AN OVERVIEW ON THE ROLE OF SIDDHA PRACTICES IN THE PREVENTION AND MANAGEMENT OF AGE RELATED NEURODEGENERATIVE DISORDERS WITH SPECIAL REFERENCE TO SENILE DEMENTIA

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ABSTRACT

Siddha science is the oldest one, generated from Dravidian culture. Siddha medicine grew out of empirical observations that were handed from generations to generations. In Siddha system there is still lot of incognito fields which is unexplored to the present day scenario. People rely entirely on native medicine, before the invention of modern medicine practices. From the social occurrence, an individual encounters relatively unchanged disease conditions as of now. In siddha system, the physicians skillfully managed every condition with specialized procedures. There exist Kirigai maruthuvam, kayakarpa procedures and techniques are of great current value in preventive and curative aspects of geriatric health care. The context of Kayakarpa therapy and its attanga yogam and karpa avizhtham components are largely unexplored part of ancient wisdom. There is a great need to make aware the professionals as well as the public about the use of Siddha Kayakarpa remedies given in Siddha texts. There is also a need to carry out applicable research plans in the Siddha field to develop an evidence-based approach to treat senile individuals with neuro psychiatric issues. This article reviews the pharmacological and non-pharmacological interventions in Siddha system for the management of senile dementia and throws some scientific light on the age-old practices to bring that into current-day clinical practice. The modern approach has some downsides, in which the Siddha system can fill the gaps in natural way, especially in the cases of dementia in elderly.

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INTRODUCTION

Dementia is a descriptive term for a collection of symptoms that affect the brain. People with these symptoms may experience cognitive difficulties, personality changes, and behavioral problems. While these problems most often affect the elderly, they are not a normal part of aging. Globally, 44.4 million people were estimated with dementia. By 2030, this estimate will rise to 75.6 million, and 135.5 million by 2050. Developing countries have considerable growth, which implies that at present there is 62% dementia people will rise to 71% by 2050. There is a reckless upsurge of aged people in China, India, and their south Asian and western Pacific neighbours. In 2010, 35.6 million people were assessed to be living with dementia. Each year, the incidence is 7.7 million cases, which indicate that for every four second there is a new dementia patient arises. The accelerating rates of dementia are cause for immediate action, especially in low- and middle-income countries where resources are few.

Dementia remains a largely hidden problem in India, especially in those parts of India where poverty and illiteracy levels are high. India was home to more than 75 million people older than sixty years in 2001. This age group, which was 7.5% of the population, is expected to grow dramatically in the coming decades. The demographic profile depicts that in the years 2000–2050, the overall population in India will grow by 55% whereas the aged population of 60 years and above will increase by 326% and those in the age group of 80+ by 700%. This has resulted in an increased proportion of older people in the total population, termed as the “graying of population”. The burden of mental disorders’ morbidities is increasing in the Indian elderly due to ageing of the brain, problems associated with physical health, cerebral pathology and socio-economic factors such as breakdown of the family support systems, social isolation and decrease in economic independence.

Dementia has wider impact of the overwhelming illness process on the affected people, their families, the society and the nation at large. The evidence base for management of dementia is lacking. The pharmacological and non-pharmacological treatment approaches are being followed for centuries in Siddha practice. There is also a need to carry out applicable research plans on the age-old practices to bring that into current-day clinical practice and to develop an evidence-based approach to treat senile individuals with neuro psychiatric issues. The modern approach has some downsides, in which the Siddha system can fill the gaps in natural way, especially in the cases of dementia in elderly. An in-depth view, to the extents of kayakarpam will lead to break-through in combating various incurable diseases such as dementia. The aim of this review is to deal about the siddha treatment approaches for the prevention and management of neuro psychiatry illnesses of elderly, especially senile dementia.

Neurodegenerative diseases

Neurodegenerative diseases represent a large group of neurological disorders with heterogeneous clinical and pathological expressions affecting specific subsets of neurons in specific functional anatomical systems; they arise for unknown reasons and progress in a relentless manner. Neurodegenerative disorders are a major cause of mortality and disability. Alzheimer’s disease is the major cause for dementia, which accounts for 50 to 70%. The second most common type of dementia is vascular dementia, which is caused by deficient blood flow to the brain. Multi-infarct dementia can arise when sequence of small strokes affect tiny arteries. Many individuals with Parkinson’s have dementia at the advanced stage of the disease. Dementia with Lewy bodies starts with wide disparities in attention and alertness. Individuals affected by this illness frequently experience visual hallucinations as well as muscle rigidity and tremors like those associated with Parkinson’s disease. The automobile accident or other trauma causes brain injury, which cause symptoms of dementia such as behavioral changes, memory loss, and other cognitive difficulties. Huntington’s disease is an inherited, progressive disorder that causes irregular movements of the upper and lower limbs, facial muscle palsy, personality changes, and weakening of thinking ability.

Creutzfeldt-Jakob disease (CJD) is a rare, rapidly fatal disorder that retards memory and coordination causing behavioral changes. Among hundreds of different neurodegenerative disorders, attention has been given to Alzheimer’s disease (AD), Parkinson’s disease (PD), Huntington disease (HD) and amyotrophic lateral sclerosis (ALS). The number of neurodegenerative diseases is currently estimated to a few hundred and among these; many appear to overlap with one another clinically and pathologically leads to confusion in classifying the diseases.

Siddha medicine

Siddha science is the oldest one, generated from Dravidian culture. It came to South India when the Tamil people, who may have been the original inhabitants of the Indus valley, migrated southward. It is thought to have developed during the Indus civilization, which flourished between 2500 and 1700 BCE. Siddha medicine grew out of empirical observations that were handed from generations to generations. Siddhars, who are the sect of Tamil sages, derived the medicinal ideas and practices of Siddha medicine. Siddhars, the fore runners of native medical science of South India, have attained Siddhis by virtue of perception and super natural powers. Ominously, one of the descriptions of Siddha medicine is conquest of death: “that safeguards one against mortality”. Thirumoolar Siddhar’s Thirumantiram literature, a classic text on the basic philosophy of Siddha medicine authorizes this description. One of the notable characteristics of Siddha treatment relates to an intricate technique known as Kaya Karpa method that is used for rejuvenation and the presumed immortalisation of the human body. Siddha medical science most distinctly emphasizes the practice of Kayakarpam to rejuvenate the body and mind that eventually slows down biological ageing.
Psychiatry in Siddha medicine

Kiriigai Maruthuvam, the Neuro-psychiatry in Siddha system of medicine is propounded by several siddhars of whom the most renowned are Agasthiyar, Yugumunivar and Theraiyar. Their descriptions are phenomenological. In Siddha system, the physiology of human body is dealt in 96 Thathuvangal (Philosophy)\textsuperscript{[11]}. Of the 96 thathuvangal, Maṉam (Mind), butthi (Wisdom, Decision making), Chittham (Determination), Muqaippu (Accomplishment) are responsible for mental well-being. Muqaippu is the innate character of Maṉam. Manam (Mind) is responsible for thinking, reasoning, planning and Self-realization. The Mind and physique are inseparable and inter depended. Maṉam is both receptive and executive. In-appropriate Food, seasonal variations, somatic diseases, and drug abuse are some of the factors that influence the mind. This stimulates the three humours Vaḷi, Azhal and iyam, especially deranges Vaḷi or Azhal or often the predominance of Azhal humour over the other two, thereby manifest Maṉa Nōikaḷ (Mental diseases). Agasthiya maanidar kiriigai nool and Yugi chinthamani-800 are noteworthy psychiatric literatures in siddha system. They classified the clinical variety of mental illness, based on symptomatology. It absolutely correlates with modern neuro psychiatric illnesses like schizophrenia, mania, depression, convulsive disorders, neurotic illnesses, drug dependence, toxic psychosis etc.

In Siddha system,
- Kalikkam (application of eye drops),
- Anjanam (eye lid application),
- Nasiam (ingestion of medicated oil into the nostrils),
- Aakkiraanam (inhaltion of dry herbal powders through nose),
- Pugai (imbibing of herbal smoke),
- Kudori maruthuvam (rubing medicines in the incised skin parts),
- Thuvaalai (application of medicated oil/herbal paste/herbal mixture),
- Emany muzhukku (medicated oil bath) are in practice to treat Kiriigai noigal\textsuperscript{[12]}.  

Kaya karpa

Among the fields of Siddha medicines, Karpa medicines for rejuvenation and prevention of diseases and Yoga practice for physical and mental well-being, said to be the hallmark of this system\textsuperscript{[11]}. The Tamil word ‘kaya’ means body and ‘karpa’ means stone. Therefore, ‘kayakarpam’ means sturdy as a rock and ageless physical body. While consuming karpa medicines, it naturally prevents the body from diseases and deterioration of physical stature. Kayakarpam usage provides both mental and physical wellness to the individual. Kaya karpa therapy encompasses pharmacological and non-pharmacological regimen. The oral therapies (Karpa avizhtham) are from herbal, Mineral and animal sources which includes dietary and medicinal habits. The physico-intellectual method (Karpa yogam) is known as Attanga yogam practices, which are non-pharmacological methods described in Siddha literatures\textsuperscript{[12]}. Unlike the disease modifying activity, these Kayakarapa drugs enhance the immunity and counteracting the aging process. The supremacy of Siddha medicine in the context of Geriatric care through Kaya Karpa therapy is unique because of its ability to promote longevity and influence all aspects of health in a positive way\textsuperscript{[13]}. Describing the effects of Kaya Karpa, the classical texts of Siddha say that from Kaya Karpa, one can attain longevity, improved harmony and intelligence, freedom from disorder, youthful vigor, complexion and voice, optimum strength of physique and senses, command over language, respectability and brilliance\textsuperscript{[14]}. Siddhars had firm faith in the immortal physical body and the soul (Seevaathma) is being in tune with the spiritual divinity (Paramaattha) which helps to realize and reach the omnipotent.

Karpa Avizhtham (Kayakarapa Medicines)

Karpa avizhtham or oral medicines include herbal, mineral and animal product preparations. Kayakarapr recipe is to build a strong body. Karpa avizhtham are of two types, by preparing it daily or make it as some types of internal and external medicines such as powder (churannam), decoction (kudineer) forms, poochu (external application) etc. Herbal Karpa avizhtham are mentioned in various Siddha literatures such as Theraiyir yamaga venba, Bohar karpan 300, Bohar 7000, Thiruvalluvar karpan 300, Pulathiar karpan 300 etc. Mineral Karpa medicines are given in Agathiyir chendoooram300, Bohar 7000 & 700 etc. The herbal kayakarapa, emphasized by Thiruvalluva nayanar is that in the morning intake of fresh ginger after removing the outer skin, mixed with honey, at noon dry ginger powder, and at evening Kadukki (Terminalia chebula) powder mixed with water would give disease free life to a person.\textsuperscript{[13]} There are prepared forms of medicine, which cures diseases and act as rejuvenators. Some of which are, Aya sambeera karpan, an iron based preparation is made from fermentation of iron soaked in lemon, Ayabringaraja Karpan is made from iron processed in Eclipta Alba plant juice and lime juice and Poorna Chandrodaya chenthuram made up of gold, mercury, and sulphur. Fresh and boiled cow’s milk, cochinell insect, which are mostly seen in rainy season are the animal originated kaya karpa medicines which are denoted in the Paththaartha guna sinthaamani literature. Karpa drugs have rejuvenating powers and are believed to retard the aging process. Of the mercurial drugs, according to Bhogar siddhar, mercuric sulphide with gold and borax would be good for rejuvenation and he has described a method for its preparation\textsuperscript{[11]} Kattu, Kalangu, Chatthu, Guru kuliṅgai, Amuri and Muppu are highly acclaimed preparations in Tamil Siddha tradition. With their great insight and deep knowledge in chemistry and metallurgy, Siddhars evaluated a number of metal and mineral preparations, which even today challenge the incurable diseases\textsuperscript{[14]}. 

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Karpa Yogam

In Siddha system, Yogam begins with the basic attainment of purity in mind and action. It is the stepping-stone to the successive next stages of Attaanga yogam without any incompetency. In India, Yoga sutras (Sage Patanjali’s dictums of yoga, second century BC), advocate controlled breathing, deliberation of mind, mastery over senses, and intense meditation techniques, moreover it includes certain postures or exercises for psychosomatic harmony[10]. Even before the existence of Sage Patanjali, in Tamil tradition there was the presence of yogic practices. The archeological evidences of stone sculptures found in Mohenjo-Daro civilization symbolizes meditative posture, ensures that the people practiced yogam. There is number of aadhanaam postures that are given in Tholkappiam, an oldest literature of Tamil language authorizes the vintage of Siddha System and yogic practices. Tholkappiam, which has been written before 7th Century AD, denotes eight types of Yogic practices in its Puram 75.6th verse[13]. Subsequently, Thirumoolar in his works has denoted many yogic procedures, given away the tactics to attain death-less life and to halt re-birth. Thirumoolar's writings is the basis for Attanga Yogam* (Eight-Limbed Yoga). This eight-limbed concept is derived from the Thirumanthiram book, and is a core characteristic of every Rasayoga variation taught practically today. The Eight Limbs are:

- **Iyamam** (Pureness of Mind)
- **Niyamam** (Good conduct)
- **Aadhanam** (Postures)
- **Praanayaamaam** (Breathing exercises)
- **Pratyakaaraam** (Abstraction)
- **Dhaaranaam** (Concentration)
- **Dhyaanam** (Meditation)
- **Samaadhi** (Liberation)

Iyamam is said to be that having and involving good thoughts. Indulging in immoral thoughts like jealous, selfishness, anger could eventually leads into dejected mental status that causes stress in routine life, in long run it will leads into psychiatric illnesses.

Niyamam is to perform virtuous deeds to all living being around us, not to harm by either speech and/or act. Right diet habits, self-cleanness also comes under, Niyamam. One should avoid cigarette smoking and alcohol drinking etc. These habits are with no doubt will leads to many social humiliation.

Aadhanam is a vast collection of physical postures during sitting, standing or lying on the floor, along with specific breathing patterns.

Among the eight steps, Praanayaama method is a non-pharmaco therapeutic method in Siddha system dealt with the control of breath. Human breath is nothing but a physical manifestation of praana. As oxygen is taken up by the circulatory system, so is praana taken up by the nervous system and is spent as nerve force in the act of thinking, desiring etc., Regulation of breath enables one to absorb a greater supply of praana to be stored up in the brain and the nerve centers to be used whenever necessary. According to the Siddhar Yugimuni, 21,600 respirations a day is the secret of remaining ever young[10].

Pratyakaaraam is the method of withdrawal of sense organs from the external objects.

Dhaaranaai is fixing the attention on a single object.

Dhyaanam is intense contemplation of the nature of the object of meditation. Meditation on the elements, beginning with the “random” and ending with the “inner consciousness,” enable one to gain mastery over the perception.

Samaadhi is to merging consciousness with the object of meditation[12].

Oxidative stress and Mechanism of action of Kayakarpam medicines

The brain is exposed throughout life to oxidative Stress, and certain diseases of the brain and nervous system are thought to involve free radical processes and oxidative damage, either as a major cause or because of disease progression. There is evidence of usefulness of herbal kayakarpam from sangam period, once the great king Athiyaman gave an eternal nellikkani (Indian gooseberry) fruit to Avvaiyar, quoting that this is a special and potent fruit, whoever eats they can live a long healthy life. Athiyaman wanted Avvaiyar to eat the eternal fruit because she was the right person who could serve the Tamil community. If she could live forever, so would the Tamil heritage and language. Therefore, the knowledge of anti-ageing properties of herbal harvests was deep-rooted in Tamil heritage[17].

Free radical theory

The human body cells mount up free radical harm throughout the life, so we turn old. An incomplete atom or a molecule having a unpaired electron in the external orbit is called a free radical. The unpaired electron snips nearer cell’s electron to couple, which is the starting point of cell damage. The free radical consecutively creates additional free radicals and a chemical chain response of radical production takes place[18]. The free radicals produced in such reactions frequently laid off by eliminating an electron from a molecule, which converts it or cannot function without it. It leads to pro oxidative shift in cellular balance which has been associated in the cause of many diseases like diabetes, ischimic or reperfusion injuries, rheumatoid arthritis, cancer, hypertension, atherosclerosis, neurodegenerative diseases such as Parkinson’s disease and Alzheimer’s dementias, and even the process of aging. However, nature has evolved elegant regulatory mechanisms for countering this free radical damage. These primarily involve antioxidant reducing agents that can slow or stop oxidation reaction. Some antioxidants are part of the body's natural regulating machinery while other dietary antioxidants are derived from diet source[19]. These antioxidant molecules donate an electron, which neutralize the radical and stops the chemical chain reaction to reduce and prevent oxidative cell damage. The antioxidant chemicals
are abundantly present in vegetables and fruits, which forms the basis for its rejuvenating action. Kaya Karpa is that form of treatment, which restores the aged and debilitated body to its pristine youth and vigor, re-establishes the full potentialities of the senses and gives good health. Kaya Karpa adds new life to years and new years to life. Kaya Karpa restores Vali, Azhal and Iyam to natural balance, brings the Saptadhatus functions to the state of equilibrium and cures many diseases.

Nootropic drugs

The nootropics or Cognitive enhancers that improve creativity, recall, alertness, mental focus, cognition by protecting and fortifying the brain cells. These substances delay or even reverse brain aging and even make young brains work better. Various mechanisms by which the drugs acting on brain are by increasing brain circulation, supplying precursors to neurotransmitters, enhance the neuronal function, preventing oxidative damage and providing energy to the brain. Antioxidants help to preserve the extensive psychological capabilities, make the brain younger and defend it from oxidative loss. Kaya karpa medicines and attanga yoga intellectual exercises can act as cognitive enhancers, which has the positive influence on body’s natural constitution that may help to reduce the symptoms of senile dementia and if followed regularly would prevent these disorders in elderly and improves their quality of life.

Natural antioxidants

Antioxidants are substances that help us defend our bodies against those dangerous mutants of nature called free radicals. The two important enzymatic antioxidants are Superoxide Dismutase (SOD) and glutathione peroxidase. There are two types of SOD—one is inside the mitochondria, the other outside, but within the cell. The one inside the mitochondria has manganese as its component, and the one outside has zinc and copper in its structure. A small deficiency in any of these elements may greatly affect the SOD activity in our body. These chelated minerals are generally better absorbed than the non-chelated minerals. The minerals (zinc, copper and manganese) found in these products will aid the body to manufacture its own SOD dependably.

The other antioxidant enzyme, glutathione peroxidase has the mineral selenium, as one of its major components help to deactivate the harmful effects of heavy metals such as cadmium, mercury, lead and aluminum and saves the cells from oxidation. Both white and red blood cells depend on this enzyme for their proper functioning.

The third important enzyme catalase is activated by iron. Its function is primarily to neutralize the hydrogen peroxides. Young individuals naturally produce catalase, but it drops down with age increases. Several investigations provide significant association of catalase levels with healthy and longer life. To slow down aging, for curing pain and modulating inflammation the catalase could be supplemented to neutralize free radicals for promoting longevity. The current evidences suggest that reduced levels of catalase have influence in the graying process of human hair. The body naturally produces hydrogen peroxide and catalase breaks it down. If catalase levels decline, hydrogen peroxide cannot be broken down as well. This allows the hydrogen peroxide to bleach the hair from the inside out and preventing the melanin that produces color from synthesizing pigments. Evidence indicates that phytochemicals having antioxidant properties reduce the symptoms of Neurodegeneration. In Siddha, Thirumuoolar dictates three types of muppu, which helps in rejuvenation of human body. Among the three, Yoga muppu is said to be the bodily production of natural anti-oxidants, which yields disease free, glowing body. These muppu can be secreted by adoring yogic way of life. So, the muppu, a natural anti-oxidant, if secrets in the body can prevent graying of hair, wrinkling of skin, senility and death due to aging.

Dietary karpam (General rejuvenators)

Plants are potent biochemical factories and have been components of phyto medicine since times immemorial; Pothu karpam (general rejuvenator) is being administered as regular diet. The glucose level in the brain is being increased by food substances and supplements which has the impact on learning and memory, attentiveness and execution. The inadequacy of dietary intake leads to a decline in the efficiencies of the brain. Depression is associated with poor nutrition, with severely compromised cognition and functioning resulting from malnutrition. Adjusting both diet and nutrition may help some people with mental illnesses manage their symptoms and promote recovery.

Theraiyar Siddhar assures that daily intake of Zingiber officinale (Inji then) rhizome after removing its outer skin, sliced and soaked with honey will prevents senility, promotes good eyesight and strengthens the body. Zingiber Officinale (Zingiberaceae) rhizomes shown potent memory enhancing action in scopolamine induced amnesia model study by significantly increasing whole brain acetyl cholinesterase inhibition. The cognitive enhancer and neuro protective effect of ginger is due to its antioxidant activity, which is reported. So, the nootropic action of ginger is accomplished because of the acetyl cholinesterase inhibitory action, anti-inflammatory, antioxidant and neuro-protective property.

Oryza sativa (paddy rice) flour mixed with cow’s ghee (Nell ma nei) can be taken daily. A complete internal rejuvenation takes place when rice protein is metabolized into health-building amino acids. These amino acids build resilient muscle that comes back to its original form after stretching and bending, healthy skin and hair and clearer eyesight and nourish the heart and lungs, tendons and ligaments, brain, nervous system and glandular network. Brown rice is said to contain high levels of neurotransmitter nutrients that can prevent Alzheimer’s disease to a considerable extent.

Alternernthera sessilis (Ponnanganni) can be cooked with ghee, pepper and salt make it as curry and taken with daily food result in good looks. The aqueous and ethanolic extracts of aerial parts of Alternanthera sessilis at three different doses reduced Transfer latency and significantly reversed scopolamine-induced amnesia, suggesting an underlying cholinergic mechanism.
*Azadiracta indica* (Vembut) tender leaves are ground and added with *Tachyspermum ammi* (omam) and salt. This powder is specially started on rohini nakshathra for 40 days. It that the Pre-treatment with *A. indica* in ischemia-reperfusion injury of brain has been demonstrated as protective effect on brain cells due to its antioxidant property and it can inverse cognitive deficits induced by chronic hypo perfusion of rat brain on bilateral carotid artery ligation technique[30]. The recent scientific reports also suggest that neem possess antioxidant and cognition-enhancing actions[31].

Intake of *Aloe barbedenses* (Katrachai) as dry or cooked form, gives the excellent complexion and goodness to the body, as if the person consumes regular fruit and mercurial drugs. It contains polysaccharides and flavonoids that are potent antioxidants. Aloe is an excellent example of a functional food that plays a significant role in protection from oxidative stress[32].

When *Solanum nigrum* (Manathakkali keerai) taken as curry, dry vatthal or decoction yields extraordinary physical and mental wellness. A potential role of the antioxidants present in *S.nigrum* plant extract as a supplemental nutritional therapeutic agent in the disorders related with the free radical damage. The results also indicate that *S. nigrum* extract could serve as a dietary supplement to combat various neurodegenerative diseases[33].

In *Limonia acidissima* (Vila), all parts including leaf, unripe fruit, fruit, bark, root are to be consumed as curry or in a decoction form to prevent ageing and death. *Limonia acidissima* contains polysaccharides and triterpenoids in enormous amount which exhibits high antioxidant and having free radical scavenging activity[34].

Different phytochemical studies on *Cyperus rotundus* (Korai kizhangu) revealed the presence of alkaloids, flavonoids, tannins, starch, glycosides, furochromones, monoterpenes, sesquiterpenes, sitosterol, fatty oil containing a neutral waxy substance, glycerol, linolenic, myristic and stearic acids[35]. Oral daily administration of 500 mg/Kg of the extract (Once a day for seven consecutive days) significantly lowered the blood glucose levels in rats with alloxan-induced diabetes. The scientists concluded that this anti-hyperglycemic activity can be attributed to its antioxidant activity as *C.rotundus* showed a strong 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging action in-Vitro[36].

*Withania sominifera* (Amakara) root powder mixed with ghee or milk taken twice a day improves fertility, reduces nervous debility, strengthens the body and longevity of life. *Amukkara* contains the ergostane-type steroidal lactones, including withanolides A to Y, dehydro withanolide R, withasomminiferine A, withasomidienone, withasominiferol A to C, withaferin A, and withanone. Other constituents include the phytosterols sitoindosides VII to X and beta-sitosterol as well asalkaloids (for example, ashwagandhine, cuscohygrine, tropine, pseudotropine, isopeltierine, and anafarine), a variety of amino acids (including tryptophan), and high amounts of iron[37]. A double-blind, randomized, placebo controlled study of the effects of *Aswagandha* on stress found that it reduced symptoms of stress and inability to concentrate and reversed forgetfulness in a dose-dependent manner, and 500 mg/day was more effective[38].

*Basella alba* (Kodi Pasalai) leaf can be prepared as curry and to be taken along with diet is said to promote sexual desire and strengthen the body. It has high values of total phenol, flavonoids and ascorbic acid content and has antioxidant activity[39]. Some unique constituents of the plant are basellasaponins, kaempferol and betalain. Anthocyanins are a natural pigment that is responsible for the blue, purple, violet and red colours in fruits, flowers, stem and leaves. Anthocyanin pigments are reported to have many therapeutic benefits including vasoprotective and anti-inflammatory properties, reversing age related deficits and useful in controlling oxidative stress[40].

Mushrooms have been utilized in folk medicine since ancient time. The species of mushrooms used varied in different cultures, i.e. more species have been used in China and Japan than in Western Cultures. In China, where mushrooms are considered the elixir of life, mushrooms have played an important role in medicine for as far back as 7,000 years. Numerous species are recognized, including *Lentinula edodes*, *Hericium erinaceum*, *Flammulina velutipes*, *Auricularia polytricha* and *Tremella fuciformis*, to name a few, and these are species that are also prized for eating, as well. Cordyceps sinensis species is commonly called the Caterpillar Fungus and has probably been the most extensively studied species. It has properties similar to ginseng and is said to be more potent. It is also believed to be a remedy for weakness and fatigue, often used as a "rejuvenator" for increase in energy. Successful treatment for impotence, acting as an aphrodisiac has also been demonstrated in clinical human testing[41, 42, 43].

Potato (*Solanum tuberosum*) serves as major, inexpensive low-fat food sources providing energy (starch), high-quality protein, fiber, and vitamins. Potatoes also produce biologically active secondary metabolites, which may have both adverse and beneficial effects in the diet. These include glycoalkaloids, calystegine alkaloids, protease inhibitors, lectins, phenolic compounds, and chlorophyll[44]. Naturally occurring benzodiazepines have been identified in regular food such as wheat and potato, potato extracts can affect CNS responses in vivo. In this study potato juice as well as potato taken as food may have the capacity of influencing brain GABA-ergic activity[45].

Pumpkin (*Cucurbita maxima*) juice can be applied over the body and the vegetable can be taken as curry. It balances the body heat and strengthens the body. Xia & Wang demonstrated the hypoglycemic action of pumpkin (fruit) extract as well as its role as an antioxidant to reveal a mechanism for its cyto-protective (cell-protecting) action in streptozotocin-induced diabetic animals[46].

Diets high in pumpkin seeds have also been associated with lower risk of gastric, breast, lung and colorectal cancers[47]. The carotenoids from pumpkin fruits have been linked to the prevention of prostate cancer[48, 49]. Boiled pumpkin juice significantly suppressed the incidence of aberrant cells while fresh pumpkin juice enhanced it[50]. It was reported that pumpkin fruit extracts markedly reduced tumour weight in S-180-bearing mice[51]. Pumpkin may ease depression too, because the seeds contain L-tryptophan, which raises levels of serotonin in the brain[51].
**Eclipta prostrata** (Kaiyaan) dry powder has to be taken with tender coconut water for one month and then one month with honey. This strengthens the body and avoids premature aging. Further, it has enzymatic and non-enzymatic antioxidants such as ascorbic acid and rutin [52]. Eclipta prostrata has been used as a traditional medicinal plant to prevent dementia and to enhance memory in Asia. It’s potential as a nootropic and as an antioxidant has been reported in mice [53]. The stem part of *Cissus quadangularis* contains vitamin C, carotenoids, calcium and steroids, which are known to be potent antioxidants. In the β-carotene linoleic acid system and in the 1, 1-diphenyl-2-picrylhydrazyl system, *Cissus quadangularis* Linn stem extracts at a concentration of 100 ppm showed 64.8% and 61.6% of antioxidant activity respectively. The methanolic extract of *Cissus quadangularis* demonstrated significant inhibition in DPPH free radical formation, superoxide radical production and lipid peroxide production in erythrocytes [54].

**Therapeutic karpa (Disease specific rejuvenators)**

There are numerous therapeutic karpa drugs, which are indicated for specified ailments. This section deals with the possible karpa drugs that can be used in dementia.

*Calotropis gigantea* (Erukkai) whole plant is powdered and can be taken with dry ginger, long pepper, and black pepper seed with water will cure vatha, pittha and kapha diseases respectively. *C. proceras* (50, 100, 200 mg/kg bodyweight i.p) significantly reduces whole brain AChE activity indicating it as a potential anti-cholinesterase agent [55].

*Phyllanthus amarus* (Kizhakkai-nelli) whole plant is prepared as paste and to be taken with milk/butter milk for 40 days with avoidance of tamarind and salt. This is specific for ophthalmic diseases, liver disorders, giddiness and vomiting. In a study conducted by Joshi et al. 2007, the plant aqueous extract when administered for 9 days to young and older mice showed significant reduction of brain acetylcholinesterase activity thereby probably facilitating cholinergic transmission and improving memory of animals [56]. The memory improving activity *Phyllanthus amarus* may be attributed to its antioxidant, neuro protective and memory enhancing activity, suggesting that the plant might have chemical constituents, which possess nootropic activity, and having the ability to improve or ameliorate short-term memory loss by the regulation of the antioxidant system [57].

*Terminalia chebula* (gall-nut, Kadukkai) powder can be taken for 48 days with water in the evening time relieves jaundice, ascites and mental diseases like delusions. *T. chebula* plant extracts, which demonstrated potent free radical scavenging properties particularly those showed EC50 < 10 μg/ml expected to play a vital role in reducing the oxidative stress and this, may explain their use in traditional medicine for improvement of AD and/or ageing related diseases [58].

Due to vitiation of *Azhal* the ulcers appearing in the lips can be treated by mixing cumin seeds (*Cuminum cyminum*) with country brown sugar can be taken as internally, which will reduce the elevated *azhal kuttram*. Previous in-vivo study showed memory-enhancing activity of *C. cyminum* in normal and scopolamine-induced amnestic rats, supporting for the anti-stress, antioxidant, and memory-enhancing activities [59]. Aqueous extract of *C. cyminum* seed inhibited AChE in concentration dependent manner. It illustrates the fact that *C. cyminum* can acts as an inhibitor of AChE, helpful in enhancing memory and other cognitive functions of brain [60].

*Centella asiatica* (Vallarai) leaf can be used as curry daily. It can also be taken along with common salt for 40 days. It is used in liver disorders, enhances memory, intelligence and strengthens the body. It is found to reduce adrenal corticosterone levels in blood on stress and is beneficial for cognitive and nervous illnesses as well as cerebro-vascular complications. It was proven its effect in preventing the cognitive deficits and can be a free radical scavenger [61,62,63].

Either the decoction or the food item prepared by clearing nut or amla fruit (*Strychnos potatorum* or *Phyllanthes embelica*) as given in the literature will cure body heat, anemia, ascites etc. The lignan-glycosides vanprukoside, strychnoside, and glucopyranoside isolated from *Strychnos vanprukii* have shown significant antioxidant property [64].Anwaal churna (*Nellikkai*) may prove to be a useful remedy for the management of AD because of its multifarious beneficial effects such as its memory improving property, cholesterol-lowering property and anticholinesterase activity [65].

The oil prepared with *Thulasi* known as Holy basil (*Ocimum sanctum*), plant is used to apply on the head while taking bath, helps to cure pittha-accompanied diseases. This plant extract has been shown to possess anti-inflammatory, antioxidant and cognition-enhancing properties [66]. Thulasi treatment enhanced the antioxidant status in discrete regions of brain and the phytochemical contents of *thulasi* have been suggested to be responsible for this effect. The plant is capable of promoting a healthy aging due to its multiple but complimentary and synergistic medicinal properties, which can combat a diverse spectrum of disorders associated with aging [67]. The medicinal oil or decoction prepared from bael tree fruits and root helps to cure decreased consciousness and *iya* diseases. While using, it strengthens the body and gives exquisiteness. A significant source of phenolics and flavonoids present in *A. marmelos* effectively inhibits AChE activity and multiple components of the oxidative stress pathway that can contribute to Alzheimer’s pathology [68].

If we intake the green called *Amaranthus gangeticus* (*sirukeerai*) as food with seasoning of salt, pepper and ghee, it provides mental sharpness, and body stamina. The chemical constituents responsible for antioxidant activity are carotenoids, ascorbic acid, flavonoids and phenolic acids. Betacyanins, the coloring pigments present in the plant, have been reported to possess their antioxidant and radical scavenging properties for protection against certain oxidative stress-related disorders [69].

If the lemon juice or salted lemon is taken daily for 6 months regularly with strict adherence of karpa dietary customs, the greyness of hair, mental impedance, insanity will be cured. It also rejuvenates the body. Lemons are a rich source of vitamin C, providing 64% of the Daily Value in a 100 g serving. Fruit extracts have also shown good antioxidant activity [70].
Role of Physical and intellectual exercises in anti-aging

The principal uses of antiaging effects in older adults include lessening of stress, prevention of diseases while aging, memory enhancement and treatment of various neuropsychiatric disorders, such as depression, anxiety, insomnia, pain and many other specific symptoms. Some of the clinical and preclinical studies validate that exercise targets many features of brain function providing brain healthiness. The benefits of exercise in the elderly populations are by the protection from neurodegeneration and alleviation of depression. Exercise upsurgs synaptic plasticity by directly affecting synaptic configuration and improves the potentiality of synaptic strength. It further strengthens the underlying systems that help to improve plasticity such as neurogenesis, metabolism and vascular function. The hippocampus is the most affected part of brain induced by exercise, which leads to structural and functional change. Systematic data confirms that the mindful physical exercises cure insulin resistance, hypertension, cardiovascular disease, and depression and anxiety disorders. Clinical effects of meditation alleviate reduced anxiety, pain and depression, enhanced temper and self-esteem, and decreased stress. Meditation practice can absolutely influence the experience of chronic illness and can serve as a multi-level prevention strategy. Further controlled trials of yoga practice have demonstrated improvements in mood and quality of life for elderly, people caring for patients with dementia. The longevity of an organism clearly depends on its individual parts and their effective organization. The intercellular organization can be made effective with help of karpa medicines, and by practicing special regimens like pranayama, yoga and meditation. A belief system at its core, Siddha medicine has immense faith in the mercurial hypothesis that deals with the thokkanam methods. It is to regulate the accumulated praana force in the affected part of the body. It is done by nine different methods as indicated in theran tharu text. Rubbing with medicated oil, striking with fist, pressing the body parts, tightening the body are some of the common methods used in massage technique. It is used to relive mental stress, musculoskeletal pain, rheumatic pain and nerve compression pain etc. The literature specifies that the massage makes the body strong, relieves pain, improves fertility, skin gets radiance and the person gets sound sleep. Today’s modern science discovered the massage therapy to cure many diseases provoked by psychiatric disorders. They discovered that it regulates lymphatic channels to facilitate uninterrupted lymph flow. After performing massage, the blood levels of tryptophan, serotonin and melatonin are increased. It eventually leads to improvement in sleep in geriatric individuals. This method has many positive influences on the nervous system. On brain, the massage improves the following:

1. Subconscious mechanisms are certainly involved; however, which ones are unidentified. The reciprocal interplay between the body and mind is evident
2. Reducing pain may be a subconscious effect on the parts of the brain associated with pain and emotions (tautological argument, very weak30); Dampen central pain perception processing
3. Increased dopamine and serotonin along with decreased cortisol levels and lowers serum cortisol levels,

Suzuki et al, 2010 has reported the effects of tactile massage on changes in cognitive function and BPSD in the everyday life of elderly patients with severe dementia through a 6-week course of tactile hand massage. The results of this study showed a significant reduction on the GBS for both intellectual function and emotional function in the control and interventional groups. In this study changes in salivary CgA measurements, used as a stress index, which showed reduction in stress after intervention. A 30-minute back massage for 5 days to 52 hospitalized depressed and adjustment disorder children and adolescents were less depressed compared to control and had lower saliva cortisol levels after massage. They were less anxious and more co-operative and increased nighttime sleep was reported.

Siddha mechanism to treat psychiatric diseases

In Siddha System, there were number of ways to administer drug for epileptic, unconscious and schizophrenic individuals. Siddha vaithiyars used blowing of herbal medicines into eyes, nose and ears to unconscious snake bitten person to get him up. The drug nullifies venom by counter-acting or eliminating the neurotoxic and vasculotoxic effects in rapid way, indicates that these modes of drug delivery can cross biological barriers but oral route of administration may not. The biggest challenge to drug delivery into the CNS is bypassing the blood-brain barrier (BBB) as it limits access to the CNS. For decades, the BBB has prevented the use of many therapeutic agents for treating brain-related diseases and injuries, including AD, stroke, brain tumor, head injury, and other CNS disorders. Nasiam, an intra-nasal drug delivery in Siddha is practiced for its rapid, non-invasive action because the unique relationship between nasal cavity and cranial cavity tissues in anatomy and physiology makes intranasal delivery to the brain feasible. Existence of a direct transport route from the nasal cavity to the brain, bypassing the BBB, would offer an exciting mode of delivering neurotherapeutic agents. The nasal mucosa has a rich vasculature and, therefore, offers greater permeability than any other mucosal surfaces of the body. The nasal route offers faster drug absorption as it bypasses the hepatic first pass metabolism. Likewise, the other modes such as kalikkam, anjanam etc might bypass BBB and act on CNS. It implies that Siddha lineages are competent in administering medicines to psychiatric individuals.
DISCUSSION

Alzheimer’s disease and multi-infarct dementia are progressive illnesses, and up to now, there is no effective treatment. It is best to distinguish the symptoms timely and be diagnosed and assessed by a doctor. There are currently some modern medications available to slow the progress of disease. The review of above siddha practices with contemporary evidences states that these approaches can be used to prevent complications of aging up to considerable extent and gives appropriate hints for the effective management of age related cognitive insufficiencies. The holistic approaches in Siddha system can be able to alleviate the progression of senile dementia. Thus, the Siddha therapeutic package which consists oral medicines, siddha psychiatric treatments, massage and attanga yoga physico-intellectual exercises are having the potential to check the cognitive decline in elderly and these can be used to improve their quality of life. The general and therapeutic rejuvenators, kirigai maruthuvam practices given in the Siddha literatures, which are elapsed techniques from current day practice because of its complexity, can be used as effective mode of management. Dementia is progressive, which means the symptoms will steadily get worse. These set of therapies including oral intake of kayakarpa drug with the practice of yogic techniques, combined with regular body massage stimulation will certainly moderates the disease progression.

CONCLUSION

The age-old literary evidences conjoin with current scientific proofs, which form a new pathway of treatment procedure for dementia. The usage of herbal treatment for dementia gives future hope for the discovery of targeted drug action in a naturalistic way. There is a need of holistic approach in the dementia patients with more person-centered form of care. Siddha system indeed caters this set of circumstances. The above therapies would protect or may reduce the risk for dementia that is important for controlling this distressing disease. Further, it is essential to standardize these therapies for systematic use in dementia individuals.

Competing Interests

The authors declare no conflict of interest.
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