



NEUROPROTECTIVE EFFICACY OF SIDDHA SPICES, “THIRISADHAM”: A REVIEW

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ABSTRACT:

Background: There has been an increased search for disease prevention and health promotion features among kitchen spices. Siddha, one of the indigenous Indian systems of medicine describes about various spices and their role in disease prevention while using in cuisines, signifying the paradigm, “Food is medicine”. Apart from being immunomodulators, spices also don the role of organ specific protective action. **Method:** Literature search was carried out through Classical Siddha Literatures as well as in Online platforms such as Google, PubMed, for keywords “Neuroprotective”, “Alzheimer”, “spices”, “neurotoxicity”. **Result:** Various Research studies confirm the neuroprotective action of the constituent individual Siddha spices in “Thirisadham” combination, which is a combination of three siddha herbs namely *Elakkai*, *Kirambu* and *Lavangapathiri*. **Conclusion:** As the individual herbs of the thirisadham combination show neuroprotective potential, the combination can be used in clinical practice for prevention as well as attenuation of neurodegenerative diseases. Thirisadham can be used in novel drug discovery techniques used for prevention of neurotoxicity.

Key words: Siddha, Spices, *Thirisadham*, Neuroprotective, Research

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INTRODUCTION:

The history of spices has shaped the history of mankind. Our ancestors recognised the infinite health benefits of spices and brought them to medicinal use from kitchen base.

Siddha literatures defines various collective raw drugs while describing medicines formulation and some of them are *thirikadugu*, *thiriphala*, *thirisadham*, *thirinimbam*, *thirimanjal*, *thiripathiri*, *thirigantham*, etc. These drugs are used in various dosage forms such as *chooranam*, *ilagam*, *thylam*, while they act by principle of synergism enhancing potency along with bioavailability. The *thirisadham* is one such *thogai sarakku* (collective raw drug) consisting of Siddha herbs, *Elakkai*, *Kirambu* and *Lavangapathiri* [1].

This paper reviews the possible neuroprotective mechanism of the herbs in "Thirisadham" with recent updates.

Thirisadham:

According to the list of *Thogai sarakku* given in Siddha system, *thirisadham* is a combination of three herbs, the fruit pod of *Elam* (*Elettaria cardamomum* (L.) Maton), the fruit bud of *lavangam* (*Syzygium aromaticum* (L.) Merr. & L.M.Perry) and the leaf, *Lavangapathiri* *Cinnamomum tamala* (Buch.-Ham.) T.Nees & Eberm. These three herbs possess carminative, stomachic and stimulant

properties. These spices have *Karppu* (Pungent) taste with hot potency and produces pungent taste during post digestive assimilation [2]. The pungent combination of *lavangam* and *Lavangapathiri* is counteracted upon by *Elam* which is mildly pungent. Some of the Siddha medicines containing *Thirisadham* are *Inji chooranam*, *Gandhaga Rasayanam*, *Maha Valladhi Ilagam*, *Thalisadhi chooranam*, *Thippili Rasayanam* [3].

Synergism among herbs:

The question as to how these herbal combinations have synergistic effects can be explained through the principles of biomolecules interacting with each other. Cocktail of herbs contains active metabolites, which regulates target cell receptors through agonistic pathway causing signal transduction synergistically. This may be done in two mechanisms, 1) different phytochemical molecules regulate either a single or different target pathway in synergistic/agonistic mechanism or 2) one molecule regulate the enzymes and transport systems involved in a hepatic/intestinal metabolism so as to enhance drug bioavailability of the other molecules [4],[5].

Hence, multicomponent nature of an herbal drug suits for treating both chronic as well as the acute inflammatory ailments.

Elam / cardamom:

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The plant (*Elettaria cardamomum* (L.) Maton, belongs to the family, Zingiberaceae. Dried fruits along with seeds are used as condiments in cooking. Known as the Queen of the spices among Indian spices [6], it is used in Siddha medicines for its anti-pitha properties, apart from being a kayakarpam herb, it is used in ailments of dyspepsia, anorexia, and other stomach related disorders [7]. The Essential oil (EO) of the cardamom capsules varies from 6 to 14% depending upon the type and processing methods. The EO contains predominantly monoterpenes constituents such as 1,8-cineole, α -pinene, α -terpineol, linalool, linalyl acetate and nerolidol and the ester constituent α -terpinyl acetate all of which have therapeutic benefits including antioxidant, anticancer, antidiabetic, anti-inflammatory, antifungal, antiviral and gastroprotective activities [8].

Research Findings: Cardamom possesses significant neuroprotective effects against Alzheimer's disease and Convulsions [9],[10]. It works to improve serotonin and dopamine levels thereby improving memory and other behavioural attitudes [10],[11]. It attenuates memory loss in scopolamine induced amnesia besides displaying anxiolytic and muscle-relaxing effects [12]. Administration of extract improved anxiety like behaviour in post-traumatic stress disorder as examined by

open field, elevated plus maze and rotarod tests [13].

Lavangam/Kirambu:

The plant, (*Syzygium aromaticum* (L.) Merr. & L.M.Perry) belongs to the family, Myrtaceae. has long been recognized as a medical plant in traditional Siddha medicine. Traditionally, the clove buds are used to treat sinusitis, tooth ache, as a poultice for headache. It is used to stimulate appetite, control vomiting and indigestion. The clove buds are also used along with betel chewing after a heavy meal due to its carminative effect [14]. Cloves contain the highest levels of total antioxidant capacity among dried spices (Wu et.al 2004).

Eugenol is the main bioactive compound of clove, which is found in concentrations ranging from 9 381.70 to 14 650.00 mg per 100 g of fresh plant material. With regard to the phenolic acids, gallic acid is the compound found in higher concentration (783.50 mg/100 g fresh weight). Concentrations up to 18% of essential oil can be found in the clove flower buds. Roughly, 89% of the clove essential oil is eugenol and 5% to 15% is eugenol acetate and β -cariofileno. Another important compound found in the essential oil of clove in concentrations up to 2.1% is α -humulen. Other volatile compounds present in lower concentrations in clove essential oil are β -pinene, limonene, farnesol, benzaldehyde, 2-heptanone and ethyl hexanoate [15].

Research Findings: Clove reduces short and long-term memory impairment with improvement memory and learning ability in scopolamine-treated mice [16]. Clove oil affects both cholinergic and glutamatergic systems, directly inhibiting the NMDA induced cell neurotoxicity [17],[18]. WIE MB 1997 et al; Ogata M 2000 et al. Clove demonstrates positive effects on cognitive function and reducing oxidative damage [19],[20],[21]. Exercise and clove extract reverse memory deficits, apoptosis and mitochondrial dysfunction of the hippocampus in Alzheimer's disease [22]. The antioxidant and anti- apoptotic properties can be effective in the prevention and treatment of Alzheimer's disease.

Eugenol, the main component of clove improved the number of putative neural stem cells and granular cells while decreasing the rate of neuronal cell death. It has also increased spatial and recognition memory performance. As analysed by behavioural tests and Golgi staining of brain tissue, eugenol can increase memory performance, neurogenesis, and dendritic complexity of neurons in the Dentate Gyrus and cornu ammonis basal region of brain in mice [23].

Lavangapathiri/ Indian Bay Leaf:

The plant, (*Cinnamomum tamala* (Buch. - Ham.) T.Nees & Eberm) belongs to the family, Lauraceae. Dried leaves of cinnamon are used in flavouring foods and also as

insecticide/natural preservative, emits clove-cinnamon like aroma.

Traditionally, the Indian bay leaf is used to relieve cough, cold, thirst, and vomiting. Apart from being a carminative, it is also used in fever for its diaphoretic properties [24]. Analysis of the leaf essential oil from *C.tamala* revealed Eugenol, α -Phellandrene and β -Phellandrene, α -Pinene, Elixene, cis-Caryophyllene, Myrcene and Limonene as its major constituents [25].

Research Findings: *Cinnamomum tamala* extracts showed antidepressant activity similar to imipramine at a dose level 400 mg/kg. These cause behavioural despair, learned helplessness, and tail suspension. Plant shows significant anxiolytic activity and has therapeutic beneficial for the management of psychological ailments [26]. Cinnamtannin B1, type A Proanthocyanidin is an active component found in the *lavangapathiri* [27]. In a research study, it is found that Cinnamtannin B1 protects astrocytes from Oxygen-glucose-serum (OGSD) deprivation/reoxygenation induced cell death probably by increasing the ERK phosphorylation and Bcl-2 expression level. the antioxidant, Cinnamtannin B-1 reduced the increased level of ROS in OGSD/reoxygenation-treated cells, which can be considered as a factor in the protective effect of Cinnamtannin B1 in cell survival.

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Astrocytes can support neuronal survival, some diseases, including spinal muscular atrophy (SMA) and amyotrophic lateral sclerosis (ALS) were found to be associated with function loss of astrocytes in the spinal cord. Thus, using exogenous antioxidants could be beneficial for the protection of the CNS [28].

In another study, the beta caryophyllene, a sesquiterpene was found to constitute 25.3% of the essential oil of *lavangapathiri* [29]. (a major source) BCAR, a dietary Phyto cannabinoid, has a neuroprotective capability through its CNS-mediated pharmacological activities such as analgesic, anxiolytic and anti-depressant, anti- Alzheimer, anti-inflammatory, and immunomodulatory. BCAR acts against alcoholism and autoimmune encephalomyelitis. Neuroprotective effects of BCAR may be linked to its antioxidant and anti-inflammatory properties [30].

Neuroprotection by Target compounds:

The bioactive metabolites of Indian spices have long been studied for therapeutic potential in prevention of neurodegenerative diseases. Either by attenuating or preventing they exert their effects through prevention of apoptosis, regulation of cellular metabolism, calcium homeostasis, reduction of ROS generation, downregulating pro-inflammatory cytokines, reducing neuro-excitability while

promoting endogenous antioxidant defence [31]. Reversal of mitochondrial dysfunction, damage to the neuronal & Schwann cells, microglial activation is some of the interesting neuroprotective effects of the natural phytocompounds from the *Thirisadham* herbal constituents.

CONCLUSION:

The burden of neurological disorders is also expected to increase in India following rapid demographic and epidemiological transition occurring in the country. Thirisadham, the Siddha drug with simple kitchen spices, cardamom, clove and Indian bay leaf shows promising neuroprotective effects. Thirisadham combination can be used in integrated modules for prevention, therapeutics and rehabilitation of neurodegenerative conditions more effectively.

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