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(REVIEW ARTICLE)

The study of pharmacological and pharmacodynamic actions of Herbal *Medhya* Plants in *Manas-Vikara's*

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Abstract

In the present era every human being who is running for survival is facing some kind of mental or psychological disturbances. According to the WHO, by the year 2020, depression will constitute the second largest disease burden worldwide. The COVID-19 pandemic has posed a serious threat to global mental health. A finding suggest a link between COVID-19 and a higher risk for later mental health and neurological disorders. It includes Cognitive and emotional problems such as anxiety, depression, stress, guilt, fear, anger and confusion then behavioural troubles like changes in attitude and social withdrawal and Somatic problems such as migraine, loss of appetite, fatigue and insomnia. In spite of great advancement in the science of psychiatry for decades the problems with the management of a certain mental problems have remain unsolved .In addition to this, adverse effects of anti-psychotic, anxiolytic medications are creating considerable amount of discomfort to the patient. So that peoples are searching towards the best treatments those are more effective and less harmful. *Ayurveda* are one of the best therapy to cure the mental health issues as it has a lots of herbal plants which acts on mental health like nervine tonics such as *Brhami, Ashwagandha, Guduchi, Yasthimadhu, Vacha* etc. Present study is a review to update knowledge on pharmacological properties, major chemical constituents, therapeutic actions, safety and possible mode of action of the selected herbs from *ayurvedic* pharmacopoeia.

Keyword: Medhya plants; Pharmacology; Pharmacodynamics; Manas-Vikara

1. Introduction

WHO defines mental health as mental well-being in which an Person realize his or her own abilities, can survive with the normal stresses of life, can work effectively and is able to makea contribution to his or her community[1].The mental disease may show more dangerous than the physical one. It can be extremely painful for the family members and have huge impact on family's financial as well as emotional component[2]. In *Ayurveda* lots of hebal plants, medicines are prescribed for mental health illness such as *Vacha, brahmi, guduchi, Yashtimadhu, Shankhapushi, Pippali, Haritaki, Jyotishamti* and so on. This drugs does the *medhya karma* by acting on *Majjadhatu, Tarpak Kapha* and *Sadhaka Pitta.* Also they work as cognitive by their essential active principles. In Modern research the various pharmacological actions of this herbal medicines are proved such as Nootropic, Anti-oxidative, Anti-aging, Free radical scavenging, Anti-inflammatory, Anti-stress, Anti-toxic etc. In this review we will study the herbal drugs with their cognitive effects.

2. Manas-Vikara

Ayurveda considers mind and body as the two sites for the manifestation of disease. Mind has three attributes *Satva* (balance), *Rajas* (arrogance) and *Tamas* (indolence). Satva is largely responsible for inherent quality of themind.If it (Satva) overshadowed by Rajas or Tamas, losses its predominance resulting into emotional imbalance and psychological

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disturbances. Therefore, they termed as two Dosha of mind.Balanced dosha of mindregulates the emotion while disturbed dosha of mind play an important role in the pathogenesis of mental diseases. The term Medha includes *Dhriti* (power of retention), *Dhi* (Power of Acquisition) and *Smriti* (Power of Remembrance). All these faculties are interlinked with each other and derangement of any of these *will* reflects on each other.

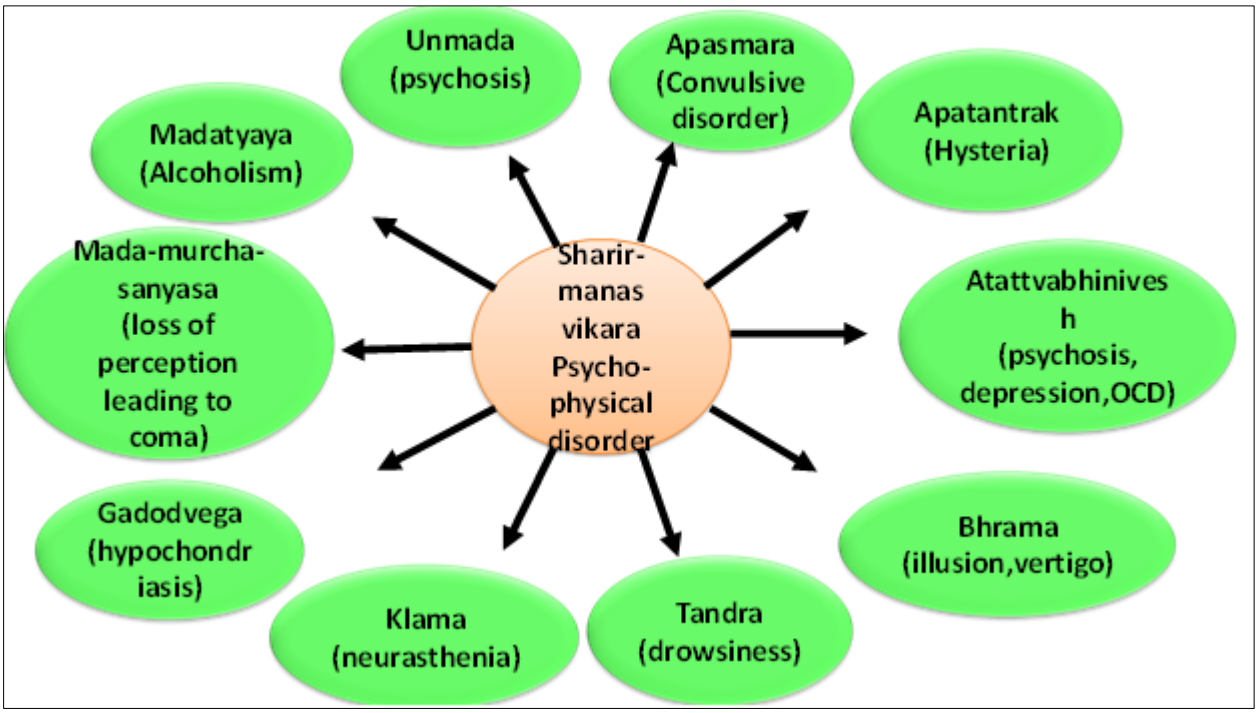

Figure 1 Sharir-Manas Vikara's

Ayurveda has described various kinds of *Manasa vikara* such as *Unmad* (Insanity), *Apsmara* (Convulsive disorder), *Atattvabhinivesh* (Psychosis), *Smritibransh* (Alzheimer's disease), *Mada-Murchaa-Sanyasa* (Loss of perception leading to Coma), *Bhaya* (Fear), *Harsha* (Excitation), *Shoka* (Grief), *Udvega* (Anxiety), *Avasada* (Depression).

2.1. Manasvikara related Karma (Actions) and drug

2.1.1. Medhya Karma

Medhya karma can be consider as Prabhavjanya means unrecognized action. The drugs which are essential to brain enhancement are called as Medhya dravya.

Ex.*Brahmi, Shankhapushpi, Yashtimadhu, Guduchi, Suvarna, Rajata, Ghrita, Keshara, Jyotishmati, Kushmand, Mandukparni, Kasturi* etc

2.1.2. Samdnyasthapana Karma

Vitiation of *Tama* and *Pitta dosha* causes *Sangya nash (Murchaa)* or unconsciousness. The drugs which are useful to restore the unconsciousness are called as Samdnyasthapana dravyas.

Ex. *Vacha, Jatamamsi, Katphal, Arimed, Brahmi, Guggulu, Katuka, Hingu* etc

2.1.3. Nidrajanan Karma

Dravyas which induces and maintain sleep.The action of drug which are useful in treatment of insomnia are called as *nidrajanan Karma.*

Ex.*Ahiphen, Vijaya, Madya, Suchi, Sarpagandha, Alabu, Upodika* etc

2.1.4. Shirovirechanopaga Karma

The action of drugs which is supportive to *shirovirechana karma* are called as *Shirovirechanoapaga karma*. Ex. Shigru, Pippali, Marich, Sarshapa, Vidanga, Apamarga etc

2.2. Medhya Dravyas

Table 1 Introduction of *Medhya dravyas*

Drug Name	Image	Latin name	Family	Part used
Vacha[3]		*Acorus Calomus*	Areaceae	Rhizome, root
Haritaki[4]		*Terminalia chebula*	Combretaceae	Fruit
Aamalaki[5]		*Emblicaofficinalis Gaertn.*	Euphorbiaceae	Fruit
Jatamansi[6]		*Nordostachys jatamansi*	Valerianaceae	Root
Jyotishamati[7]		*Celastrus panniculatus*	Celastraceae	Seed, oil
Hingu[8]		*Ferula narthex*	Umbeliferae	Niryasa (Resin)
Shatawari[9]		*Asparagus racemosus*	Liliaceae	Root
Sarpagandha[10]		*Rauwolfia serpentina Benth. Ex kurz.*	Apocynaceae	root

Ashwagandha[11]		*Withania somnifera(L.)*	Solanaceae	Root
Jatiphala[12]		*Myristica fragrans Houtt*	Myristicaceae	seed, seed coat, oil
Parasik Yavani[13]		*Hyoscymus niger Linn.*	Solanaceae	Plant
Shankhapushpi[14]		*Convolvulus pluricaulis Chois;*	Convolvulaceae;	Whole plant
Guduchi[15]		*Tinospora cordifolia*	Menispermaceae	Stem, leaf, areal roots
Mandukparni[16]		*Centella asiatica*	Umbelliferae	Whole plant
Yashtimadhu[17]		*Glycyrrhiza glabra*	Fabaceae	root

Table 2 *Rasa-panchaka* of Medhya dravyas

Drugs	***Rasa***	***Guna***	***Virya***	***Vipaka***
Vacha[3]	*Katu, Tikta*	*Laghu, Tikshna*	*Ushna*	*Katu* *Prabhav: Medhya*
Haritaki[4]	*Pancharasa (except Lavana)*	*Laghu, Ruksha*	*Ushna*	*Madhur*
Aamalaki[5]	*Pancharasa (except Lavana) Amlapradhana*	*Laghu, Ruksha, Sheeta.*	*Sheeta*	*Madhur*
Jatamansi(Root)[6]	*Tikta, Kashaya, Madhura*	*Lagu, Snigdha*	*Sheeta*	*Katu*

Jyotishamati[7]	*Katu, Tikta*	*Tikshna*	*Ushna*	*Katu*
Hingu[8]	*Katu*	*Laghu, Snigdha, Tikshna*	*Ushna*	*Katu*
Shatawari[9]	*Tikta, Madhura*	*Guru, Snigdha*	*Sheeta*	*Madhura*
Sarpagandha[10]	*Tikta, Katu*	*Laghu,ruksha*	*Ushna*	*Katu*
Ashwagandha[11]	*Tikta, Kashaya*	*Laghu, Snigdha*	*Ushna*	*Madhura*
Jatiphala[12]	*Tikta, Katu*	*laghu, tikshna*	*Ushna*	*Katu*
Parasik Yavani[13]	*Katu*	*Ruksha, Guru*	*Ushna*	*Katu*
Shankhapushpi	*Tikta*	*Snigdha, Picchil*	*Anushna*	*Madhura*
Guduchi[15]	*Tikta kashaya*	*Guru Snigdha*	*Ushna*	*Madhura*
Mandukparni[16]	*Tikta, Kashaya, Madhur*	*Laghu*	*Sheeta*	*Madhura*
Yashtimadhu[17]	*madhur*	*Gurusnigdha*	*Sheeta*	*Madhura*

Table 3 Phytochemical constituents and Pharmacological actions of Medhya dravyas

Drug	Chemical Composition	Pharmacological actions
Vacha	Acoretin, Asarone, Acorin, Asaryl-aldehyde ,camphene, calamine,Tannin Caffeine	Anticonvulsant activity[18] – The methanol extract shows Anticonvulsant effects feasibly through potentiating the action of gamma-aminobutyric acid(GABA)pathway in the central nervous system. Antidepressant activity[18] – Interaction of the methanolic A.calamus rhizome extract with the adrenergic, dopaminergic, serotonergic, and GABAergic system was found responsible for the expression of antidepressant activity. Neuroprotective activity[18] – The ethanolic extract was studied (25,50 and 100mg/kg doses, oral and intraperitoneal routes) for learning and memory-inhancing activity
Haritaki	Chebulin ,Chebulinic acid, Tannic acid, Oleic acid,Palmitic acid, vit.C ,Anthraquinone	Neuroprotective activity[19] – The methanol and water extracts of *Terminalia chebula* exhibit neuroprotective activities against H2O2-induced toxicity toward PCI2 cells and are potential candidates for the treatment of H2O2-induced neurodegenerative disease. Anti-convulsant activity[20] – The ethanolic extract of *Terminalia chebula* significantly reduced the duration of seizures induced by maximal electroshok (MES).
Aamalaki	Gallic acid,Ellagic acid, Linolic acid, Tannin,Emblicanin A & B, Quercetin , Phyllemblin,vit.C	Antidepressant activity[21]- the antidepressant activity of aqueousextract of fruits of *E.officinalis* in inbred adult male Swiss Albino mice weighing25-30g.The test was carried out by forced swim test (FST) and tail suspension test (TST). The result of this test showed the antidepressant activity of *E.officinalis* as comparable to the standard antidepressant drug imipramine
Jatamamsi	Jatamansin ,Jatamansinol, Actinidine,J	Antidepressantactivity[22] - extract of *Nordostachys jatamansi* shows antidepressant –like effect due to interaction with GABA receptor, resulting in decrease in the level of GABA in mouse brain.

	atamansicacid,Nardin, Essential volatile oil, Jatamansone,Nardal Active component	Antiparkinsonism activity[23] -Rats were treated with 200,400 & 600mg/kg bd.wt of *N.jatamansi* roots for 3 weeks. The increase in drug-induced rotations & decrease in locomotor activity and muscuar cordination due to 6-OHDA injections were significantlyand dose dependently restored. Anxiolytic & Sedative activity - Journal of medicinal plants- A Rezaie et al. In this study, the rizome of *N.jatamansi* was extracted by hydromethanolic extract solvent and ingested with decided doses. The study concluded that the extract of *N.jatamansi* gives sedative and anxiolytic effect.
Jyotishamati	Celapagine,Srearic acid, Palmitic ,Linoleic,Linolenic ,Paniculatine ,Celastrine, Celastrol ,Celapanine ,Celapanigine	Anti-epileptic activity[24] - Research gate- Diana vivian et.al-The methanolic extract of *Celatrus panniculatus* wild.whole plant significantly delayed the onset of epileptic seizures induced INH & reduced the duration of tonic hind limb extension phase of PTZ induced seizures. Overall it suggests that the methanolic extract of *Celatrus panniculatus* contains some active principles which possesses antiepileptic activity. Antidepressantactivity[25]-*Celastrus paniculatus* seed oil showed significant antidepressant-like activity in both unstressed and chronic unpredictable mild stressed mice due to inhibition of MAO-A activity decrease in plasma nitrite levels and through scavenging of free radicles. Neuro Protectiveactivity[25] – G.Lekha et al- The study done using *Jyotishmati* seed oil for the estimation of Acetylchoiline esterase(AchE) activity where CP oil was administered in rodents in a dose of 400mg/kg/body weight. There was a significant decrease in AchE activity asseyed from hypothalamus,frontal cortex and hippocampus thus leading to stablize the cognitive function of brain.
Hingu	A- pinene ,Asafoetidin, B- Essential oil – disulfide, C- Butyl propenyl disulfide, D- Asaresinotannol, E- Umbeliiferone, F- Ferulic acid, Valeric acid	Antiepileptic activity - Sitaramj.s.et.al*Hingu* consits of varied forms like lipid based formulations, a study conducted for antiepileptic action demonstrated that the hydro-alcoholic gum extract of *F.asafoetida* reduced PTZ induced seizures by an enzyme mediated antiantioxidant effect. Anxiolytic activity - Saleh Alqasoumi-In this studythe Ferula asafoetida solution was compared to diazepam which further suggested to be a better alternative for treatment of anxiety disorders. Memory enhancing activity[26] - The study was done to evaluate memorization and learning activity. There was seen memory enhancing potential of F.asafoetida due to AchE inhibiting and antioxidant property.
Shatawari	Arginine, Saponins,Resin, Vit A,B1 ,B2 C, E, Tryosine,	Antidepressant activity[27] - experimentally studied that methanolic extract of roots of *Asparagus racemosus* shows antidepressant effect

	Asparagine	probably mediated through the serotonergic and the noradrenergic system and augmentation of antioxidant defenses. Neuroprotective activity[28] - The study demonstrated that the Ethanolic extract root has significant neuroprotective activity and showedmarked improvement in memory enhancement and learning.
Sarpagandha	Reserpine, Ajmalicine, Deserpidine, Resecinnamine	*Rauwolfia serpentine*[29] is a safe & effective treatment for Hypertension, also used in Angina pectoris in pt. with coronary artery disease. Rauwolfia has been studied for treatment of mental diseases. Study also found that effectiveness of Rauwolfia in treatment of anxiety[30].
Ashwagandha	Withanolide A to Y, Withasomniferine A, Dehydrowithanolide R, Withsomniferols A – C,Withanone,Withanoside	Aqueous extract of *Ashwagandha* increases cholinergic activity resulting into increases in the acetylcholine content and cholineacetyl transferase activity in rats shows cognition-enhancing effect, memory-improving effects . Subsequent treatment with a methanol extract of *Ashwagandha* induced significant regeneration of both axons and dendrites. In addition to the reconstruction of pre- and post-synapses in the neurons, methanol extracts of Ashwagandha reversed amyloid peptide-induced memorydeficit in mice. *Ashwagandha* treated controls, suggesting the chemopreventive effects of ashwagandha against β-amyloid induced toxicity[31].
Jatiphala	Myristicin, Elemicin, Safrole, Myristic acid, Sabinene, Trimyristin	N-hexane extract has been proven experimentally for antidepressant activity[32]. Nutmeg oil of *Myristica fragrans* also proved for Anticonvulsant activity[33].Myristicin, a component of nutmeg showing evaluation of anxiolytic properties interacting with GABA receptor in rats which reduces[34].
Parsik Yavani	Hyoscyamine, Atropine, Scopoline ,Hyoscine	Hyoscyamus has narcotic property. It is principally employed as sedative in nervous affections and irritable conditions such as asthma and wooping cough.
Shankhpushpi	Shankhpushpin, Beta sitosterol , Kaemferol , Sedatives and Tranqlisem	Memory enhancing[35] - Memory enhancement, cognitive function, Reduce amyloid levels in PSAPP mice, effect on cholinergic system, prevent aluminium neurotoxicity i.e., protect brain from oxidative damage resulting from aluminium toxicity. Anxiolytic activity[35] - It produced systematic relief and quantitative reduction in anxiety level and neuroticism in anxiety neurosis. Mood elevating[35] - It potentiates effects of arecoline, amus-curanicmemory enhancer that ameliorates cognitive defects in Alzheimer's.
Guduchi	Tinosporin, Cordifolide, Cordifol, Berberine	Memory enhancing[36] - possess learning and memory enhancing, antioxidant, and anti-stress action, enhances the cognition in normal and cognition deficits animals in behavioural test. It is useful for treatment of bhrama(Vertigo), in improving behavior disorders, mental deficit and IQ levels Antioxident[37]– Berberine helps prevent oxidation damage to bio molecules of brain, reduces peptides that interfere with memory function and lowers lipids that hamper cerebral blood flow Tinospora cardifolia plant have excellent antioxidant and rejuvenative

		properties loaded with essential nutrients and minerals like zinc and copper- these herbs are extremely beneficial fortreating a host of neural disorder. Arrests-neuro degeneration[36]- Thus,*guduchi* arrests neuro degeneration which is commonly present in Alzheimer's disease. Berberine reduces A beta levels by modulating APP (amyloid precursors) processing in human neuroglioma cells without toxicity. Hence it is *medhya rasayana* used in degenerative disorders.
Mandukparni	Alkaloid , Hydrocortyline Asiaticoside Velerine, Resins, Tannin, Sugar	Anti-depressants[38] - Therapeutic Evaluation-double blind trial of *mandukparni* on mentally retarded children showed a significant increase in both general ability and behavioral pattern Anti oxidant[38] - *Centella asiatica* possesses this triterpene which is neuro protective and has anti oxidant properties.
Yashtimadhu	Glycyrrizin, Isoliquriitin Glabirine, Hiquirin Lucurside	Memory enhancing activity[39] - Increases the circulation into the CNS system,improves learning and memory on scopolamine induced mice. Neuroprotective effect[39] - *Glycyrrhizin* (GL) is a triterpene present in the roots and rhizomes of *licorice* (*Glycyrrhizaglabra*) It is found to have neuroprotective effect in thenkainic acid induced neuronal cell death in mouse Memory-strengthening activity[39] - Memory-strengthening activity of *Glycyrrhizaglab*rainexteroceptive and interoceptive behavioural models of memory is also shown by other investigators.

Table 4 Amayika Prayoga (Therapeutic Uses)

Dravya	*Samhita*	*Adhyaya (Chapter)*	*Formulation*	*Benefits*
Vacha	*Charak*	*Apsmarchikitsa (10)*	*Vacha + Madhu*	*Medha-Vardhan* *Atatvabhinivesha-hara*
	Sushruta	*Medhaayush kamiyarasayan chikitsa*	*Vacha Rasayanyoga* *1 Tola Vacha Powder consumed with milk*	*12 days regular consumed – Increase hearing power* *Consumed for 24 days – Increase Memory power* *If consume for 48 days – Increase power of aquacation*
	Bhavprakasha	*Haritakyadi Varga*	*Vacha Powder consumed with Madhu or Ghrita* *Sarswata Churna – ½ to 1 gm consumed with Madhu and Ghrita* *Medhavardhak Vachadi Yoga – Vacha Powder + Suvarna bhasma + Bilva Powder consumed with Cow Ghrita*	*Dhriti (power of retention)* *Unmad-hara (Insanity), Increase Smriti (Power of Remembrance)* *Speech power* *Medha-Ayu-Vardhaka*

	Chakradutta	*Apsmara*	*Consumption of Vacha Powder along with Madhu*	*Apsmara-Hara*
Haritaki and Aamalaki	*Charaka*	*Abhaya-aamalaki Rasayanpada*	*Pratham Brahma-Rasayana (Haritaki – 1000 Aamalaki – 3000)* *Chyavanprash*	*Increase Smriti (Power of Remembrance) and Intelligence* *Increase Smriti (Power of Remembrance) and Intelligence and Power of Sense organ*
			Aamalaka-Rasayana	*Sharir-Indriyas-Medha-bala Vardhaka*
			Haritakyadi Rasayana	*Sharir-Indriyas-Medha-bala Vardhaka*
		Pranakamiya Rasayanapada	*Aamalaka Ghrita*	*Increase Audible power*
		Karaprachitiya Rasayanpada	*Triphala Rasayana*	*Increase Smriti (Power of Remembrance) and Intelligence*
	Bhavaprakash	*Haritakyadi Varga (Haritaki)*	*Haritaki consumed with meal*	*Sharir-Indriyas-Medha-bala Vardhaka*
	Vaidyamanorama	*Aadarsh-nighantu (Aamalaki)*	*Aamalaki powder + Sesame oil in equal amount along with Madhu/Ghrita take at early morning for 1 month*	*Increase Intelligence*
Jatamansi	*Bhavaprakash*	*Karpuradi Varga (Jatamansi)*	*Jatamansi Phant – 30-60ml* *Jatamansi oil – 2-5 drop*	*Apsmara, Aptantraka-hara* *Aakshepa-hara*
	Dhanvantari	*Chandnadi Trutiya Varga*	*Mansyadi Kwath*	*Apsmara-Unmada-Nadidaurbalya-Mastishkdaurbalya Nashaka*
Jyotishmati	*Bhavprakash*	*Haritakyadi Varga*	*Application of Jyotishmati oil with 8 times butter on Head*	*Increase Intelligence*
	Aadarsha-Nighantu	*Jyotishmatyadi Varga*	*Taken Jyotishmati seed in increasing order (upto 50 seeds)*	*Medhya, Vatahara*
Shatawari	*Charak*	*Panduchikitsa Adhyaya*	*Shatawari + Payasa*	*Apsmara-hara*
	Shodhala	*Aadarsha Nighantu*	*Shatawari + Payasa*	*Apsmara-hara*

	Bhavaprakash	*Guduchyadi Varga*	*Shatawari Powder – 10-20gm*	*Apsmara-hara Balya*
Shankhapushpi	*Chakradutta*	*Shankhapushpi*	*Shankhpushpi extract juice*	*Unmada-hara*

Table 5 Drugs used in both *Sharir* and *Manas-vyadhi*

Drug	**Specific contents**	**Main indication**	**Psychiatric disease**
Dhatryadi Ghrita[40,41]	*Aamalaki, Vidari, Ikshu, Jeevaniya dravyas*	*Kshataj Kasa*	*Apsmar*
Kushmand Rasayana[42]	*Kushmand*	*Kshataj Kasa*	*Medha and Smriti enhancer*
Eladi Grita[43]	*Ela, Ajmoda, Triphala, Trikatu, Chitraka etc*	*Rajayakshma*	*Medhya*
Dhanvantar Ghrita[44]	*Dashmul, Shathi, Danti, Devdar, Punernava etc*	*Rajayakshma*	*Unmad, Apsmar*
Dashmuladi Ghrita (Dadhik Grita)[45]	*Dashmul, Bala, Nilini, Devdar, Pnarnava*	*Gulma*	*Unmad*
Ksharagad	*Devdar, Nishottara, Danti, Kutaki, Panchkol etc*	*Rajayakshma*	*Unmad, Apsmar*
Haritaki Ghrita[46]	*Haritaki*	*Rajayakshma*	*Unmad, Apsmar*
Tapyadi Loha[47]	*Suvarnmakshik, Shilajit, Rajat, Trikatu etc*	*Pandu*	*Apsmar*
Bala Taila	*Bala, Guduchi, Rasna, Ajakshir*	*Pandu*	*Apsmar*
Vyoshadi Yoga	*Trikatu, Triphala, Shigru, Vidanga*	*Sthaulya*	*Buddhi, Medhakar*

3. Mechanism of action of Drugs

Buddhi and *Medha* are synonymous. That which is beneficial to *medha* or *buddhi* is *Medhya. Medhya* action is *Prabhavjanya,* because it cannot be explained on the basis of *rasa-virya-vipaka siddhant.* Some medhya dravyas have *Madhura rasa, vipaka* and *sheeta veerya.* They exert balya and brihmana actions. Also they nourish *tarpaka Kapha* and give stability to mind.

Also by stimulating *ashukari* and *teekshna gunas* of *Pitta, satvaguna* of manas is aroused whereby acquisition of knowledge are carried out. These two functions viz. Dhi and Smriti depend upon the strength of *Sadhaka Pitta.* Such as Vacha (due to Ushna Virya and Katu Vipaka it increases the *Pittagni* and *Majjadhatvagni* resulting into *Majjadhatugata Dosha-Shodhan* and increases *Medha* and act as cognitive drug).

However, since these medhya actions cannot be explained well on the basis of *rasa-virya-vipaka,* they are attributed to *Prabhava of Medhya drugs*.

Thus, there are two types of *medhya dravyas viz. Ushna and Sheeta veerya. Ushna dravyas* stimulates *Dhi and Smriti* like *Vacha, Haritaki, Jyotishmati, Hingu, Sarpgandha, Jatiphala, Parsikyavani* etc. and Sheeta dravyas stimulates retention of power *(Dhriti) such as Aamalaki, Jatamansi, Shatawari, Ashwagandha, Yastimadhu.*

Due to *Madhur Vipaka of Guduchi* it nourishes the all *Dhatus* especially *Majja dhatu and due to Tikta, Kashaya* rasa it increases the qualities of *Rakta dhatu* and ultimately does the *Mehya Karma.*

Due to Laghu, Ruksha, Tikshna guna of Haritaki it improves the quality of all Dhatus especially Majjadhatu by reducing the Kapha, Kleda and excessive Medha dhatu andrelieves the Buddhi Jadyatherefore, Indriya and Dhatus make capable to does excellent work and do Medhya Karma.

Acharya Charaka has given a radiantexplanation on four *medhya rasayanas* viz. *Shankapushpi*

kalka, swarasa of *Mandookaparni, Yashtimadhu* along with milk and *Guduchi kwath.* When observed, it's seen that all thefour drugs are *madhura vipaki dravyas*.All are of sheet virya except *guduchi.Medha* is the karma given of *prakri*t *pitta.*This can be related to orientation andgrasping power. *Guduchi,* being *madhuravipaki* and *ushna virya* can help in enhancing grasping power as its constitutionis ideal for karma of *pitta, especially sadhaka pitta.* It can stimulate neuronal functions due to pachana karma. The madhura vipaki and sheeta virya dravyas can help the function of *Tarpaka kapha* to go on smoothly due to its constitution that is favourable for kapha karma. Dhruti i.e *dharana shakti,* memory retention capacity which can oc-cur in presence of only sheeta virya. Thus we see that though all the drugs are medhya, each exhibits different functions[49].

- ***Guduchi:*** The major constituent *of guduchi* is berberine which exhibits a peculiar action. It is isoquinolone alkaloid that has AChE (acetylcholinesterase inhibitory) action; similarly it is MAO – inhibitory. Berberine helps prevent oxidation damage to bio molecules of brain, reduces peptides that interfere with memory function and lowers lipids that hamper cerebral blood flow. Thus, guduchi arrests neuro degeneration which is generallypresent in Alzheimer's disease. Berberine reduces A beta levels by modulating APP (amyloid precursors) processing in human neuroglioma cells without toxicity. Hence it is medhya rasayana used in degenerative disorders[50,51].
- ***Yashtimadhu:*** The major constituent useful in brain function is glabridin. Chemically it is a flavonoid polyphenol which is proven to attenuate cerebral injuries in stroke as it is neuro-protective. It is also proved in animal studies that it enhances memory retention. Thus it is useful mainly in Alzheimers disease[52].
- ***Shankhapushpi:*** Convolvulus pluricaulis species has been studied deeply. The constituent con-volvine is responsible for blocking M2 and M4 cholinergic muscuranic receptors. It potentiates effects of arecoline, a muscuranic memory enhancer that ameliorates cognitive defects in Alzheimer's.
- ***Mandukparni:*** The constituent responsible is asiaticoside. Centella asiatica possesses this triterpene which is neuro protective and has anti oxidant properties. Thus, it can be said that all of these four dravyas are medhya with respect to their beneficence in neuro-degenerative disorders[54].

4. Discussion

By observing the actions of all drugs it consider that all this drug does Medhya karma in different ways as per their qualities. Thus Medhya Karma happens into three ways such as

- ***Majjadhatuposhaka*****(Neuro-nutrient):** In this the *Madhur Rasa, Vipaka, Sheeta Virya Guru, Snigdha*,Guna and *Balya, Bruhmana* properties thisdravyas increases the qualities and quantity if *Rasa* (Nutritional value of Circulatory plasma) so that nourishment of successive dhatus are done and provide nutrition to neuronal matter of the brain so it will be effective in *Apatarpanjanya Medhakshya* for ex. *Yashtimadhu, Shatawari, Kushmand etc*
- ***Majjadhtwagni-Dipaka*** **(Nervous tissue metabolism enhancer):** This drugs stimulatesthe *Majja dhtwagni*. It improves the organic metabolism of nervous tissue and enhance the structural and functional form of nervous tissue. It generally includes *Tikta, Katu Rasa, Ushna Virya and Ruksha, Laghu Guna's* Dravyas such as *Guduchi, Shankhpushpi, Tagar, Keshar* etc
- ***Majjagata Srotoshodhaka*** **(channel clearing agents):**This drugs does the Ama pachana and clear the passage of srotasa. This drugs have mainely *Teekshna guna,* due to this it removes the metabolic waste and does detoxification and clear the passage ofsrotasa's so that it provokes the micro-circulation and tissue perfusion. This drugs are mainely *Katu, Tikta Rasa, Katu Vipaka and Ushna Virya and Ruksha, Laghu, Teekshna, Ushna, Vishad guna such as Jyotishmati, Vacha* etc

Guduchi, Shatawari, Aamalaki, Mandukparni, Yashtimadhu etc this are *Medhya Rasayana dravyas* which nourishes the Rasa dhatus and enhance the qualities of all dhatus.

5. Conclusion

So it concluded that this Medhya Dravyas improves the cognitive function of brain and regenerate neuronal tissues so ultimately it increases the memory, reduce stress and brain-aging. In Modern research also proves the various

pharmacological actions of this drugs such as Nootropic, Anti-oxidant, Anti-aging, Free radical scavenging, Anti-inflammatory, Anti-stress, Anti-toxic etc. On the basis of this we can prepare the various medicine on Neurological and Psychological diseases.

By application of this drugs According to Dushyam,Desha, Kala, Bala, Vaya, Agni, Prakriti, Aahara, Avstha etc and taking all references of modern researches it can be become most useful in treatment.

Compliance with ethical standards

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Disclosure of conflict of interest

Authors declare that there is no conflict of interest.

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