IAMJ

INTERNATIONAL AYURVEDIC MEDICAL JOURNAL

Research Article ISSN: 2320-5091 Impact Factor: 6.719

ROLE OF HERBS, PANCHAKARMA THERAPIES, AND AYURVEDA MEDICINES IN THE MANAGEMENT OF ATTENTION DEFICIT HYPERACTIVE DISORDER (ADHD)

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https://doi.org/10.46607/iamj0511052023

(Published Online: May 2023)

Open Access

Article Received: 17/04/2023 - **Peer Reviewed:** 25/04/2023 - **Accepted for Publication:** 09/05/2023.

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ABSTRACT

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common neurobehavioral illnesses in children and frequently persists into adulthood. Children with ADHD may struggle to control their conduct (act without considering the consequences) or be extremely active. It is typical for kids to occasionally struggle with their attention spans and manners. Nevertheless, these behaviors do not just disappear in children with ADHD. Current research indicates that heredity has a significant influence on ADHD, even though the etiology and risk factors are unclear. Together with behavioral therapy, Ayurvedic treatments that improve brain function, increase concentration, and quiet the mind can be highly beneficial in treating ADHD.

Keywords: ADHD, *Vataj Unmaad*, Herbs

INTRODUCTION

ADHD is a neuro-developmental disorder that is one of the most prevalent chronic healthconditions affecting school-aged children. It is characterized by inattention, hyperactivity, and impulsiveness. Processing of any information in the brain depends upon functional arousal, alertness, and attention. An intact anatomic and petrochemical brain system is required for functional attention to attain. Primary structures involved in the above functioning are the brainstem, mainly basal ganglia, the limbic system for example amygdale hippocampus, and the frontal lobes. The neurotransmitter dopamine and its neuronal pathways have been identified as a major chemical modulator of attention. The acquirement of knowledge, its organization, processing of information, and executive functions depend upon the cognitive mechanisms of the brain. Children with attention dysfunction comprise a heterogeneous group of the population who show various patterns of impairment of the above-mentioned systems. Children with ADHD show an on-going pattern of three different types of symptoms[1] viz - difficulty paying attention (inattention), being overactive (hyperactivity), and acting without thinking (impulsivity). These symptoms get in the way of functioning or development. The child who has ADHD havecombinations of these symptoms:

Signs of inattention may include:

- Make careless mistakes in schoolwork or during other activities.
- Have problems sustaining attention in tasks or play.
- Seem not to listen when spoken to directly.
- Fail to not follow through on instructions, fail to finish schoolwork.
- Start tasks but quickly lose focus and are easily sidetracked.
- Have problems organizing tasks and activities, such as doing tasks in sequence, and keepingmaterials and belongings in order.
- Avoid or dislike tasks that require sustained mental effort, such as schoolwork or homework, Lose things necessary for tasks or activities, such as school supplies, pencils,books, and tools.
- Become easily distracted by unrelated thoughts or stimuli.
- Forgetful in daily activities.

Signs of hyperactivity and impulsivity may include:

- Fidgeting and squirming while seated
- Getting up and moving around in situations when staying
- Seated is expected, such as in the classroom.
- Running or dashing around or climbing in situations where it is inappropriate.
- Being unable to play or engage in hobbies quietly.
- Being constantly in motion or "on the go," or acting as if "driven by a motor"
- Talking nonstop
- Blurting out an answer before a question has been completed, finishing other people's sentences, or speaking without waiting for a turn in the conversation.
- Having trouble waiting for his or her turn
- Interrupting or intruding on others, for example in conversations, games, or activities.

With an estimated worldwide-pooled prevalence of 5.3%, ADHD is the most prevalent mental disorder in children. The prevalence of ADHD has been reported to be 11.32% with a male predominance ratio, of 3:1 worldwide and 4:1 in India.[2]

AIMS AND OBJECTIVES

- To review the literature for *Ayurvedic* management of A.D.H.D (attention deficit hyperactivity disorder).
- To elaborate on the mode of action of *Medhya* herbs which are effective in the management of ADHD.
- To elaborate on the ayurvedic medicines which are effective in the management of ADHD.

MATERIALS AND METHODS

Classical texts of Ayurveda like *Charaka Samhita*, and *Sushruta Samhita*, and modern textbooks includ-

ing digital media, Ayush Research Portal, PubMed, Google Scholar, and other websites on the internet regarding.

ADHD and Ayurveda

In Ayurveda, there is no direct correlation for ADHD. But according to its symptoms, to some extent, it can be compared with *Vataja Unmaad* and *Anavasthita-chittatwa (Vatavyadhi)*[3]. According to *Acharya Charak*, intake of *Viriddha, Dushta, Asuchiahara* (intake of incompatible, polluted food), *Devata, Guru, Brahmana Apamana* (insult to God and teacher), affliction of mind due to excessive fear and excitement, and other undesired activities leads to Unmaad[4]. Due to the intake of *Vatavruddhikara Ahara Vihara*, the aggravated *Vata* adversely affects the heart afflicted with mental agony (including worry, passion, and anger) and instantaneously perverts intellect and memory. As a result of this, the following sign and symptoms are manifested: Laughing, smiling, dancing, singing, speaking, moving limbs of the body, and weeping in inappropriate places (inopportune moments) Along with this general *Unmaad* symptoms likeintellectual confusion, the fickleness of mind, unsteadiness of vision, impatience may also be seen[5].

The main reason for ADHD is the vitiation of *Dhee* (rational thinking), *Dhriti* (retaining power of the mind), *and Smriti* (memory) which causes abnormality and abnormal conduct resulting in improper contact of the senses with their objectives and gives rise to inattention, hyperactivity, and impulsivity. According to *Ayurveda*, psychological problems start when fundamental imbalances develop in the biological intelligence that controls all bodily processes. While explaining the treatment *Charakacharya* has told that, in *Vataja Unmaad* first *Sharpipana* should be given. In *Panchakarma snehana, swedana, vamana, virechana, and samsarjana krama* should be followed according to patient6.

Ayurvedic treatment

Effective principles involved in treating ADHD.

- ***Deepana and Pachana*:** The principle corrects *Pachakagni* and digests *Ama.* Thereby it corrects the appetite, clears the channel obstructions by removing Ama, and aids proper nourishment to all *Dhatus.*
- ***Srotoshodhana*:** Here, the most affected channels are those that carry out brain processes. Lack of attention, learning difficulties, poor memory, and other symptoms are carried on by the obstruction of the regular dosha flow. *Vacha* (Acorus calamus), an ayurvedic herb, aids in clearing blockages from channels, particularly *Manovahasrotas*. By digesting ama, it clears the channels and enables normal brain activity thanks to its penetrating and digestive properties.
- **Improving brain function:** *Rasayana* medications are used to prevent and treat illnesses. They enhance strength and immunity while nourishing all tissues. The *Medhya Rasayanas* are those that focus specifically on mental growth and nervous system rejuvenation. They boost intelligence, learning, attention, and memory.

Herbs effective in ADHD (*Medhya Rasayana* medicine):

The term "*Medhya Rasayanas*" is derived from the Sanskrit words "*Rasayana*," which means rejuvenation, and "*Medhya*," which means intellect or cognition. The Ayurveda medical system categorizes therapeutic herbs as brain tonics or rejuvenators. According to earlier findings, these plants are utilized in both herbal and conventional treatment and provide advantages that pharmaceutical drugs lack[7]. Memory loss, cognitive deficiencies, poor mental function, etc. are frequently related to neurological and psychiatric illnesses. The '*Medhya Rasayanas*' are said to be advantageous to enhance the intellectual.

Medhya Rasayana is a group of four medicinal plants that can be used singly or in combinations.[8] They are *Mandukaparni* (*Centella asiatica* Linn.), *Yastimadhu* (*Glycirrhiza glabra* Linn.), *Guduchi* (*Tinospora cordifolia* (Wild) Miers) and *Shankhapushpi* (*Convolvulus pleuricaulis* Chois), specially mentioned with a wide range of applications on different systems.

The formulation of *Medhya Rasayana* drugs is two types:

1. *Shita Virya* and *Madhura Vipaka*- it promotes *kapha* and enhances "*Dharana Karma*" (i.e., re-

tention of cognition) e.g., *Yastimadhu, Bramhi, Sankhpushpi,* etc.

2. *Ushna Virya* and *Tikta Rasa*- it promotes *pitta* and enhances *Grahana* and *Smarana* (i.e., grasping power and Memory) e.g., *Guduchi, Vacha, Jyotishmati,* etc.

Medhya drugs act at different levels[9]-

- At the level of *Rasa*
- Act by stimulating and improving the function of *Agni.*
- Improve circulation of Rasa by opening and cleaning the micro channel and thus improving-*Medhya* function.

***Medhya Rasayanas* in neuroprotection**

Medhyarasayana drugs play an essential role in the treatment of psychiatric and psychosomatic diseases. The mode of this therapy involves the individual attaining sedation, calmness, tranquility, or stimulation of activities of the brain[10]. Based on the experimental and clinicalresearch, it is known that these drugs have varying degrees of psychotropic action and are known to possess antidepressant, sedative, and tranquilizing action. *Medhya Rasayana* drugs are used for the prevention and treatment of mental disorders of all age groups. These drugs promote the Intellect (*Dhi*) Retention power (*Dhriti*), and memory (*Smriti*). They produce the Nueuronutrient effect by improving cerebral metabolism[11]. *Medhya Rasayana* drugs are known to have a specific effect on mental performance by promoting the functions of "*Buddhi*" and "*Manas*" by correcting the disturbances of "*Rajas*" and "*Tamas*". [11] This helps the mental patient to get relief from stress, anxiety, and depression.

Mandukaparni (Centella asiatica Linn.)

Mandukaparni is *Centella asiatica* Linn. Family – Umbelliferae. *They* are *Tikta Rasa, Laghu Guna, Sita Virya, Madhur Vipaka*. Major constituents of it are saponins, medacoside, asiaticoside, meda and Asiatic acid, a new triterpenicacid.[12] They act on behaviour besides being neuro-protectives[13] and brain growth promoters[14]. Dendritic arborization is supposed to be the neuronal basis for improved learning and memory[15]. Anti-seizure activity may result from direct or indirect modulation of ATPase activity[16]. *Centella asiatica* Linn. inhibits the memory impairment induced by scopolamine through the inhibition of AChE[17]. *Centella asiatica* Linn. accelerates nerve regeneration upon oral administration and contains multiple active fractions increasing neurite elongation in-vitro[18]. Earlier studies have reported ameliorating the effect of CEon learning and memory impairment induced by transient bilateral common carotid arteries occlusion (T2 VO) in mice[19]. *Centella asiatica* plays a significant role in improving cognition and memory. Administration of *Centella asiatica* showed improved memory performance, oxidative defense decreased aluminum concentration, caspase-3, acetylcholinesterase activity,and reversal of mitochondrial enzyme activity as compared to aluminum-treated animals[20].

Yasthimadhu (Glycyrrhiza glabra Linn.)

Yastimadhu is *Glycyrrhiza glabra* Linn., Family – Fabaceae. Glycyrrhizin (GL) is a triterpene present in the roots and rhizomes of licorice (*Glycyrrhiza glabra*).[21] It has *Madhur Rasa, Guru, Snigdha Guna*, *Sita Virya* and *Madhur Vipaka.* Through the inhibition of AChE, it inhibits the memory impairment induced by scopolamine and it acts on behavior besides being a neuroprotective brain growth promoter. The roots and rhizomes of *Glycyrrhiza glabra* Linn. æan efficient brain tonic; it increases the circulation into the CNS system and balances the sugar levels in the blood[22]. Liquorice has significant action on memory-enhancing activity in dementia. It significantly improved learning and memory in scopolamine-induced dementia[23]. Glabridin, isolated from the roots of *Glycyrrhiza glabra* is also a promising candidate for learning and memory in mice[24]. Antidepressant-like activity of *Glycyrrhiza glabra* is demonstrated in mouse models of immobility tests. This is mediated by an increase of brain norepinephrine and dopamine, but not by an increase of serotonin[25]. The memory-strengthening activity of *Glycyrrhiza glabra* in exteroceptive and interoceptive behavioral models of memory is also shown by other investigators[26]. The beneficial effect on learning and memory by *Glycyrrhiza. glabra* (popularly known as liquorice) in mouse brain is due to the facilitation of cholinergic

transmission also known[27].

***Guduchi (Tinospora cordifolia* (Willd) Miers.)**

Guduchi is *Tinospora cordifolia* Willd. Miers, Family–Menispermaceae. *Guduchi* has an Antioxidant effect that helps in memory enhancing and possesses anti-stress action. It is useful for the treatment of *Bhrama* (Vertigo), in improving behaviour disorders, mental deficits, and IQ levels[28]. *It is Tikta, Kasaya Rasa, Guru and Snigdha* Guna, *Usna Virya* and *Madhur Vipaka*. Chemical constituents' classes are alkaloids, diterpenoid lactones, glycosides, steroids, sesqui-terpenoids, phenolics, aliphatic compounds, and polysaccharides[29]. Neuro-protective and ameliorative properties are due to their antioxidant and trace element contents[30] *Tinospora cordifolia* (Willd) Miers. has been claimed to possess learning and memory enhancing[31] and antioxidant activities[32,33,34]. *Tinospora cordifolia* (Willd) Miers. enhanced the cognition in normal and cognition deficit animals in behavioural test Hebb William maze and the passive avoidance task[35]. The mechanism of cognitive enhancement is by immune-stimulation and increasing the synthesis of acetylcholine, this supplementation of choline enhances the cognition[36].

Shankhapushpi (Convolvulus pluricaulis Chois)

Shankhapushpi is *Convolvulus pleuricaulis* Chois. Family – Convolvulaceae. *Shankhapushpi* is known worldwide for its action on boosting memory and improving intellect power and is advantageous for brain-related disorders like epilepsy, mental retardation, etc. *They are Tikta Rasa, Snigdha, Picchil Guna, Sita Virya* and *Madhu Vipaka.* It is effective in anxiety disorders, decreases Pentobarbitone-induced sleep, reverses social isolation-related stress, increased total motor activity, and stress-induced antinociception in an experimental model. It helps in memory enhancement and has effects on mood elevating, helps to retard brain aging, helps in the regeneration of brain cells and in Dendritic arborization which is the neuronal basis for improved learning and memory, and increases in AGhE activity in CA1 with AS and CA3 and has anxiolytic effect[37]. Ayushman-8 (containing *Shankhpushpi, Brahmi,* and *Vacha*) was reported to be effective on *Manasa-mandata* (mental retardation) [38]. *Shankhapushpi* compounds containing *Shankhapushpi, Sarpagandha,* and *Gokshura* in equal quantities are studied to be effective in *Chittodvega*. (anxiety disorders) [39]. *Shankhapushpi* is effective in relieving signs and symptoms of *Chittodvega* (anxiety disorders) [40]. Other beneficial drugs used with similar aims are *Brahmi* (*Bacopa monniera*), *Jyotishmati* (*Celastrus panniculata*), *Vacha* (*Acorus calamus*), *Jatamamsi* (*Nardostachys jatamamsi*), and *Kushmanda* (*Benincasa hispida*). These used either single or combination forms.

Table 1: *Medhya Rasayana* drugs and their mode of action

S No	Medhya Rasayanadrugs	Mode of action	Reference
1	Withanolide-A isolated from the root of *Ashwagandha*(*withania somnifera*)	Neuritic regeneration, synaptic reconstruction, axon extensiondendrite extension synaptogenesis memory improvement	[41,42]
2	Withanolide IV (*Withania somnifera)*	Axon extension dendrite extension synaptogenesis memoryimprovement	[42]
3	Withanolide IV	Axon extension dendrite extension synaptogenesis memoryimprovement	[42]
4	*Bramhi* (*Bacopa monnieri* Linn)	Memory enhancement, cognitive function, reduce amyloid levels in PSAPP mice, effect on the cholinergic system, prevent aluminum neurotoxicity i.e., protect the brain from oxidative damage resulting from aluminum toxicity.	[43-46]
5	*Sankhapushpi* (*Convolvuluspluricaulis*)	Anxiolytic and memory enhancing, mood elevating, retard brainaging	[47]

6	*Mandukaparni* (*Centella asiatica*)	Useful in treating mental retardation (improvement in performance IQ), Social Quotient, immediate memory span and reaction time, Asiatic acid (AA), a pentacyclic triterpene in *Centella asiatica*- attenuates glutamate-induced cognitive deficits of mice and protects SH-SY5Y cells against glutamate-induced apoptosis *in-vitro*, influence the neuronal morphology and promote the higher brain function of juvenile and young adult mice, cognitive enhancement, prevent oxidative stress, enhance neuronal dendrites, dendritic growth in the hippocampal CA3 neurons in adult rats. antidepressant activity.	[48-51]
7	*Guduchi* (*Tinosporacordifolia*)	Enhanced verbal learning and memory and logical memory (of immediate and short-term type), enhances cognition (learning and memory) in normal rats and cyclosporine-induced memory deficit, anti-stress, anti-depressant, and anxiolytic properties, improvement in sensile memory impairment	[52-54]
8	*Ashwagandha* (*Withania somnifera*)	Mood stabilizer in clinical conditions of anxiety and depression., clearance and reverses the behavioural deficits and pathology seen in Alzheimer's disease models.	[55,56]
9	*Jyothismati* (*Celastrus paniculatus*)	Affects learning and recall of memory, with a significant decrease in the AChE activity assayed from the hypothalamus, frontal cortex, and hippocampus of the rat brain treated with 400 mg/kg body weight. With CP oil i.e., *Jyothismati* oil from seeds of *Celastrus paniculatus* (CP))	[57,58]
10	*Vidanga* (*Embelia ribes*)	Defense against MCAO- induced focal cerebral ischemia in rats and exhibits neuroprotective activity, useful adjunct in the treatment of stroke.	[59,60]
11	*Kushmanda Ghrita* (*Benincasa hispida*)	Increased immediate memory, possess antidepressant activity	[61]

Ayurvedic medications used in ADHD.

- **Saraswat Churna:** Extensively used in low memory, loss of concentration, delayed speech, language disorders, and delay milestone development.
- **Saraswata Ghritha:** Widely used in children to enhance memory and intelligence. Also used in speech and language disorders. Improves digestive power.
- **Saraswatha Arista:** is the best memory and immunity booster tonic, used in psychological conditions, epilepsy, and insanity, and improves voice.
- **Medhya Rasayana:** It is a potent Ayurvedic memory booster tonic. Enhances memory, and intelligence, corrects impaired speech and voice, and relieves sleeplessness and vertigo. It calms the restless mind and cools down the aggressive nature.
- **Manasamitra Vati:** It is used in children to improve concentration, memory, and learning disabilities Used in autism, epilepsy, and depression. It is the best neuroprotective Ayurvedic medicine.
- **Brento Syrup:** Used to improve memory and concentration. Exhibits neuroprotective, anxiolytic, and anti-depressant actions.
- **Brahmi Vati:** It is used in mental disorders. It enhances memory.
- **Brahmi Ghritha:** It is extensively used to enhance intelligence, memory, learning skills, and speech and balances all three doshas.

Relieves Other Ayurvedic medicines that are commonly used for the treatment of ADHD are-

- Memovit granules
- Mahakalyanaka ghrita
- Panchagavya Ghrita
- Braintone Syrup

- Shankhapushpi syrup

Therapies effective in ADHD

- **Abyanga** - body oil massage is done in the classical method that helps to relieve *vata dosha*, relaxes the body's muscles, and calms the mind.
- **Shirodhara -** Continuous pouring of any liquid / medicated liquid (milk, oil, etc) on the forehead & allow it to flow over the scalp, using an instrument *Dharayantra* is known as *Shirahseka*, this is also popularly known as *Shirodhara*. During the entire process, the liquid is poured over the forehead of patients in the form of a regular stream from a specific height of eight centimeters in a fixed fashion in the form of oscillatory movements for 45 minutes per day for two weeks. Many studies have been conducted to date to establish the role of Shirodhara in the management of ADHD.[62] It calms the mind, improves concentration, relieves sleeplessness, depression, anxiety, etc. *Vata* relieving liquids are more effective inADHD patients.
- **Basti-** In a study, it proved that *Matrabasti* with *Ksheerbala oil* and *Mahanarayan oil* was quite effective in the amelioration of clinical features of ADHD in children[63]. It was found effective to break the pathogenesis of ADHD.

CONCLUSION

It concluded by the above study that herbs, herbomineral compounds, and *Panchkarma* therapies like *Abhyanga*, *Shirodhara*, *Shirobasti*, and *Basti* are quite effective not only in ameliorating symptoms of ADHD but also maintain homeostasis among vitiated *doshas* without showing side effects. In this manner, Ayurveda provides a complete, safe, effective, and cheaper management of ADHD.

REFERENCES

1. Clinical practice guideline: diagnosis and evaluation of the child with attention- deficit/hyperactivity disorder. Amer ican Academy of Paediatrics. Pediatrics. 2000 May; 105(5):1158-70.
2. Venkata JA, Panicker AS (2013) Prevalence of Attention Deficit Hyperactivity Disorder in primary school children. Indian J Psychiatry 55(4): 338-342.
3. Chavali's Principles and Practice of Paediatric in Ayurveda Dr. CHS Sastry, Dr. Krishna Dutt Chavali, Dr. Anita Gayatri.
4. Vaidya Yadavji Trikamji Acharya, CharakSamhita of Agnivesa with Ayurved- Deepika Commentary of Sri Chakrapanidatta, Chikitsa Sthana, 9/6, Chaukhamba Publication, Delhi, Reprint Edition 2017, pg-468.
5. Vaidya Yadavji Trikamji Acharya, CharakSamhita of Agnivesa with Ayurved- Deepika Commentary of Sri Chakrapanidatta, Chikitsa Sthana, 9/10, Chaukhamba Publication,Delhi, Reprint Edition 2017, pg-468.
6. Vaidya Yadavji Trikamji Acharya, CharakSamhita of Agnivesa with Ayurved- Deepika Commentary of Sri Chakrapanidatta, Chikitsa Sthana, 9/25, 26, Chaukhamba Publication, Delhi, Reprint Edition 2017, pg-470
7. Kumar V (2006) Potential medicinal plants for CNS disorders: an overview. Phytother Res 20: 1023-1035.
8. Kulkarni R, Girish KJ, Kumar A (2012) Nootropic herbs (Medhya Rasayana) in Ayurveda: An update. Pharmacogn Rev 6: 147-153.
9. Singh AK, Gupta AK, Manish Singh PK (2014) Rasayana therapy: A magic contribution of Ayurveda for healthy long life. Int J Res Ayurveda Pharm 5: 41-47.
10. Chaudhari K, Murthy ARV (2014) Effect of rasayana on mental health-a review study. International Journal of Ayurveda and Alternative medicine 2: 1-7.
11. Tiwari R, Tripathi JS, Gupta S, Reddy KRC (2011) Pharmaceutical and clinical studies on compound Ayurvedic formulation, Saraswata Churna. International Research Journal of Pharmacy 2: 77-84.
12. Sharma PC, Yelne MB, Dennis TJ. Database on Medicinal plants used in Ayurveda and Siddha. Vol. 1. New Delhi: CCRAS, Dept. of AYUSH, Ministry of Health and Family Welfare, Govt. of India; 2005. pp.265–266
13. Neuro-protective evaluation of standardized extract of Centella asciatica in monosodium glutamate treated rats. Ramanathan M, Sivakumar S, Anand Vijaya kumar PR, Saravana babu C, Pandian PR Indian J Exp Biol. 2007 May; 45(5):425-31.
14. Ambu Ganapathi GA. Synergetic effect of Vallarai and Brahmi on the learning ability of albino mice and school children. Ootacamund: Paper presented at the International Seminar on Recent Trends in Pharmaceutical Sciences; 1995. pp. 18–20.
15. Centella asiatica (L.) leaf extract treatment during the growth spurt period enhances hippocampal CA3 neuronal dendritic arborization in rats. Mohandas Rao KG, Muddanna Rao S, Gurumadhva Rao S Evid Based Complement Alternat Med. 2006 Sep; 3(3):349- 57.
16. The antiepileptic effect of Centella asiatica on the activities of Na/K, Mg, and Ca- ATPases in rat brain during pentylenetetrazol-induced epilepsy. G V, K SP, V L, Rajendra W Indian J Pharmacol. 2010 Apr;

42(2):82-6.
17. Review Bacopa monniera, a reputed nootropic plant: an overview. Russo A, Borrelli F Phyto medicine. 2005 Apr; 12(4):305-17.
18. Soumyanath A, Zhong YP, et al, Department of Neurology, Oregon Health & Science University, 3181 SW Sam Jackson Park Road, Portland OR 97239, USA.
19. Doknark S, Mingmalairak S, Vattanajun A, Tantisira B, Tantisira MH (2014) Study of ameliorating effects of ethanolic extract of Centella asiatica on learning and memory deficit in animal models. J Med Assoc Thai 97 Suppl 2: S68-76.
20. Prakash A, Kumar A (2013) Mitoprotective effect of Centella asiatica against aluminum-induced neurotoxicity in rats: possible relevance to its antioxidant and anti-apoptosis mechanism. Neurol Sci 34: 1403-1409.
21. Luo L, Jin Y, Kim ID, Lee JK (2014) Glycyrrhizin suppresses HMGB1 inductions in the hippocampus and subsequent accumulation in serum of a kainic acid-induced seizure mouse model. Cell Mol Neurobiol 34: 987-997.
22. Rathee P, Chaudhary H, Rathee S, Rathee D. Natural memory boosters. Phcog Rev. 2008;2:249– 56.
23. Memory enhancing activity of Glycyrrhiza glabra in mice. Dhingra D, Parle M, Kulkarni SK J Ethnopharmacol. 2004 Apr; 91(2-3):361-5.
24. Cui YM, Ao MZ, Li W, Yu LJ (2008) Effect of glabridin from Glycyrrhiza glabra on learning and memory in mice. Planta Med 74: 377-380.
25. Dhingra D, Sharma A (2006) Antidepressant-like activity of Glycyrrhiza glabra L. in mouse models of immobility tests. Prog Neuropsychopharmacology Biol Psychiatry 30: 449-454.
26. Parle M, Dhingra D, Kulkarni SK (2004) Memory-strengthening activity of Glycyrrhiza glabra in exteroceptive and interoceptive behavioral models. J Med Food 7: 462-466.
27. Dhingra D, Parle M, Kulkarni SK (2004) Memory enhancing activity of Glycyrrhiza glabra in mice. J Ethnopharmacol 91: 361-365.
28. Upadhyay AK, Kumar K, Kumar A, Mishra HS (2010) Tinospora cordifolia (Willd.) Hook. f. and Thoms. (Guduchi)–validation of Ayurvedic pharmacology through experimental and clinical studies. International Journal of Ayurveda Research 1: 112-121.
29. Singh SS, Pandey SC, Srivastava S, Gupta VS, Patro B, Ghosh AC. Chemistry and Medicinal properties of Tinospora cordifolia (Guduchi) Indian J Pharmacol. 2003;35:83–91
30. Rubia cordifolia, Fagonia cretica linn, and Tinospora cordifolia exert neuroprotection by modulating the antioxidant system in rat hippocampal slices subjected to oxygen-glucose deprivation. Rawal AK, Muddeshwar MG, Biswas SKBMC Complement Altern Med. 2004 Aug 13; 4(:11.
31. Agarwal A, Malini S, Bairy KL, Rao MS. Effect of Tinospora cordifolia on Learning and Memory in normal and memory deficit rats. Indian J Pharmacol. 2002;34:339–49.
32. Singh RP, Banerjee S, Kumar PV, Raveesha KA, Rao AR. Tinospora cordifolia induces enzymes of carcinogen/drug metabolism and antioxidant System and inhibits lipid peroxidation in mice. Phytomedicine. 2006;13:74–84
33. The antioxidant action of Tinospora cordifolia root extract in alloxan diabetic rats. Stanley Mainzen Prince P, Menon VP Phytother Res. 2001 May; 15(3):213-8.) and anti-stress activity
34. Patil M, Patki P, Kamath HV, Patwardhan B. Antistress activity of Tinospora cordifolia (Willd) Meirs. Indian drugs. 1997;34:211–5
35. Yalla Reddy Y, Mohana Lakshmi S, Saravana KA. Review on Effect of Natural Memory Enhancing Drugs on Dementia. Int J Phytopharmacol. 2010;1:1–7
36. Ashutosh A, Malini S, Bairy KL, Muddanna SR. Effect of Tinospora cordifolia onlearning and memory in normal and memory deficits rats. Indian J Pharmacol. 2000;34:339–49.
37. Dhingra D, Valecha R (2007) Evaluation of the antidepressant-like activity of Convolvulus pluricaulis Choisy in the mouse forced swim and tail suspension tests. Med Sci Monit 13: BR155-161.
38. Rajagopalan V. Seminar on research in Ayurveda and Sidha. New Delhi: CCRAS; 1995
39. Kalra Sanjeev. A study on the effect of Shankhapushpi compound and Satwavajaya Chikitsa in Chittodvega (generalized anxiety disorders) Dept. of Post Graduate studies in Manasa Roga, SDM College of Ayurveda and Hospital. Hassan, Rajiv Gandhi Universityof Health Sciences, Karnataka. 2006
40. Parsania S. A clinical study on the role of Jaladhara and Shankhapushpi (Convolvulus pleuricaulis) in the management of Chittodvega (anxiety disorder) Jamnagar: Dept. of Kayachikitsa, IPGT and RA, Gujarat Ayurveda university; 2001.
41. Kuboyama T, Tohda C, Komatsu K (2005) Neuritic regeneration and synaptic reconstruction induced by withanolide A. Br J Pharmacol 144: 961-971.
42. Kuboyama T, Tohda C, Zhao J, Nakamura N, Hattori M, et al. (2002) Axon- or dendrite- predominant outgrowth induced by constituents from Ashwagandha. Neuroreport 13: 1715-1720.
43. Stough C, Lloyd J, Clarke J, Downey LA, Hutchison CW, et al. (2001) The chronic effects of an extract of Bacopa monniera (Brahmi) on cognitive function in healthy human subjects. Psychopharmacology (Berl) 156: 481-484.
44. Holcomb LA, Dhanasekaran M, Hitt AR, Young KA, Riggs M, et al. (2006) Bacopa monniera extract reduces amyloid levels in PSAPP mice. J Alzheimers Dis 9: 243-251.

45. Saraf MK, Prabhakar S, Khanduja KL, Anand A (2011) Bacopa monniera Attenuates Scopolamine-Induced Impairment of Spatial Memory in Mice. Evid Based Complement Alternat Med 2011: 236186.
46. Neetu, Singhal H & Kataria A. A critical review on brahmi [bacopa monniera(l.) Pennell], European Journal of Pharmaceutical and Medical Research ejpmr, 2016,3(8), 270-276
47. Dhingra D, Valecha R (2007) Evaluation of the antidepressant-like activity of Convolvulus pluricaulis Choisy in the mouse forced swim and tail suspension tests. Med Sci Monit 13: BR155-161.
48. Rao SB, Chetana M, Uma Devi P (2005) Centella asiatica treatment during the postnatal period enhances learning and memory in mice. Physiol Behav 86: 449-457.
49. Veerendra Kumar MH, Gupta YK (2002) Effect of different extracts of Centella asiatica on cognition and markers of oxidative stress in rats. J Ethnopharmacol 79: 253-260.
50. Veerendra Kumar MH, Gupta YK (2003) Effect of Centella asiatica on cognition and oxidative stress in an intracerebroventricular streptozotocin model of Alzheimer's disease in rats. Clin Exp Pharmacol Physiol 30: 336-342.
51. Gadahad MR, Rao M, Rao G (2008) Enhancement of hippocampal CA3 neuronal dendritic arborization by Centella asiatica (Linn) fresh leaf extract treatment in adult rats.J Chin Med Assoc 71: 6-13.
52. Bairy KL, Rao Y, Kumar KB (2004) Efficacy of Tinospora cordifolia on Learning and Memory in Healthy Volunteers: A Double-Blind, Randomized, Placebo-Controlled Study. Iranian Journal of Pharmacology and Therapeutics 3: 57-60.
53. Agarwal A, Malini S, Bairy KL, Rao MS (2002) Effect of Tinospora Cordifolia on Learning and Memory in Normal and Memory Deficit Rats. Indian Journal of Pharmacology 34: 339-349.
54. Kulatunga RD, Dave AR, Baghel MS (2012) Clinical efficacy of Guduchyadi Medhya Rasayana on Senile Memory Impairment. Ayu 33: 202-208.
55. Bhattacharya SK, Bhattacharya A, Sairam K, Ghoshal S (2000) Anxiolytic-antidepressant activity of Withania somnifera glycowithanolides an experimental study. Phytomedicine 7: 463-469.
56. Sehgal N, Gupta A, Valli RK, Joshi SD, Mills JT, et al. (2012) Withania somnifera reverses Alzheimer's disease pathology by enhancing low-density lipoprotein receptor-related protein in liver. Proc Natl Acad Sci USA 109: 3510-3515.
57. Singh N (2006) Effect of Celastrus paniculatus on Learning, Memory and Serum biochemistry of Aging Albino Rats. Indian Journal of Gerontology 20: 310-316.
58. Lekha G, Kumar BP, Rao SN, Arockiasamy I, Mohan K (2010) Cognitive enhancement and Neuroprotective effect of Celastrus paniculatus Willd. seed oil (Jyothishmati oil) on male Wistar rats. Journal of Pharmaceutical Science and Technology 2: 130-138.
59. Ansari MN, Bhandari U, Islam F, Tripathi CD (2008) Evaluation of antioxidant and neuroprotective effect of ethanolic extract of Embelia ribes Burm in focal cerebral ischemia/reperfusion-induced oxidative stress in rats. Fundamental & Clinical Pharmacology 22: 305-314.
60. Thippeswamy BS, Nagakannan P, Shivasharan BD, Mahendran S, Veerapur VP, et al. (2011) Protective effect of embelin from Embelia ribes Burm. against transient global ischemia-induced brain damage in rats. Neurotox Res 20: 379-386.
61. Chandre R, Upadhyay BN, Murthy KH (2011) Clinical evaluation of Kushmanda Ghrita in the management of depressive illness. Ayu 32: 230-233.
62. Singhal HK, Neetu, Kumar A, Rai M. Ayurvedic approach for improving reaction time of attention deficit hyperactivity disorder affected children. Ayu. 2010 Jul;31(3):338-42. doi 10.4103/0974-8520.77169.
63. Gurav A. D'souza J. A Case Report on Ayurvedic Management of Attention Deficit Hyperactivity Disorder [ADHD] in Children. Journal of Ayurveda and Integrated Medical Sciences, (2022). 7(5), 166 - 170.

Source of Support: Nil
Conflict of Interest: None Declared

How to cite this URL: Manvita Gidwani et al: Role of Herbs, Panchakarma Therapies and Ayurveda Medicines in the Management of Attention Deficit Hyperactive Disorder (ADHD). International Ayurvedic Medical Journal {online} 2023 {cited May 2023} Available from: http://www.iamj.in/posts/images/upload/1039_1047.pdf