CRITICAL REVIEW OF MEDHYA RASAYANA DRUGS MENTIONED IN AYURVEDA – TRADITIONAL INDIAN MEDICINE

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ABSTRACT

Ayurvedic system of medicine has mentioned several medicinal preparations under the category ‘Medhya’. By virtue of inducing mental upliftment as major influence several medicinal plants mentioned as ‘Rasayana drugs’ in Ayurveda are primarily claimed as ‘Medhya’. Further there is a special class of Rasayana drugs called ‘Medhya Rasayana’ which is supposed to be having specific influence on brain functions. Cognitive deficits like memory disorders are found in high prevalence among the aged. In Ayurvedic literature, impairment of memory is mentioned as Smriti bhramsha which occurs due to vitiation of Rajo and Tamo doshas. It has been noted that cognitive functions are thoroughly affected due to stress and other related psychological disorders. It is clearly emphasized that Medha (intellect) and Buddhi (wisdom) deteriorate in these conditions. People's lifestyle also has an additional influence on the intellectual capacity. Several Medhya Rasayana drugs mentioned in Ayurveda have multi-dimensional actions having influence on memory. They not only enhance the intellectual capacity but also rejuvenate the whole system and their pathways.

KEYWORDS: Medhya Rasayana, Memory, Medha.

INTRODUCTION

The intellectual capability has naturally become a matter of concern for the scientific community. The analysis of the mind and intellect from different angles and their explanations are abundantly available in the Ayurvedic literature. The description regarding the concept of Medhya Rasayana (memory promoting rejuvenation therapy) is one among them. 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. It requires reconsideration and application in present scenario, as it can be a powerful solution for many of the psycho-somatic problems.

The description of Medhya Rasayana found in Samhita granthas (authoritative scriptures) indicates the specific utility of this type of Rasayana. In Charaka Samhita there is no direct mentioning of Medhya Rasayana as an independent type. But there is mentioning of four drugs viz. Mandookaparni svarasa (juice), Yashtimadhu kalka (paste) with Goksheera (Cow's milk), Guduchi svarasa and Shankhapushpi kalka (paste) as Medhya Rasayanas. The properties ascribed to these formulations include Medhya (memory promoting), Ayushya (longevity enhancers), Amaya nashana (eradicate diseases) and Balagni varna svara vardhana (enhances strength, digestive fire, complexion and voice)1.

In Sushruta Samhita more information pertaining to the Medhya drugs can be found such as different formulations with their mode of use etc. The chapter named ‘Medhayushkameeyadhyaya’ is meant for the description of the same. In Sangraha granthas (compiled scriptures) and in Bhava Prakasha2 and Yoga Ratnakara4 the four Medhya drugs are mentioned along with other Medhya formulations.

Aims and objectives

An attempt has been made to look into the memory promotive aspect of Medhya rasayana drugs, their method, mode and time of administration; utility, mode of action and modern researches on some Medhya drugs.

Method of administration

According to Acharya Charaka, Medhya rasayana can be administered in the way of Vatatapika rasayana (rejuvenation therapy having no restrictions) and as per Acharya Susruta, Kutiproveshika rasayana (rejuvenation therapy involving specific rules) procedure is followed.

Mode of administration

- Purva karma (Pre-operative procedure) –Koshta shuddhi before the administration is essential like that of other Rasayanas.
- Pradhana karma (Operative procedure) - Different forms of Medhya drugs are explained such as Svarasa (juice), Kalka (paste) etc. Similarly the dose, duration and adjuvant will also vary depending upon the specific yoga (formulation). Ex: Shveta Avalgudiya Rasayana is taken along with Ushna jala (luke warm water) for 6 months whereas Vracha Rasayana is administered with Goksheera for 48 days4.
- Paschat karma (Post-operative procedure) – After the digestion of Medhya rasayana pathyapathya (do’s and don’ts) should be followed. Shashtika shali (A variety of rice) with Ghrita (Cow’s ghee) and Ksheera (milk) is the Pathya (wholesome) mentioned for many of the formulations.
Time of administration
Early morning before food is the ideal time for the administration of Medhya Rasayana5.

Utility of Medhya rasayana
Medhya Rasayana has a specific purpose of benefitting Medha in particular and they do not have broad spectrum of action like other Rasayanas. As per Acharya Susruta, the benefits derived from Medhya Rasayana and their applied aspects are enlisted below.
1. Shruta Nigadi (Power of retention of scriptures)
2. Smrutiman (Endowed with good memory)
3. Medhavi (Becomes genius)
4. Grantham Ipsitam utpadayati (Develops enthusiasm to read the scriptures)
5. Nastam cha Pradurbhavati (Power to recollect the forgotten)
6. Devirucchaaritam shatamapi avadharayati (Capable of retaining 100 words spoken only twice)
7. Moorthimaticcha enam vagdeyanupravishyati (Goddess of speech enters one’s body)
8. Sarvasicha enam shrutayaapatishtanti (All the srutis (Vedas and other scriptures) remain within)
9. Shruta dharaya panchavarsha shatayur bhavati (Power of remembering the scriptures and a life of 500 years)
10. Shrutam vivriyate (Endowed with good hearing capacity)
11. Dviraabhyasat smrutiman bhavati (Endowed with good memory)
12. Trirabhyasat shrutamadatte (Retains the scriptures in one’s mind)
13. Sarvam tarati kilvisham (Gets rid of all blemishes)

Probable mode of action of Medhya Rasayana
The Medhya effect of Rasayana can be considered as Prabhava janya (unthinkable and unimaginable). This attribution holds good since the action of Medhya dravya cannot be related to a particular quality of the drug. Maintaining of normal functioning of Sadhaka pitta and Tarpaka kapha is the desired action of any Medhya drug.

Medhya drugs also act on Manasika bhavas (faculties of mind) there by relieving anxiety, stress etc. They are having Mastishka balya (nourishing brain property. It is very difficult to conclude the mode of action of Medhya Rasayanas as the mechanism of Medha is very complex one and the properties of Medhya Rasayana are also not uniform.

Researches on Medhya Drayyas

Mandukaparni (Centella asiatica Linn.)
1. Major constituents of it are saponins, medacoside, asiaticoside, medacassoside and asiatic acid, a new triterpenic acid.46
2. They act on behavior besides being neuro-protectives and brain growth promoters.9. Dendritic arborization is supposed to be the neuronal basis for improved learning and memory.9
3. Anti-seizure activity may result from direct or indirect modulation of ATPase activity, Centella asiatica Linn. inhibits the memory impairment induced by scopolamine through the inhibition of AChE.11
4. Methanol extract of Centella asiatica Linn. showed highest free radical scavenging activity that can be attributed to the presence of polyphenols and flavonoids as this fraction contains maximum amount of these secondary metabolites (0.07 mg/ml). These two namely poly phenols and flavonoids are responsible for potent anti-oxidant activity and terminate free radicals.12
5. Centella asiatica Linn. extract selectively decreases amyloid beta levels in hippocampus of Alzheimer’s disease animal model13
6. Centella asiatica Linn. accelerates nerve regeneration upon oral administration and contains multiple active fractions increasing neurite elongation in-vitro.14

Yasthimadhu (Glycyrrhiza glabra Linn.)
1. The roots and rhizomes of G. glabra have been studied with respect to spatial learning and passive avoidance15, preliminary free radical scavenging16, cerebral ischemia17 and antioxidant capacity towards LDL oxidation.18
2. Glycyrrhiza glabra Linn. aqueous extract markedly improves anti-hypoxic effects induced by sodium nitrite in rats and this effect may be mediated by its antioxidant properties.19,20
3. The roots and rhizomes of Glycyrrhiza glabra Linn. is an efficient brain tonic; it increases the circulation into the CNS system and balances the sugar levels in the blood.21
4. Liquorice has significant action on memory enhancing activity in dementia. It significantly improved learning and memory on scopolamine induced dementia.22

Gaduchi (Tinospora cordifolia (Willd) Miers.)
1. Its root is known for its anti-stress, anti-leprotic and anti-malarial activities.23,24,25
2. Chemical constituents classes are alkaloids, diterpenoid lactones, glycosides, steroids, sesquiterpenoids, phenolics, aliphatic compounds and polysaccharides.26
3. Neuro-protective and ameliorative properties are due to their antioxidant and trace element contents.26
4. Tinospora cordifolia (Willd) Miers. is known to be a rich source of trace elements (Zinc and Copper) which act as antioxidants and protects cells from the damaging effects of oxygen radicals generated during immune activation.27
5. It increases the blood profile and has lead scavenging activity.20
6. Tinospora cordifolia (Willd) Miers. has been claimed to possess learning and memory enhancing activity and antioxidant activities.30,31,32
7. Tinospora cordifolia (Willd) Miers. enhanced the cognition in normal and cognition deficit animals in behavioural test Hebb William maze and the passive avoidance task.33. Mechanism of cognitive enhancement is by immune-stimulation and increasing the synthesis of acetylcholine, this supplementation of choline enhances the cognition.34
8. Myriad actions of *Guduchi* may be attributed to its antioxidant\(^{25,36}\) and immune-modulatory properties\(^{37}\).

**Shankhapushpi (Convolvulus pleuricaulis Chois.)**
1. Important chemical principles are microphylic acid, shankhapushpin, kaempferol-kaempferol-3-glucoside, 3, 4 dihydroxycinnamic acid and sitosterols. Neuro-protective and intellect promoting activity is implicated to the free radical scavenging and antioxidant properties\(^{38}\).
2. BR-16A (Mentat) a poly-herbal combination containing *Shankhapushpi* significantly reversed the social isolation stress-induced prolongation of onset and decrease in pento-barbitone-induced sleep, increased total motor activity and stress-induced antinociception in experimental model\(^{39}\).
3. Ayushman-8 (containing *Shankpushpi*, *Brahmi* and *Vacha*) reported to be effective on *Manasa mandata* (mental retardation)\(^{40}\).
4. *Shankhapushpi* compound containing *Shankhapushpi*, *Sarpagandha*, and *Gokshura* in equal quantities are studied to be effective in *Chittodvega* (anxiety disorders)\(^{41}\).
5. *Shankhapushpi* is effective in relieving signs and symptoms of *Chittodvega* (anxiety disorders)\(^{42}\).
6. Herbalists believe that *Shankhpushpi* calms the nerves by regulating the body’s production of the stress hormones, adrenaline and cortisol\(^{43}\).
7. Few investigations report that *Shankhpushpi* has potent depressive action in mice\(^{44}\).
8. *Convolvulus pleuricaulis* Chois. whole plant extract, shows the highest inhibitory activity against *Helicobacter muridarum*\(^{45}\).
9. *Convolvulus pleuricaulis* Chois. aqueous extract possesses neuro-protective potential, thus validating its use in alleviating toxic effects of scopolamine\(^{46}\).

**Brahmi (Bacopa monnieri (L.) Wettst.)**
1. It is commonly called as *Brahmi* and it belongs to Scrophulariaceae family. *Bacopa monnieri* (L.) Wettst. is a well-known nootropic plant reported for its tranquilizing\(^{47}\) sedative action\(^{48}\), cognitive enhancer\(^{49}\), hepato-protective\(^{50}\), memory enhancer\(^{51}\) and antioxidant actions\(^{52,53}\).
2. Neuro-protective activity may be ascribed to having its reactive oxygen species scavenging property\(^{54}\).
3. *Bacopa monnieri* (L.) Wettst. is a saponin rich plant\(^{55}\). Bacosides are the main active nootropic principles present in the alcoholic extract of the plant\(^{56}\).
4. Isolation of a new saponin, a jujubogenin, named bacopasaponin G, and a new glycoside, phenyl-ethyl alcohol was reported\(^{57}\). Three new saponins designated as bacopasides III, IV and V were isolated\(^{58}\). Apart from memory enhancer activity, these bacosides have the potential to modulate the activities of heat shock protein (Hsp70) expression, cytochrome P450 and superoxide dismutase in the rat brain\(^{59}\).
5. On rats, alcoholic extract increases both cognitive function and retention capacity, decreases retrograde amnesia and protects from phenytoin - induced cognitive deficit\(^{60}\).
6. It is mainly utilized in the treatment of memory and attention disorders\(^{61}\).
7. Recent studies have indicated antioxidant effect of bacosides (triterpenoidsaponin isolated from *Bacopa monnieri* (L.) Wettst.) against chronic toxin induced oxidative damage in rat brain\(^{62}\) and thyroid T\(_2\) hormone stimulating activity in animals in high doses\(^{63}\).
8. *Brahmi rasayana* might prove to be a useful memory restorative agent in the treatment of dementia seen in elderly\(^{64}\).
9. *Brahmi* decreases the rate of forgetting of newly acquired information\(^{65}\).

**Jyotishmati (Celastrus paniculatus Willd.)**
1. Seed oil (*Jyotishmati Taila*) is known for *Medhya* action\(^{66}\).
2. This oil contains several terpenoids like paniculatadiol, b-sitosterol, celastrol, b-amin, pristimerin, but its most investigated components are its many sesquiterpenoids, dihydro-agarofuran-type polyols or esters\(^{67}\).
3. *Celastrus paniculatus* Willd. showed antioxidant activity by decreasing the lipid peroxidation\(^{68}\) and anti-arthritic activity in rat model\(^{69}\).
4. Seed oil of *Celastrus paniculatus* Willd. (*Malkangni*) reversed scopolamine-induced deficits in navigational memory task in young adult rats\(^{70}\).

**Kushmanda (Benincasa hispida (Thumb.) Cogn.)**
1. Phytochemical analysis of *Benincasa hispida* (Thumb.) Cogn. shows presence of alkaloids, flavinoids, saponins and steroids\(^{71}\).
2. *Benincasa cerifera* Savi. serves as Reactive Oxygen Species scavenger and an antioxidant effective agent\(^{72}\).
3. It has a tissue protective preventive effect on colchicine induced Alzheimer’s disease via direct and indirect antioxidant activity\(^{73}\).
4. *Kushmandadi Ghrita* showed significant results in the management of *Chittodvega* (anxiety disorders)\(^{74}\).

**Vacha (Acorus calamus Linn.)**
1. Rhizome is useful part having *Medhya* quality. It has been used in Indian and Chinese systems of medicine for hundreds of years to cure diseases especially the central nervous system (CNS) abnormalities\(^{75}\).
2. Active chemical principles are *a*-asarone, elemicine, cis-isodeleminc, cis and trans isouegenol and their methyl ethers, camphene, P-cymene, bgujrune, a-selinene, b-cadinene, camphor,terpen-4-ol, aterpineol and a-calacorene, acorone, acrnenone, acoragermacrone, 2-deca-4,7 dienol, shobunones, linalool and preisocalamendiol. Acoradin, galangin, 2, 4, 5- trimethoxybenzaldehyde, 2,5- dimethoxybenzoquinone, calamendiol, spathulenol and sitosterol are also present\(^{76,77}\).
3. It has been proved for its analgesic and anti-convulsant\(^{78}\), hepato-protective\(^{79}\), antioxidant\(^{80,81}\), antimutagenic\(^{82}\), sedative and hypothermic effects\(^{83}\).
4. Good in clearing speech to the children\textsuperscript{84,85} and useful in schizophrenic psychosis\textsuperscript{86}.  
5. Food and Drug Administration banned usage of its oil in food formulations and in other therapeutic preparations\textsuperscript{87} due to carcinogenic and toxic properties of \(\beta\)asarone compound\textsuperscript{88}.

**Jatamansi (Nardostachys jatamansi DC.):**  
1. Rhizome is used for medicinal purposes as it is Bhutaghna or Manasa Dosh hara (relieves psychiatic problems) and Medhya\textsuperscript{89}.  
2. Roots and rhizomes of \textit{N. jatamansi} DC. are used to treat hysteria, epilepsy, and convulsions\textsuperscript{90}.  
3. The decoction of the drug is also used in neurological disorders, insomnia and disorders of cardiovascular system\textsuperscript{91}.  
4. Rhizomes contain a terpenoid ester, nardostachy sin\textsuperscript{92}.  
5. It is proven to improve learning and memory in mice\textsuperscript{93} and also to enhance biogenic amine activity\textsuperscript{94}.  
6. An acetone extract of \textit{N. Jatamansi} DC. has shown significant inhibition of benzoyl peroxide-induced cutaneous oxidative stress, toxicity, and ear oedema in mice\textsuperscript{95}.  

**DISCUSSION**  
Regarding administration of \textit{Medhya rasayana} Acharya Charaka suggests taking it as Vatapatikarasyayana, as the description is found in 'Kara prachiteeya rasayana pada' which mainly deals with Vatapatika rasayana. Whereas as per Acharya Susruta almost all Medhya Rasayanas mentioned are to be administered in Kutipraveshika vidhi. So both the methods of administration can be considered in the context of \textit{Medhya Rasayana}.

Early morning before food is preferred as the ideal time for the administration of \textit{Medhya Rasayana}. In Yoga Ratnakara, ‘Prabhata’ is the word used for the time of administration for the four \textit{Medhya} formulations.

\textit{Medhya} drugs are mainly Madhura and Sheeta dravyas, but there are many \textit{Medhya} drugs which do not possess these qualities. It is observed that main \textit{Medhya} Rasayanas (Mandukaparni, Yasthimadhu, Guduchi and Sankhaphushpi) are Madhura vipaki dravyas. Majority of them are \textit{Seeta veerya dravyas. Medhya} is the karma given to Prakrita pitta. This can be related to orientation and grasping power. Guduchi, being Madhura vipaka and Ushna virya can help in enhancing grasping power as its constitution is ideal for \textit{Karma of Pitta}, especially Sadhaka pitta. It can stimulate neuronal functions due to the Pachana karma. The Madhura vipaki and Seeta virya dravyas can help the function of Tarpaka kapha to go on smoothly owing to its constitution that is favourable for Kapha karma. Drhuti i.e., Dharaana shakthi, memory retention capacity can occur in the presence of only \textit{Seeta virya}.

Pharmacological studies reveal that \textit{Mandukaparni} has neuro-protective, brain growth promoter, anti-seizure activities and free radical scavenger (anti-oxidant) properties and is helpful in subsiding neuro-degenerative changes that occur with Alzheimer’s disease and also accelerates repair of damaged neurons; It has been found that \textit{Yasthimadhu} is an anti-oxidant, memory enhancer and improves anti-hypoxic effects; \textit{Guduchi} has got neuro-protective, anti-oxidant, memory enhancing, anti-stress, anti-leprotic and anti-malarial properties; It is observed that \textit{Shankhaphushpi} has got anti-stress, neuro-protective and anti-oxidant properties; \textit{Brahmi} is a cognitive enhancer, hepato-protective, memory enhancer, anti-oxidant and a neuro-protective agent; \textit{Jyotishmata} is a memory promoter, anti-oxidant and anti-arthritic; \textit{Kushmanda} possesses anti-oxidant, anti-stress, neuro-protective and memory enhancing properties; \textit{Vacha} has got memory enhancing, anti-convulsant, hepato-protective and anti-oxidant properties. \textit{Jatamansi} has memory promotive action and is useful in insomnia, hysteria, epilepsy and convulsions.  

**CONCLUSION**

Ayurveda a holistic science provides solutions for memory related disorders in a fruitful way. In the present scenario \textit{Medhya Rasayana} drugs of Ayurveda can be used to obtain effective results in memory related disorders. Hence attempt has been made to think logically in the aspect of memory promotion in a view to seek greener pastures.

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