardamom has a bronchodilator effect mediated by Ca mechanism of the antagonist, which gives it a good mechanical background medicinal use in asthma.[18]

Anti-inflammatory activity

Souissi, M., et al have demonstrated thatcardamom extracts were considerably declined secretion of IL-1b, TNF-α and IL-8 by lipopolysaccharide-aroused macrophages. The evidence suggested that the anti-inflammatory effect may be due to inhibition of the NF-κB signalling pathway.[19]

Anti-spasmodic Activity

Cardamom oil from seeds (200-900 nl) was evaluated for antispasmodic activity in rabbits, using acetylcholine as an agonist. The oil inhibits the stimulant action of acetylcholine in a dose-dependent manner. The atropine (3 µg) and cardamom oil (400 nl) produced a 50% reduction of the stimulant action of acetylcholine. In conclusion, cardamom oil exerts its anti-spasmodic action through muscarinic receptor blockage.[20]

Other pharmacological properties

Anti-Alzheimer Activity, Analgesic Activity, Anti-convulsant Activity, Anti-cancer Activity, Anti-oxidant Activity, Diuretic Activity, Hepatoprotective Effect, Immunomodulatory Activity.

6. THALISAPATHIRI (Abies spectabilis)

Fig. 6: ***Abies spectabilis.***

Botanical Classification

Kingdom : Plantae

Phylum : Streptophyta

Class : Equisetopsida

Subclass : Pinidae

Order : Pinales

Family : Pinaceae

Genus : Abies

Species : *Abies spectabilis*

Synonym : *Abies webbiana*

Habitat : Tree 40–50 m tall, 1.5–2.5 m . Crown broadly pyramidal or columnar, becoming irregular and flat-topped in mature trees.

Bronchodilator activity

In isolated rabbit tracheal preparations, crude extract of A. webbiana leaves caused relaxation of carbachol and K+ -induced contractions comparable to standard drug, verapamil suggesting thebronchodilatory effect which may be mediated through calcium channel blockage.[21]

b) Antispasmodic Activity

Crude extract of A. webbiana leaves spasmolytic activity in spontaneous and K+ (80 mM)-induced contractions isolated rabbit jejunum in a concentration-dependent manner providingevidence for its folkloric use stomach disorders.[21]

c) Antitussive Activity

Methanol extract of A. webbiana leaf extract (400 and 600 mg/kg) showed maximum inhibition of SO2-induced cough frequency by 71.69% and 78.67%, respectively, when compared with the control group and was comparable in effect to codeine phosphate.[22]

d) Anti-Inflammatory Activity

The methanol extract of leaves of Abies webbiana showed the anti-inflammatory activity as compared to that of diclofenac sodium (150 mg/kg, p.o.) in carrageenan-induced paw edema model of rats.[23]

Antioxidant Activity

Hydroalcoholic extract of Abies spectabilis exhibited a substantial antioxidant activity in DPPH, nitric oxide and hydrogen peroxide radical scavenging in vitro models and reducing power was comparable to L-ascorbic acid, curcumin and α-tocopherol.[24]

Other pharmacological Properties

Antitumor activity, Anti-Platelet Activity, Antibacterial Activity.

7.* WHITE SUGAR (*Saccharum officinarum)

Fig. 7: *Saccharum officinarum.*

Botanical classification

Kingdom : Plantae

Order : Poales

Family : Poaceae

Subfamily : Panicoideae

Tribe : Andropogoneae

Genus : Saccharum

Species : *S. officinarum*

Habitat: S. Officinarum, a perennial plant, grows in clumps consisting of a number of strong unbranched stems. A network of rhizomes forms under the soil which sends up secondary shoots near the parent plant. The stems vary in color, being green, pinkish, or purple and can reach 5 m (16 ft) in height.

Chemical constituents High-Performance Liquid Chromatography with Diode-Array Detection (HPLC-DAD) analysis of phenolic compounds from sugarcane juice showed the presence of phenolic acids such as hydroxycinnamic acid, sinapic acid, and caffeic acid along with flavones such as apigenin, luteolin, and tricin. Among the flavones, tricin derivatives

accounted for the highest concentration. Extensive chromatographic and spectroscopic studies indicated the presence of various -O- and -C- glycosides of the above-mentioned flavones, and 3947 were identified. Four new minor flavones swertisin, tricin-7-O-neohesperoside-4'-Orhamnoside, tricin-7-O-methylglucuronate-4'-O-rhamnoside, and tricin-7-Omethylglucuronide were isolated and identified from sugarcane juice.

Anti-inflammatory Effect

Mixtures of fatty acids isolated from sugarcane wax were examined for their anti inflammatory effect on both rats and mice. Oral administration of this mixture showed anti inflammatory activity in the cotton pellet granuloma assay and in the carrageenan-induced pleurisy test, both in rats, as well as in the peritoneal capillary permeability test in mice.[25]

Other Pharmacological properties

Analgesic activity, Antihepatotoxic activity, Antihypercholesterolemic effect, Anti-malaria.

CONCLUSION

Through this extensive review on recent research reports maximum scientific validation has been carried out on various pharmacological actions and therapeutic benefits of each ingredient of Elai Erumal Chooranam. The ingredients present in this formulation have effective in the treatment of Asthma. Based on this evidence of Siddha literature and the modern scientific research studies also provide keyhole.

Each ingredient of the formulation is easily available, low cost and very effective. As a chooranam, it can be easily prepared at any time and easily consumed by the patients. From this review, the ingredients of EEC possess Anti-asthmatic, Broncho dilator, Anti histamine, Antispasmodic, Anti-inflammatory, Antioxidant activities that expose its efficacy in a scientific manner, which work synergetically and give better results in the management of Asthma.

Thus further research publications on preclinical and clinical evaluation is the need of the hour for their wide spread acceptance among public and scientific community.

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