



AYURVEDA AND AGEING BRAIN

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Article Received on 12/10/2017

Article Revised on 02/11/2017

Article Accepted on 23/11/2017

ABSTRACT

Ayurveda is the oldest system of Medicine in the world, its antiquity going back to the *Vedas*. It adapts a unique holistic approach to the entire science of life, health and cure. The areas of special consideration in *Ayurveda* are geriatrics, rejuvenation, nutrition, immunology, genetics and higher consciousness. The *Ayurvedic* texts describe a set of rejuvenative measures to impart biological sustenance to the bodily tissues. These remedies are called *Rasayana* which are claimed to act as micronutrients. 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 effect. *Medha* means intellect and/or retention and *Rasayana* means therapeutic procedure or preparation that on regular practice will boost nourishment, health, memory, intellect, immunity and hence longevity. *Medhya Rasayana* is a group of 4 medicinal plants that can be used singly or in combinations. These are *Ashwagandha* (*Withania somnifera* Dunal), *Brahmi* (*Bacopa monnieri* Linn), *Mandukaparni* (*Centella asiatica* Linn) and *Sankhapuspi* (*Convolvulus pluricaulis* Choisy).

KEYWORDS: *Ayurveda*, *Medhya Rasayana*, Ageing, brain aging.

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] *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. 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.^[3]

DISCUSSION

Characteristics of the *Medhya Rasayana* drugs

1. *Mandukaparni* (*Centella asiatica* Linn. Family – Umbelliferae)

This Plant is described in *Tikta skandh*, *Prajastapana* and *Vayasthapana mahakashaya* of *Charak Samhita* and

Tikta varga of *Shusruta Samhita*. The Synonyms are *Manduki, Twastri, Divya, Mahausadhi. Dosha karma – Kapha-Pitta shamak*.^[4] 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.^[5] Following neuro-chemical action of centella asiatica, 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. 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

2. *Yastimadhu* (*Glycyrrhiza glabra* Linn., Family – Fabaceae)

This plant is described in *Kanthy, Jivaniya, Sandhaniya, Varnya, Sonitastha-pana, Kandughna, Chardinigrahana, Sne-hopaga, Vamanopaga, Asthapanopaga, Mutravirajaniya Mahakasaya* of *Charak Samhita* and *Kakolyadi, Sarivadi, Anjanadi, Brhatyadi, Ambasthadi, Utpaladi Gana*, of *Shusruta Samhita*. The Synonyms are *Yas-timadhuk, Klitaka. Dosha karma – Vata- pitta shamak*.^[6]

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-glycyrrhetic 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 noncompetitive inhibitor against BACE1 enzyme.^[7]

3. *Guduchi* (*Tinospora cordifolia* Willd. Miers, Family – Menispermaceae)

This plant is described in *Vayahstha-pana, Dahaprashamana, Trishna-nigraha, Stanya, sodhana, Triptighna Mahakasaya* of *Charak Samhita* and *Guducyadi, Patoladi, Araghvadi, Kakolyadi, Valli panchamula* of *Shusruta Samhita*. The Synonyms are *Amrita, Madhuparni, Chinnamula, Cakra-lakshnika, Amrita-valli, Chinna, Chin-nodhbhava, Vatsadani, Jivanti, Tantrika, Soma, Somavalli, Kundali, Dheera, Vishalya, Rasayani, Candrasasa, Vayastha, Mandali, Deva-nirmita, Dosha karma – Tri-dosha shamak*.^[8] 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 antidepressant activity.^[9]

4. *Shankhapushpi* (*Convolvulus pleuricaulis* Chois. Family – Convolvula-ceae)

The Synonyms are *Ksheerpushpi, Mangalyakusuma. Dosha karma – Vata- pitta shamaka*.^[10]

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. *Shankhapushpi* has shown to help in regeneration of brain cells and in Dendritic arborization which is the neuronal basis for improved learning and memory.^[11]

Table no. 1: Properties of Medhaya drugs.

Drug	Rasa	Guna	Virya	Vipaka
<i>Mandukaparni</i>	<i>Tikta</i>	<i>Laghu</i>	<i>Sheeta</i>	<i>Madhura</i>
<i>Yashtimadhu</i>	<i>Madhur</i>	<i>Guru, Snigdha</i>	<i>Sheeta</i>	<i>Madhura</i>
<i>Guduchi</i>	<i>Tikta, Kashaya</i>	<i>Guru, Snigdha</i>	<i>Ushna</i>	<i>Madhura</i>
<i>Shankhapushpi</i>	<i>Tikta</i>	<i>Snigdha, Pichla</i>	<i>Sheeta</i>	<i>Madhura</i>

CONCLUSION

Jara or old age is inevitable (*Nishpratikiya*) 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*.

The *medhya karma* is considered as *Prabhava jayna* because some *Medhya Dravya* are *Sita Virya*, *Madhura Rasa* and *Madhur Vipaka* e.g. *Yastimadhu*; and some are *Tikta Rasa* and *Usna Virya* e.g. *Guduchi*. These *Medhya Dravya* have more *Medya Karma* present rather than a *Samanya Dravya*, so *Medhya Karma* is *Prabhava Janya*. *Graham shakti* (power of acquisition), *Dharan Shakti* (power of retention) and *Smriti* (power of recollection) all three are included in *Medha*. *Pitta* is *Ashu* and *Tikshna* so it is helpful in *Vishaya Graham* and *Smriti*, that's why *Medha* is included in *Pra-Krit Karma* of *Pitta*. *Vata* is also necessary for association of ideas in the process of *Smriti*. *Kapha* provides *Dhriti* (*Dharan*) and stability that's why *Sthirita* and *Dhriti* are included in *Prakrit Karma* of *Kapha*.^[12] Due to all these reasons the *Ushna Virya* and *Sheeta Virya Draya* should Be *Medhya*.

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