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MEDHYA RASAYANA IN AN AGEING BRAIN

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ABSTRACT

Aging is a natural process that begins at conception, progresses throughout one's life and ends at death. It is the process of physical, psychological and social change in multidimensional aspects. *Ayurveda* describes ageing or *Jaravastha* as *Swabhavaja* (physiological). The *Ayurvedic* texts describe a set of rejuvenative measures to impart biological sustenance to the bodily tissues during this crucial period of life. These remedies are called *Rasayana* which are claimed to supply micronutrients. Many treatment procedures such as *Shodhana, Dhumapana, Raktamokshana* which at times can be cumbersome are contra-indicated in elderly persons. Thus, the use of *Rasayanas* alone can prove to be ideal as well as beneficial to such subjects. Some of these *Rasayanas* are organ and tissue specific. Those specific to brain tissue are called *Medhya Rasayana*. Such *Rasayanas* retard brain aging and help in regeneration of neural tissues besides producing antistress, adaptogenic and memory enhancing effects. In addition to the long tradition of textual and experience-based evidence for their efficacy, certain recent studies conducted on these traditional remedies on scientific parameters have shown promising results in ensuring healthy brain ageing. This paper is an attempt to review the role of *Medhya Rasayanas* in promoting mental well-being in the geriatric population.

Keywords: *Ayurveda*, *Medhya Rasayana,* Ageing, brain aging, Cognitive impairment

INTRODUCTION

As you get older three things happen. The first is your memory goes and I can't remember the other two…."

-Sir Norman Wisdom

The World population of the elderly is increasing and by the year 2050, adults older than 65 years will comprise 1/5th of the global population. In India 3.8% of the population are older than 65 years of age. According to an estimate, the geriatric population is expected to rise to 113 million by 2016 and to 301 million by 2051.[1] Eighty nine out of thousand geriatric populations suffer from cognitive impairments. This acceleration in cognitive deficits among geriatric population demands meticulous planning and execution of health services to the elderly to help them lead a healthy and a comfortable life. *Ayurveda* defines mental health as a state of mental, intellectual and spiritual well-being.[2]It is well established that this state of mental harmony declines with advancing age leading to various degenerative conditions. According to *Ayurveda*, loss of virility, strength, and cognitive power, is progressively noted from the 6th decade of life.[3]To delay this physiological process, the use of *Medhya Rasayanas* has been stressed upon in the young and middle age. However, our *Acharyas* have not contra-indicated the use of *Rasayanas* in old

age. Due to the scientific advancements, the *Medhya Rasayanas* have proven beneficial in delaying the deteriorating cognitive changes in old age. Thus, a systematic evaluation of these drugs gives us a clear picture to prevent and tackle the age-related cognitive impairments in the elderly.

Mechanism of brain aging

A number of changes take place in the brain during ageing at molecular, cellular, structural, and functional level. Neural cells may succumb to neuro-degeneration. There is considerable loss of neurons, reduced synthesis of neurotransmitters like glutamate, acetylcholine, dopamine which leads to formation of plaques and tangles, accumulation of lipofuscin (yellow-brown pigment granules which are residues of lysosomal digestion) in nerve tissue, resulting in the breakdown of nerves. Associated conditions accelerating the process of brain ageing include, vitamin B group deficiencies (B vitamins protect brain function by regulating energy metabolism), high levels of inflammatory cytokines, high C-reactive proteins, deficiency of dietary anti-oxidants like acetyl-L carnitine which delay the onset of age-related cognitive decline and improve overall cognitive function in the elderly subjects. Hyperglycemia has shown an adverse effect on hippocampus and thus increases the risk of Alzheimer's disease.[4]

DISCUSSION

The following are regarded as *medhya rasayanas*[5]

1. *Yashtimadhu churna*
2. *Mandukaparni swarasa*
3. *Shankhapushpi kalka*
4. *Guduchi swarasa*

Yashtimadhu *(Glycyrrhiza glabra)*: The roots and rhizomes of *G. glabra* have been studied with respect to spatial learning and passive avoidance, preliminary free radical scavenging, cerebral ischemia and antioxidant capacity towards LDL oxidation. *Glycyrrhiza glabra* aqueous extract markedly improves hypoxic effects induced by sodium nitrite in rats and this effect may be mediated by its antioxidant properties.[6]The active principles include, Glycyrrhizin and 18beta-glycyrrhetinic acid, Liquiritin (flavanones), Isoliquiritinin and Isoliquiritin (chalcones), Genistien, Glisoflavone, (Isoflavones).[7]

The antiradical activity, protective effect against lipid peroxidation (LPO) inhibitory effect against the reactive oxygen species (ROS), facilitation of cholinergic transmission in brain, restored the decreased levels of glutamate, dopamine and decreased acetylcholinesterase (AChE) activity significantly. Licochalcones A and B scavenge nitric oxide, superoxide, hydroxyl radicals which inhibit lipid peroxidation. Glabridin stimulates the BAX proteins which inhibit the activation of caspases and prevent neuronal apoptosis. 2,2′,4′-trihydroxychalcone (TDC) from *Glycyrrhiza glabra* inhibits β-cleavage of APP which accelerates the formation of beta amyloid plaques and functioned as a specific non-competitive inhibitor against BACE1 enzyme.[8]

Guduchi *(Tinospora cordifolia)*: The aqueous extract of the root contains Alkaloids (berberine, palmatine, magnoflorine, tinosporin, isocolumbin), glycosides steroids, Phenolic compounds, Polysaccharides. Leaves of this plant are

rich in protein (11.2%) and are fairly rich in calcium and phosphorus. It has been found to possess strong free radical scavenging properties against reactive oxygen and nitrogen species diminishing the expression of iNOS gene (their high levels create an opportunity to react with superoxide leading to cell toxicity). Significant reduction in thiobarbituric acid reactive substances and an increase in reduced glutathione catalase and superoxide dismutase (anti-oxidant) activity were also observed. It has shown to increase Monoamine oxidase (MAO-A and MAO-B) activities, the elevated levels of which have increased levels of brain monoamines leading to significant anti-depressant activity.[9]

Shankhapushpi *(Convolvulus pluricaulis)*: Fresh whole plant juice is used for therapeutic purposes as *Medhya* (cognitive enhancer). The active constituents include Glycosides coumarins, flavonoids, and alkaloids. It has been found to possess anxiolytic, memory enhancing and mood elevating effect, retard brain aging.[10] Shankhapushpi has shown to help in regeneration of brain cells and in Dendritic arborization which is the neuronal basis for improved learning and memory.

In an experimental study, a dose dependent enhancement of memory was observed with Convolvulus Pluricaulis (CP) and Asparagus Racemosus (AR) treatment as compared to control group. Hippocampal regions associated with the learning and memory functions showed dose dependent increase in AGhE activity in CA1 with AS and CA3 area with CP (Convolvulus Pluricaulis) treatment. The underlying mechanism of these actions of CP and AR may be attributed to their antioxidant, neuroprotective and cholinergic properties.[11] CA1 Dg areas in hippocampus are recognized for learning and memory. Cell loss in these areas has been implied with age related nervous disorders including memory loss. Increase in the cell number after administration of *Shankhapushpi* provides considerable evidence of the efficacy of this drug in learning and enhancement of memory. It may also help in preventing changes in the neuron cell bodies in specific brain areas.[11]

Mandukaparni *(Centella asciatica)***:** Fresh whole plant juice contains Glycosides, tannin, flavonoids (Kaempferol and quercetin), vitamins B & C, Ca, Mg, and Na all of which are congenial to brain health. A study showed a neuronal dendritic growth stimulating property, effective in reducing brain regional lipidperoxidation (LPO) and protein carbonyl (PCO) levels and in increasing anti-oxidant status.[12]Following neuro-chemical action of centella asciatica, the alcoholic extract enhanced the catecholamine and Ach in the whole brain. It has been shown to improve the altered levels of neurotransmitters such as 5HT, acetylcholine, epinephrine, nor-epinephrine, GABA (gamma-aminobutyric acid) and glutamate. It has been shown to improve the mental ability and fatigability of subjects under stress.[13]It has shown to inhibit the formation of beta amyloid plaques owing to the oxidative stress and activation of glial cells and thereby delay neuronal apoptosis.[14]

Other *Medhya dravyas* which have proved beneficial in old age include the following:

Brahmi *(Bacopa monnieri)**:*** A study demonstrated that the bacosides produced

changes in the hippocampus, cerebral cortex (areas critical to memory function) and hypothalamus regions of the brain and caused enhanced levels of protein kinase activity and increased protein levels in these regions. This indicated positive implications for improved neurotransmission and repair of damaged neurons via enhanced regeneration of nerve synapses.[15]

Ashwagandha (*Withania Somnifera*): Research conducted at the Department of Pharmacology, University of Texas Health Science Center indicated that extracts of *Ashwagandha* produce GABA-like activity, owing to its anxiolytic effect. Studies conducted on rats' brains showed that *Ashwagandha* produced an increase in the levels of three natural antioxidants superoxide dismutase, catalase and glutathione peroxidase.[16]

Kapikachu (*Mucuna Pruriens*): On Phytochemical studies *Mucuna pruriens* seeds have been shown to contain significant quantity of L-Dopa which could be the basis for its anti- Parkinsonism effect.[17]

Jyotishmati *(Celastrus paniculata)* and **Tagara** *(Valeriana wallichii)* have also shown promising results in brain and memory disorders in the elderly.[18]

CONCLUSION

Jara or old age is inevitable (*Nishpratikriya*) it cannot be avoided, it can only be delayed and graceful ageing can be ensured with the help of *Medhya Rasayanas*. *Rasayana* can be used in both curative and promotive aspects in *Vardhakya*. Young can be advocated to use *Medhya Rasayana* regularly as the period for the administration of *Rasayanas* is effectively in young and middle age groups. However, *Medhya Rasayana* can be effectively used in delaying the deteriorating aspects of *Jara*.

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