


**Review Article**
**A REVIEW ON HYPO HIDROTIC EFFECT OF SIDDHA FORMULATION –KUNGUMAPOO MATHIRAI**
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**ABSTRACT**

Hyperhidrosis is a condition present with excess sweating of palms on the hands, soles of the feet, forehead and axillae. This is socially embarrassing. There are few herbs to treat hyperhidrosis in Siddha system of medicine. The drug *Kungumapoo Mathirai* is being used in Siddha system of medicine for many years to treat hyperhidrosis. The ingredients used in the preparation of *Kungumapoo Mathirai* are *Crocus sativus*, *Zingiberofficinale*, *Piper nigrum*, *Piper cubeba*, *Costus speciosus*, *Carum capticum*, *Piper longum*, *Syzygium aromaticu*, *Elettaria cardomom*, *Korosanai* (Oxbile), *Vengaram* (Sodium baborate), *Lingam* (Red sulphide of mercury), *Sambrani poo* (Dry powder of *Styrax benzoin*). This article reviews the hypo hydration effect of the drug *Kungumapoo Mathirai* and its ingredients. This review will help to get much information on hypohydrosis effect of the chemical constituents of the drug. The antioxidant properties of the ingredients which is acting as hypo hydrating agent and their mechanism in controlling the nervous excitement by reducing the action potential in detail. The use of herbal drugs is becoming more popular due to the adverse effects of synthetic Anticholenergics and Antispasmodic drugs which are used to treat hyperhidrosis worldwide. Excellence of Siddha, formulated each and every medicines on the basis of *Thiridhosa* theory and five elemental theory, which are the basic principles of Siddha medicine. The basic theory of Siddha formulation *Kungumapoo Mathirai* is also explained here.

**KEYWORDS:** Hypohidrosis – *Kungumapoo Mathirai*- *Athiviyarvai* - A Siddha formulation.

**INTRODUCTION**

Every human race has its own traditional system of medicines and treatment. The traditional medical systems of India are Siddha, Ayurveda and Unani. The Tamil (Siddha) system of medicine is the oldest of the three Indian medical systems. Siddha system could be considered as the crown of all the traditional arts of the ancient Tamil. The medical works were bestowed by the great Siddhars, after attaining spiritual knowledge through perfection and spiritual salvation. Siddha systems of medicine were passed on from Lord Shiva to his consort and at last to Rishi devar. The present forms of works are adapted from the works of Rishi devar. In Siddha system metals and minerals have been used to a greater extent than drugs of vegetable origin, unlike in Ayurveda system. *Rasam* (Mercury) and *Gandhakam* (sulphur) play a major role in Siddha therapeutics. *Kattu* and *Kalangu* are other specialties in Siddha pharmacopoeia. Siddhars developed one of the aspects of diagnosis and prognosis of diseases by reading the pulse which is unique in Siddha system and is unknown to any other traditional system of medicines in the world. There are eight kinds of diagnosis in Siddha and the Siddhars diagnosed the diseases by pulse reading (Naadi) alone in detail<sup>[1]</sup>. Generally, Siddha system does not consider preventive and curative aspects separately, but as one; for every possible attempts has been made to prevent rather than curing the diseases.

Thiruvalluvar mentioned that the disease will never approach those who know the causes of the diseases and avoid the same in order to protect the body. Therefore people should follow all preventive measures to keep the

diseases away so as to lead a healthy and happy life. According to our ancestors, mere preventive measures alone are not enough to be free from diseases but the virtuous deeds and good conduct and character are also the important criteria for healthy longevity. Hence they have formulated a seasonal regimen for the sake of healthy living. In addition, they have dealt in detail the various principles to be followed under the areas like housing, sanitation, cookery etc. If we follow the principles and regimens as advocated by our ancestors, no doubt, we can live a disease free, happy and healthy life<sup>[3]</sup>. In human Eccrine sweat glands are found at virtually all skin sites. These glands are abundant and serve a thermoregulatory function. They are most abundant on palms, soles, forehead, and axillae, especially in patients with hyperhidrosis, may have widely dilated secretory coils that contain apocrine appearing cells. Physiological secretion of sweat occurs as a result of many factors and is mediated by cholinergic innervation. And hence it is treated by various anticholinergic and antispasmodic drugs world-wide along with many topical applications. Heat is also a prime stimulus to increased sweating, but other physiological stimuli including emotional stress, also plays an important role. During early development there is a switch between adrenergic and cholinergic innervation of sweat glands. Some response to cholinergic and adrenergic stimuli persists. Cholinergic sweating involves a biphasic response with initial hyperpolarization and secondary depolarization mediated by activation of calcium and chloride ion conductance. Adrenergic secretion involves

monophasic depolarization. Vasoactive intestinal polypeptide may also play a role in stimulating eccrine secretion<sup>[7]</sup>. The diseases which affecting the normal life should be treated at first. One of the major conditions affecting the normal routine life of a person is hyperhidrosis. The drug *Kungumapoo Mathirai* is being used by many Siddha physicians to treat the condition hyperhidrosis. And hence this study is to reveal how the whole drug and its ingredients act as a hypohydrating agent.

### Sweat Glands

Sweat glands, also known as sudoriferous or sudoriparous glands, from Latin *sudor*, meaning "sweat", sudoriferous<sup>[8]</sup> are small tubular structures of skin that produce sweat. Sweat glands are a type of exocrine gland, which produce and secrete substances onto an epithelial surface by way of a duct. There are two main types of sweat glands that differ in their structure, function, secretory product, mechanism of excretion, anatomic distribution, and distribution across species. Eccrine sweat glands are distributed almost all over the human body, in varying densities. Its water-based secretion represents a primary form of cooling in humans<sup>[9]</sup>. Apocrine sweat glands are mostly limited to the axilla (armpits) and perianal areas in humans<sup>[9]</sup>. They are not significant for cooling in humans, but are the sole effective sweat glands in hoofed animals. Ceruminous glands (which produce ear wax), mammary glands (which produce milk), and ciliary glands in the eyelids are modified apocrine sweat glands.<sup>[10]</sup>

### Hyperhidrosis

Hyperhidrosis is a condition characterized by abnormal sweating in excess of that for regulation of body temperature<sup>[11]</sup>. It can be associated with a significant quality of life burden from a psychological, emotional and social perspective. It can be called by some as the silent handicap. This condition is classified as generalized or localised<sup>[2]</sup>, to specific parts of the body. Generalised hyperhidrosis may be associated with increased body temperature, generalised sympathetic discharge, features of endocrine disorders like thyrotoxicosis, diabetes mellitus, cushing's syndrome, pheochromocytoma and carcinoid syndrome, and disorders of central nervous system interfering directly with the hypothalamic centre, hence the temperature is controlled by the centres of hypothalamus. Hands, feet, armpits and the groin area are among the most active regions of perspiration due to the high number of sweat glands in these areas. Frequently seen in young adults. Psychological problems due to body odour. Physical disability due to excessive sweating of palms (writing, doing fine works) and soles (walking) <sup>[2]</sup>. When excessive sweating is localised it is referred to as primary hyperhidrosis or focal hyperhidrosis. Excessive sweating involving the whole body is termed generalized hyperhidrosis or secondary hyperhidrosis. It is usually the result of some other, underlying condition. Hyperhidrosis is usually brought on by emotional or thermal stress <sup>[40]</sup>. Primary or focal hyperhidrosis may be further divided by the area affected, for instance palmoplantar hyperhidrosis (symptomatic sweating of only the hands or feet) or gustatory hyperhidrosis (sweating of the face or chest a few moments after eating certain foods). <sup>[12]</sup>

Hyperhidrosis may be a constitutional abnormality, characterized by onset in childhood or adolescence and, sometimes, by a family history. A recent increase in sweat secretion on the other hand, may be an early indication of thyroid over activity. Paroxysmal sweating is a common feature of anxiety. Increased catecholamine secretion from pheochromocytoma of adrenal medulla is a rare cause of hyperhidrosis. Growth hormone excess (Acromegaly) also increases sweating, perhaps because of hypertrophy of sweat glands. Increased sweating should be distinguished from flushing that occurs physiologically at the time of the natural menopause. Flushing may be a presenting feature of serotonin-secreting carcinoid tumours of the gut and usually indicates extensive disease with hepatic metastases. A common complaint of patients is that they get nervous because they sweat, then sweat more because they are nervous. Primary Hyperhidrosis is estimated at around 1% of the population, afflicting men and women equally. It commonly has its onset in adolescence <sup>[37]</sup>. Symmetry of excessive sweating in hyperhidrosis is most consistent with primary hyperhidrosis. Excessive sweating affecting only one side of the body is more suggestive of secondary hyperhidrosis and further investigation for a neurologic cause is recommended. <sup>[13]</sup>

### Sympathetic Nervous System and Perspiration

The sympathetic nervous system is one of the two main divisions of the autonomic nervous system, the other being the parasympathetic nervous system<sup>[14]</sup>. The autonomic nervous system functions to regulate the body's unconscious actions. The sympathetic nervous system's primary process is to stimulate the body's fight-or-flight response. It is, however, constantly active at a basic level to maintain homeostasis<sup>[15]</sup>. There are two kinds of neurons involved in the transmission of any signal through the sympathetic system, pre-ganglionic and post-ganglionic. The shorter pre-ganglionic neurons originate from the thoracolumbar region of the spinal cord (levels T2-L1, specifically) and travel to a ganglion, often one of the paravertebral ganglia, where they synapse with a post-ganglionic neuron. From there, the long post-ganglionic neurons extend across most of the body<sup>[16]</sup>. At the synapses within the ganglia, pre-ganglionic neurons release acetylcholine, a neurotransmitter that activates nicotinic acetylcholine receptors on post-ganglionic neurons. In response to this stimulus post-ganglionic neurons with two important exceptions release norepinephrine, which activates adrenergic receptors on the peripheral target tissues. The activation of target tissue receptors causes the effects associated with the sympathetic system<sup>[18]</sup>. The two exceptions mentioned above are postganglionic neurons of sweat glands and chromaffin cells of the adrenal medulla. Post-ganglionic neurons of sweat glands release acetylcholine for the activation of muscarinic receptors, except for areas of thick skin, the palms and the plantar surfaces of the feet, where norepinephrine is released and acts on adrenergic receptors. Chromaffin cells of the adrenal medulla are analogous to post-ganglionic neurons; the adrenal medulla develops in tandem with the sympathetic nervous system and acts as a modified sympathetic ganglion. Within this endocrine gland, pre-ganglionic neurons synapse with

chromaffin cells, stimulating the chromaffin to release norepinephrine and epinephrine directly into the blood<sup>[17]</sup>. Messages travel through the sympathetic nervous system in a bidirectional flow. Efferent messages can trigger changes in different parts of the body simultaneously. For example, the sympathetic nervous system can accelerate heart rate; widen bronchial passages; decrease motility (movement) of the large intestine; constrict blood vessels; increase peristalsis in the oesophagus; cause pupillary dilation, piloerection (goose bumps) and perspiration (sweating); and raise blood pressure. The first synapse (pre-ganglionic neuron to post-ganglionic neuron) is mediated by nicotinic receptors activated by acetylcholine. The target synapse of the post-ganglionic neuron is mediated by adrenergic receptors and is activated by either norepinephrine (noradrenaline) or epinephrine (adrenaline). There are two exceptions to this pattern of sympathetic post-ganglionic receptors: First, the sweat glands receive sympathetic intervention but have muscarinic acetylcholine receptors. Second, chromaffin cells of the adrenal medulla are technically post-ganglionic, but receive stimulation via acetylcholine to release catecholamines such as epinephrine and norepinephrine.

#### **Muscarine and Nicotinic Receptor Antagonist**

Cholinoceptor antagonists, like agonists, are divided into muscarinic and nicotinic subgroups on the basis of their specific receptor affinities. Ganglionic blockers and Neuromuscular junction blockers make up the antinicotinic drugs. Five types of muscarinic receptors have been identified. A standard terminology (M1 through M5) for these subtypes is now in common use. The M1 receptor subtype is located in central nervous system neurons, sympathetic post ganglionic cell bodies, and many presynaptic sites. M2 receptors are located in the myocardium, smooth muscle organs, and some neuronal sites. M3 receptors are most common on effector cell membranes, especially glandular and smooth muscle cells. M4 and M5 receptors are less important and appear to play a greater role in the central nervous system than in the periphery.

A muscarinic receptor antagonist (MRA) is a type of anticholinergic agent that blocks the activity of the muscarinic acetylcholine receptor. Acetylcholine (often abbreviated Ach) is a neurotransmitter, whose receptor is a protein found in synapses and other cell membranes. Besides responding to their primary neurochemical, neurotransmitter receptors can be sensitive to a variety of other molecules. Acetylcholine receptors are classified into two groups based on this muscarinic which respond to muscarine and nicotinic which respond to nicotine. Muscarinic antagonist effects and muscarinic agonist effects counterbalance each other for homeostasis. M1-type muscarinic acetylcholine receptors play a role in cognitive processing. In Alzheimer disease (AD), amyloid formation may decrease the ability of these receptors to transmit signals, leading to decreased cholinergic activity. As these receptors themselves appear relatively unchanged in the disease process. A number of muscarinic agonists have been developed and are under investigation to treat AD<sup>[19]</sup>. Antinicotinic drugs are ganglionic-blocking drugs and neuromuscular blocking drugs.

#### **Reactive Oxygen Species (ROS)**

Reactive oxygen species are chemically reactive molecules containing oxygen. Reactive oxygen species play an important role in cell signaling and homeostasis (to maintain internal environment balanced with external environment). ROS absorbs electron from electron transport chain. The electron absorbed will denature the Super Oxide Dismutase (SOD), which catalyse H<sub>2</sub>O<sub>2</sub> to O<sub>2</sub> which reduces the harmful reaction by this SOD and acts as an antioxidant.

#### **Super Oxide Dismutase**

Essential hyperhidrosis is a disorder of excessive, bilateral, and relatively symmetric sweating occurring in the axillae, palms, soles, or craniofacial region without obvious etiology. Nitric oxide may play a physiological part in the production and/or excretion of sweat in skin eccrine glands. Tempol, a SOD mimetic, increases the half-life of NO and results in vasodilatation, hypotension, and reflex activation of sympathetic nervous system. Reactive oxygen species (ROS) may directly activate both central and peripheral sympathetic nervous system activity. This study results support the hypothesis that oxidative damage resulting from increased ROS production along with insufficient capacity of antioxidant mechanisms may be involved in pathogenesis of Essential Hyperhidrosis <sup>[20]</sup>.

#### **Anticholinergic Action**

Anticholinergic drugs are agents which block the effect of Ach on cholinergic receptors but conventionally antimuscarinic drugs are referred to as anticholinergic drugs. They are also called cholinergic blocking parasympatholytic drugs. Drugs that block the nicotinic receptors are ganglionic blocker and neuro muscular blocker.

Some drugs that have anticholinergic properties are Antihistamines, Antipsychotics, Antidepressants, Atropine derivatives <sup>[34]</sup>.

#### **Basis Pharmacology of the Muscarinic Receptors – Blocking Drugs**

Atropine and its naturally occurring congeners are tertiary amine alkaloid esters of tropic acid. Atropine (hyoscyamine is found in the plant *Atropa belladonna*, or deadly nightshade and in *Datura stramonium*, also known as jimson weed, sacred *Datura* or thorn apple. Scopolamine (Hyoscine) occurs in *Hyoscyamus niger*, or henbane, as the I(-)stereoisomer. Naturally occurring atropine is I(-) hyoscyamine, but the compound readily racemizes, so the commercial material is racemic di-hyoscyamine. The I(-) isomers of both alkaloids are at least 100 times more potent than the d(+)isomers. A variety of semisynthetic and fully synthetic molecules have antimuscarinic effects. The tertiary members of these classes are often used for their effect on the eye or the CNS. Many antihistaminic, antipsychotic and antidepressant drugs have similar structures and predictably, significant antimuscarinic effects. Quaternary amine antimuscarinic agents have been developed to produce more peripheral effects with reduced CNS effects.

#### **Absorption**

Natural alkaloids and most tertiary antimuscarinic drugs are well absorbed from the gut and conjunctival membranes. When applied in a suitable vehicle, some (e.g.,

scopolamine) are even absorbed across the skin (transdermal route). In contrast, only 10-30% of a dose of quaternary antimuscarinic drug is absorbed after oral administration, reflecting the decreased lipid solubility of the charged molecule.

### Distribution

Atropine and other tertiary agents are widely distributed in the body. Significant levels are achieved in CNS within 30 minutes to 1 hour, and this can limit the dose tolerated when the drug is taken for its peripheral effects. Scopolamine is rapidly and fully distributed into the CNS where it has greater effects than most other antimuscarinic drugs. In contrast, the quaternary derivatives are poorly taken up by the brain and therefore are relatively free-at low doses of CNS effects.

### Mechanism of Action

Atropine causes reversible blockade of cholinomimetic actions at muscarinic receptors; that is blockade by a small dose of atropine can be overcome by a larger concentration of acetylcholine or equivalent muscarinic agonist. Mutation experiments suggest that aspartate in the third transmembrane segment of the heptahelical receptors forms an ionic bond with the nitrogen atom of acetylcholine; this amino acid is also required for binding of antimuscarinic drugs. When atropine binds to the muscarinic receptors, it prevents action such as the release of inositol triphosphate (IP<sub>3</sub>) and the inhibition of adenylyl cyclase that are caused by muscarinic agonists. Classically, muscarinic antagonists were viewed as neutral compounds that occupied the receptor and prevented agonist binding. Recent evidence indicates that muscarinic receptors are constitutively active, and drugs that block the actions of acetylcholine are inverse agonists that shift the equilibrium to the inactive state of the receptor. Muscarinic blocking drugs that are inverse agonists include atropine, pirenzepine, trihexyphenidyl, AF-DX 116, 4-DAMP, and a methyl derivative of Scopolamine.

The effectiveness of antimuscarinic drugs varied with the tissue and with the source of antagonist. Tissues most sensitive to atropine are salivary, bronchial and sweat glands. Secretion of acid by the gastric parietal cells is the least sensitive. In most tissues, antimuscarinic agents block exogenously than endogenously released acetylcholine. Atropine is highly selective for muscarinic receptors. Its potency at nicotinic receptors is much lower, and actions at nonmuscarinic receptors are generally undetectable clinically. Atropine does not distinguish among M<sub>1</sub>, M<sub>2</sub>, and M<sub>3</sub> subgroups of muscarinic receptors. In contrast other antimuscarinic drugs are moderately selective for one or another of these subgroups. Most synthetic antimuscarinic drugs are considerably less selective than atropine in interactions with non muscarinic receptors. For example, some quaternary amine antimuscarinic agents have significant ganglionic-blocking actions, and others are potent histaminic receptors blockers. The antimuscarinic effects of other agents, eg, antipsychotic and antidepressant drugs, have been mentioned. Their relative selectivity for muscarinic receptor subtypes has not been identified.

### Kungumapoo Mathirai

It is the drug which is used to treat various diseases such as sinusitis, gastritis, chronic constipation, and hyperhidrosis in Siddha medicine. The dosage of the drug is 1-2 tablets in the morning and evening after food with the adjuvants like honey, or with mother's milk in case of children. The preparation of this drug is to take all the above mentioned drug in equal ratio and make it fine. Then the powdered medicine should be churned with the decoction made by the saffron for 3 hours continuously. Then make the churned medicine into small pills with weight of 50mg each [4].

Most of the drugs included in the preparation of *Kungumapoo Mathirai* have anti cholinergic effect or antispasmodic effect. The pharmacological activities of the above mentioned drugs were done separately in various journals.

Globally Hyperhidrosis is treated by the anticholinergic and antispasmodic drug which acts by suppressing the muscarinic receptors, and thus it reduces the hyper hydration in humans. Likewise the drug which is being prescribed in Siddha system of medicine for hyperhidrosis, *Kungumapoo Mathirai* has the effect of anticholinergic or antispasmodic effect.

### Ingredients of Kungumapoo Maathirai

*Kungumapoo (Crocus sativus)*

*Sukku (Zingiber officinalis)*

*Venmilagu (Piper nigrum)*

*Vaal milagu (Piper cubeba)*

*Koshtam (Costus speciosus)*

*Omam (Carum capticum)*

*Thippili (Piper longum)*

*Lavangam (Syzygium aromaticum)*

*Elarisi (Elettaria cardamom)*

*Korosanam (Ox bile)*

*Vengaram (Sodium baborate)*

*Lingam (Red Sulphide of Mercury)*

*Sambarani poo (Styrax benzoin)*

### Saffron (Crocus sativus)

Tamil Name : Kungumapoo

Family : Iridaceae

Parts used : Stigma

In Siddha system of medicine saffron is used for many medicinal purposes. It is mainly cultivated in India and Kashmir. It is reddish yellow in colour, with fragrance and shining. *Crocus sativus* is the stamens of the flower in the plant. It is used as Anodyne, Emmenagogue and Antispasmodic in Siddha medicine<sup>[5]</sup>. In Kashmir it is cultivated up to 2000m and in Chauhattia in Uttar Pradesh. Saffron contains a volatile oil composed of terpenes, terpene alcohol and esters. The herb also contains bitter glycoside (including crocin), carotenoids and vitamin B<sub>1</sub> and B<sub>2</sub>.<sup>[21]</sup>

The dried stigma consists of glucosides such as Crocin, Picrocrocin, terpenes like carotene and lycopene. The main action of *Crocus sativus* is Anodyne and Anti spasmotic<sup>[6]</sup>. Plant is used as tonic in skin disease and measles as carminative, diaphoretic and emmenagogue, stimulant, stomachic, antispasmodic, nerve sedative,

diuretic, for promoting menstruation, hysteria, asthma, piles and leucorrhoea. Fruit is recommended in poliomyelitis. Uses of flower in cold and as an aphrodisiac. *Crocus sativus* is used in diaphoresis [45]. Beta-carotene, picrocrocin, wax, mucilage, proteins. It consists of many actions such as Aphrodisiac, stimulant, stomachic, slightly anodyne, antispasmodic, emmenagogue, aphrodisiac virtue, refrigerant, tonic, diuretic, stimulant for uterus [22].

Hence the *Crocus sativus* has the antispasmodic activity and thus it will reduce the hyperhidrosis by its antispasmodic activity.

#### **Dry Ginger (*Zingiber officinale*)**

Tamil name : Sukku

Family : Zingiberaceae.

Parts used : Rhizome

It is an herbaceous perennial with upright stems. Inflorescence grows on a separate stem from the foliage stem and forms a dense spike, 3 in (7.6cm). Ginger is known to contain a number of potentially bioactive substances, mainly Gingerols, Shogaols, Sesquiterpenes, Beta-bisabolene, Zingiberene, Zingiberol, Curcumene, Geranial and Neral. Chinese medicine as spicy and hot ginger is claimed to warm the body and treat cold extremities. [25]

This article aims at reviewing the most salient recent reports on these investigations. The main pharmacological actions of ginger and compounds isolated there from include immuno-modulatory, anti-tumorigenic, anti-inflammatory, anti-apoptotic, anti-hyperglycemic, anti-lipidemic and anti-emetic actions. Ginger is a strong anti-oxidant substance and may either mitigate or prevent generation of free radicals. It is considered a safe herbal medicine with only few and insignificant adverse/side effects.

More studies are required in animals and humans on the kinetics of ginger and its constituents and on the effects of their consumption over a long period of time [23]. A study was done to prove the anti-muscarinic effect of ginger in rat fundus. The results show that ginger, in addition to a direct cholinergic agonistic effect on the post-synaptic M3 receptors, also has a possible inhibitory effect on pre-synaptic muscarinic autoreceptors, similar to standard muscarinic antagonists, thus reiterating the gastric stimulant effect of this age-old plant [24].

Hence this study reveals the muscarine receptors antagonist action exhibit by the ginger and also it shows the effect of ginger to reduce the free radicals which shows the antioxidant effect of ginger and its action in hyperhidrosis.

#### **Black Pepper (*Piper nigrum*)**

Tamil Name : Milagu

Family : Piperaceae

Parts used : Dried fruit.

It is native of Malabar region, a region in the western coast of South India. Stems are stout climbing and very flexible. Leaves are elliptical to orbicular ovate. Flowers are small and borne on long pendulous spike from each node. The flowers are not showy. The berries first turn green, then red, finally turning black. Its chemical constituents are Pyrrolidinealkamide, Isopiperolein B,

Piperidine, Trachyone, Pellitorine has been isolated from the fruit [26]. The fruit is an important spice and flavouring agent and has also been used in the treatment of cholera and dyspepsia, as well as a variety of gastric ailments and arthritic disorders *Jung and Shin, 1998*. Essential oil from fruits contained alpha and beta-pinene. Water extract of *Piper nigrum* exhibited antagonist action on n-methyl-d-aspartate (NMDA)-receptor which might contribute to the drug's anticonvulsant property. The major constituent Piperin showed CNS-depressant, antipyretic, analgesic, anti-inflammatory, anti-oxidant and hepato protective property.[21]

The CNS-Depressant activity shows that the piperin will reduce the increased neuro transmission and hence act as acetylcholine antagonist which helps to reduce the hyperhidrosis. Black pepper fruit extract contains spasmolytic constituents mediating their effect through blockade of Ca<sup>2+</sup> influx, which may explain its traditional use in the treatment of some gastrointestinal disorders [35]. Supplementation with black pepper or the active principles of black pepper, piperine, can reduce high-fat diet induced oxidative stress to the cell. *Piper nigrum* is considered as a potential source of natural antioxidant. Ascorbic acid, myristic acid, palmitic acid, and piperine are the main constituents responsible for its antioxidative behaviour [27]. In Unani system of medicine black pepper is used for their antispasmodic activity [28].

#### **Long Pepper (*Piper longum*)**

Tamil name : Thippili

Family : Piperaceae

Parts Used : Rippen fruit

Its habitat is from hotter parts of India, from central Himalayas to Assam, Khasi and Mikir hills, low hills of Bengal. Fruit and roots were used in this plant for their medicinal use.[21] Antioxidant activity, anti-stress activity, nootropic activity, *Piper longum*, Preliminary phytochemical studies and antioxidant activity. Phytochemical investigation indicated the presence of alkaloids, tannins and phenols. *P. longum* showed a significant free radical scavenging activity (superoxide, hydroxyl radical, lipid peroxidation, nitric oxide), when compared to standard ascorbic acid in dose dependant manner. This indicates that the aqueous extract of *P. longum* possessed potential antioxidant activity. The IC<sub>50</sub> values of superoxide, hydroxyl radical, lipid peroxidation, nitric oxide scavenging effect of *P. longum* were comparable to those of ascorbic acid and were especially high in the case of lipid peroxidation rats, Y-maze test[29].

#### **Henbane Seeds (*Hyoscyamus niger*)**

Tamil Name: Omam

Family : Solanaceae

Parts used : Seed

This plant grows wild throughout Himalayan range at an altitude of 2500-3500m; also in Kashmir. Native to Scandinavia, Europe, Great Britain. Cultivated in USA. The active principles present in this plant are hyoscyamine and less hyoscyamine. The young plants contain more hyoscyamine and the mature plants contain hyoscyamine, hyoscyne, apoatropine, tropine, cuscohygrine, 6- beta hydroxyl hyoscyamine. Research shows that Henbane preparations produce a

parasympathetic or anticholinergic effect by competitive inhibition of acetylcholine. This inhibition affects the muscarine action of acetylcholine but not its nicotinic-like effects on ganglia and motor end-plates [21].

#### **Tailed Pepper (*Piper cubeba*)**

Tamil Name : Val Milagu

Family : Piperaceae

Parts Used : Fruits

This plant is the native of Indonesia. Fruits are largely imported for use in Unani medicine. Cultivated in Assam and Karnataka. The active principles present in this plants are, the essential oil of *Piper cubeba* gave sesquiterpene, hydrocarbons. Seed oil contains palmitic, oleic acid, linolenic, stearic and hexadecenoic acids. The essential oil consists of anti- bacterial, anti- fungal and anti-helminthic activity. [21]

#### **Clove (*Syzygium aromaticum*)**

Tamil name : Kirambu

Family : Myrtaceae

Parts used : Dried flower buds

It is mainly cultivated in South India, mainly Kerala and Coorg. Native to Malacca islands. The active principles are tannin and a crystalline substance, caryophyllene. Capsaicin is also present. The oil contain phenols, sesquiterpens and a small quantity of esters, ketones and alcohols. Eugenol exhibited marked anti-fungal activity. Clove's use as an appetizer and digestive cordial has been substantiated pharmacologically. It was also found efficacious as an antitussive agent [21]. Using a multiple-method approach, the antioxidant activity of the essential oils from *Syzygium aromaticum* was tested by Viuda-Martos et.al (2010). Niwano et.al. (2010) summarized their research for herbal extracts with potent antioxidant activity obtained from a large scale screening based on super oxide radical.[27]

#### **Cardamom (*Elettaria cardamom*)**

Tamil name : Elam

Family : Zingiberaceae

Parts used : Seeds

It is mainly cultivated in South -Western India. It consists of the volatile oil includes borneol, camphor, pinene, humulene, caryophyllene, carvone, eucalyptole, terpine, sabiene. Research showed that the volatile oil (2-8%) has a strong antispasmodic action, confirming the herb's effectiveness in relieving wind and treating colic, gripping and dyspepsis.[21]

A comparative study of the anti-inflammatory activity of the oil extracted from commercial *Elettaria cardamomum* seeds in albino mice. In addition the antispasmodic activity was determined on a rabbit intestine preparation using acetylcholine as agonist, the results proving that cardamom oil exerts its antispasmodic action through muscarinic receptor blockage. [30]

#### **Benzoin (*Styrax benzoin*)**

Tamil Name : Sambrani

Family : Styraceae

It is from the native Malay Peninsula and Sumatra. Gum Benzoin flowing from the incised stem-bark of the tree and which is largely imported into India from Penang

contains three resins, benzoic acid, cinnamic acid, vanillin and volatile oil [32].

#### **Crape Ginger (*Costus speciosus*)**

Tamil name : Kostam

Family : Costaceae

Parts used : Rhizome, Root

An elegant climbing plant found plentifully in Bengal and Kashmir. Root is bitter, astringent, stimulant and digestive, antihelminthic, depurative and aphrodisiac. The alkaloids present in this plants are chemical constitution such as physostogmine, Spirostanal, glycosides, diosgenin and sapogenin, where isolated from the rhizome.

The alkaloids show papaverin like smooth muscle relaxant activity, cardiotoxic activity like that of digitalis and antispasmodic, CNS depressant, diuretic, and hydrocholeretic activities[37]. The level of superoxide dismutase was significantly modified when treated with costinolide isolated from *costus speciosus*. There is reduction in superoxide level while administering costinolide. The study concludes that, costunolide isolated from the rhizome extract of *C. speciosus* is an efficient herbal source with effective antioxidant activities[42].

#### **Borax**

Tamil Name : Vengaram

Chemical Name : Sodium baborate

Crude borax is found in masses by evaporation of water on shore of dried up lakes in India and Tibet. It is also obtained from the mud of lakes surrounded by hills in Nepal. It is composed of Boric acid and soda. It acts as a diuretic, emmenagogue, astringent, antacid and local sedative and antiseptic. It is used by Hakims and Vaidis in the convulsions of infants and children. Dr.Gowra has found borax useful in some cases of inveterate epilepsy in which bromide has no influence [38].

As Borax which consists the property to reduce the abnormal impulse and nerve conduction from the brain it reduces the hyperhidration by acting in cholenergetic antagonist

#### **Cinnabar**

Tamil Name : Lingam

Chemical Name : Red Sulphide of Mercury

It is referred to as the common bright scarlet to brick red form of mercury, and the scarlet pigment termed as vermilion and associated red mercury pigments. The ashes of cinnabar is used in the traditional system of medicine in India to treat various diseases after purifying the drug according to the purification process mentioned in Siddha pharmacology of metals and minerals [44]. It is mainly used in Siddha system of medicine to treat veneral diseases and delirium.

From this we conclude that Cinnabar having the great capacity to reduce the hyperhidration by controlling the abnormal nerve transmission, as it is having the indication to treat the medical condition delirium.

#### **Purified Ox Bile**

Tamil Name : Korosanai

Parts used : Bile of Ox

It is used in Siddha medicine to treat various types of disease in children<sup>[44]</sup>. Mainly it is useful in treating respiratory diseases and seizural disorders in infants and children<sup>[44]</sup>. Taurine a chemical component of Ox bile which acts as a anticonvulsive by reducing the increased neurotransmission. Taurine crosses the blood–brain barrier<sup>[43]</sup> and has been implicated in a wide array of physiological phenomena including inhibitory neurotransmission<sup>[36]</sup>.

## DISCUSSION

The ingredients of Siddha formulation *Kungumapoo mathirai* which acts as a hypohydrating agent by its various pharmacological activities. Siddha medicine is mainly based on five elemental theory and *Thiridhosa* theory (*Vatham*, *Pitham* and *Kabam*) and each of the herbal and metallic drugs having their own taste as primary and secondary. According to these theories the excellence in Siddha, formulated each and every medicines. The basic elemental theory and *Thiridhosa* theory of *Kungumapoo Mathirai* are as follows. Each and every drug of *Kungumapoo Mathirai* having the *Kaippu suvai* as primary, and *Karppu suvai* as secondary. Some having *Karppu* as primary as well as secondary. Among the five elements *Kaippu suvai* is formed by *Vaayu* (wind) and *Aagayam* (sky) and *Karppu suvai* is formed by *Theyu* (fire) and *Vaayu* (wind). The action of the five elements and the tastes were explained in a Siddha text *Noi Naadal Noi Mudhal Naadal Thirattu Part -1*. The action of *Vaayu* (wind) is generally referred as movements e.g., walking, jumping, sitting, running standing etc. and the action of *Aagayam* depends upon the emotions such as anger, revenge, love etc. *Theyu* which is responsible for laziness, sleep, fear etc. simultaneously the action of these elements to be noted as *Vaayu* which is responsible for dryness, tiredness, sorrow, etc. and the *Aagaya kooru* is responsible for the humbleness and regulate the small pores of the body. *Theyu* which is responsible for the action of dryness, clearness, give colour to the body and give heat to the body, these are the actions of the elements present in the Siddha formulation *Kungumapoo Mathirai* which helps in reducing the condition hyperhidrosis by the action of taste, five elemental theory and *Thiridhosa* theory in this condition. According to the action of *Thiridhosa* and five elemental theories and by their actions the three elements involved in this formulation will help in reducing increased sweating (hyperhidrosis) by the mechanism mentioned above. As *Aagaya kooru* which helps in closing the sweat pores, and the *Theyu* and *Vaayu* which helps in controlling the emotional status which mainly leads to the condition hyperhidrosis. *Theyu* and *Vaayu* having the character to reduce the moisture content as one of its feature is making anything dry<sup>[39]</sup>. Hence this concept concludes that this *Kungumapoo Mathirai* works in the condition of hyperhidrosis and its Siddha elemental and *Thiridhosa* theories also are explained.

## CONCLUSION

This review shows that the ingredients of *Kungumapoo Mathirai* have the pharmacological activities such as anticholinergic, antioxidant, anti-depressive, and antispasmodic. The mechanism of controlling hyper hydration is also proved according to *Thiridhosa* theory of Siddha. From these activities and Siddha concept we come

to know that this Siddha formulation acts as hypo hydrating agent, and so it will reduce Hyperhidrosis. <sup>[32]</sup> All the herbs used in this formulation has the action of widening the bronchial passages so it is also proven that all these ingredients can cure the diseases of respiratory passage.<sup>[21]</sup>

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