Ayurveda Dietetics and Herbs for Learning and Attention Disorders

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What is health?

SOUL ↔ MIND ↔ BODY

ILLNESS -------- WELLNESS-----------------HAPPINESS
Learning and attention disorders

- ADHD: Trouble With Focus and Hyperactivity
- Dyslexia: Trouble With Reading
- Dyscalculia: Trouble With Mathematical calculations
- Dysgraphia: Trouble With Writing
- Dyspraxia: Trouble With Motor Skills
Topic inspired many creations
These are a few commonly occurring mental disabilities leading to hampered learning i.e. Loss of Medha:

- Dyslexia
- ADHD (Attention Deficit Hyperactivity Disorder)
- Language Processing Disorder.
- Non-Verbal Learning Disabilities.
- Visual Perceptual/Visual Motor Deficit
Causes of Learning Disorders:

- It can be –
  
a. Hereditary,
b. Chromosomal abnormalities,
c. Mishap to brain nerves at the time of birth in few cases.

- Environmental factors also contribute to a person’s mental well-being,

- Prolonged depression also results in mental disorders
Learning and Cognitive Disorders-

- Learning disabilities occur as a result of neurological problems in the human body (especially brain).

- Children are the worst affected with mental disabilities.

- It interferes with their basic learning capabilities like reading and writing.
Components of ADHD

- **INATTENTION**
  - Short attention span for age (difficulty sustaining attention)
  - Difficulty listening to others
  - Difficulty attending to details
  - Easily distracted
  - Forgetfulness
  - Poor organizational skills for age
  - Poor study skills for age

- **IMPULSIVITY**
  - Often interrupts others
  - Has difficulty waiting for his or her turn in school and/or social games
  - Tends to blurt out answers instead of waiting to be called upon
  - Takes frequent risks, and often without thinking before acting

- **HYPERACTIVITY**
  - Seems to be in constant motion with no apparent goal
  - Has difficulty remaining in his/her seat even when it is expected
  - Fidgeting excessively
  - Talks excessively
  - Has difficulty engaging in quiet activities
  - Loses or forgets things repeatedly and often
  - Inability to stay on task
Research work

- Kean JD, Downey LA, Stough C- A systematic review of the Ayurvedic medicinal herb Bacopa monnieri in child and adolescent populations. Complementary Therapies in Medicine ;Volume 29, December 2016, Pages 56-62
Cognition - As Per Ayurveda

Cognition comes under the concept of :-

• Jnanotpatti
• Medha
• Buddhi
• Smriti
Ayurveda Perspective- Buddhi cognition n coordination

Various cognitive and behavioural aspects considered in Ayurveda

Mana- Mind
Buddhi- Cognition
Sandnya- Perception
Dnyana - Knowledge
Smruti- Memory
Bhatti- Beliefs
Sheela - Morality
Cheshta- Physical Movements
Achar- Behaviour

Behavioural disorders are originated from derangement of either factors due to dosha vitiation.
Cognitive functions

Cognitive functions mainly categorized into

- Memory,
- Attention,
- Creativity and
- Intelligence
Jnaanotpatti

- It involves gross objects (indriyaartha), sense organs (indriyas), buddhi, manas and atma.

- Jnaanotpathi involves the processes of perception, attention and comprehension.

- This knowledge is coded in the form of memory and used for future works or decisions.

- Recall of old knowledge or experiences is smriti. The normal functioning of smriti results in buddhi.
Process of learning

An object
↓
Cognitive organs (Five)
↓
Mind
↓
(Buddhi) Retention, perception & recall
↓
Mind
↓
Connective organs
An action

Buddhi, Sangnya, Gyana, Smruti

Mana

Chesta, Aachara

Intellect

Mind

Behaviour
Samprapti of Learning and Cognitive disorder

According to Ayurveda, learning or acquisition of knowledge is a result of successive & complex interaction and coordination of following:-

- **Indriyas** (Cognitive and Motor Organs)
- **Indriyartha** (Sense Organs)
- **Mana** (Psyche)
- **Atma** (Soul)
- **Buddhi** (Intelect)
• The functioning of these factors is governed by *Tridosha* (*Vata, Pitta and Kapha*) and *Triguna* (*Sattva, Raja and Tama*) in a specific coordination and balance.

• Any disturbance in these *Tridosha* and *Triguna* will cause disordered functioning of *Indriya, Mana* and *Buddhi* leading to impaired learning or Dyslexia.
Components of Mind

Sattva

Tamasa

Rajasa
Diet – An important cause of Cognitive Disorders

Dietary Factors and Cognitive Decline

P.J. Smith and J.A. Blumenthal

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Abstract

Cognitive decline is an increasingly important public health problem, with more than 100 million adults worldwide projected to develop dementia by 2050. Accordingly, there has been an increased interest in preventive strategies that diminish this risk. It has been recognized that lifestyle factors including dietary patterns, may be important in the prevention of cognitive decline and dementia in later life. Several dietary components have been examined, including antioxidants, fatty acids, and B vitamins. In addition, whole dietary eating plans, including the Mediterranean diet (MeDi), and the Dietary Approaches to Stop Hypertension (DASH) diet, with and without weight loss, have become areas of increasing interest. Although prospective epidemiological studies have observed that antioxidants, fatty acids, and B vitamins are associated with better cognitive functioning, randomized clinical trials have generally failed to confirm

Association between dietary behaviors and attention-deficit/hyperactivity disorder and learning disabilities in school-aged children.

Park S1, Cho SC, Hoon YG, Oh SY, Kim JW, Shin MS, Kim BN, Yoo HJ, Cho HJ, Bhang SY

Author information

Abstract

We aimed to comprehensively investigate the association between a wide range of measures of dietary behaviors and learning disabilities and attention-deficit/hyperactivity disorder (ADHD) in community-dwelling Korean children in order to generate hypotheses for future work. The present study included 986 children (507 boys, 479 girls; mean (S.D.) age = 9.1 (0.7) years) recruited from five South Korean cities. Children’s dietary behaviors were assessed by the mini-dietary assessment (MDA) for Koreans. It consists of ten items to assess the level of intake of dairy products, high-protein foods, vegetables, fried foods, fatty meals, salt, and sweetened desserts and whether the subject is eating three regular meals and has a balanced diet. Learning disability was assessed via the Learning Disability Evaluation Scale (LDES). ADHD was assessed via the Diagnostic Interview Schedule for Children version-IV and the ADHD rating scale, and ADHD-related behavioral problems were assessed via the Child Behavior Checklist. After adjusting for potential confounders, a high intake of sweetened desserts, fried food, and salt is associated with more learning, attention, and behavioral problems, whereas a balanced diet, regular meals, and a high intake of dairy products and vegetables is associated with less learning, attention, and behavioral problems. Our data suggest that existing encouraging dietary habits mostly have beneficial effects on learning, attention, and behavioral problems in Korean children. These findings are in general the same results in other studies on ADHD children in other countries. However, the cross-sectional study design prevents our ability to assess causal relationships.
The benefits and outcomes of balanced diet as per Ayurveda

तुष्टि पुष्टि धृति बुद्धि उत्साह पौरुषं बलं
सौस्वर्यं ओजस्तेजश्च..............नृणाम॥ (का.खि. ४/११-१२)

- तुष्टि (Satisfaction)
- पुष्टि (Nutrition)
- धृति (Patience)
- बुद्धि (Intellect)
- उत्साह (Enthusiasm)
- पौरुषं (Virility)
- बलं (Strength)
- सौस्वर्यं (Good voice)
- ओजो Jaja (Immunity)
Ayurvedic dietetics comprises of

**What to eat**

- Pathya aahaar (Wholesome diet)
- Shadrasyukta aahaar (Diet Comprising of 6 Rasas)
- Nitya sevaniya (Items recommended for daily intake)
- According to prakriti & season (Personalised and seasonal regimen)

**How to eat**

- Dwadash Ashan Vichaar (12 Codes of conduct for food intake)
- Ashtavidha Aahar Visheshhaayatan (8 Codes of conduct for food intake)
Ayurveda dietetics - Key concepts

Person specific:
- Agni (Digestive capacity)
- Matra (Ingestion suitability)
- Prakriti (Physical Constitution)

Food specific:
- Rasa, veerya, vipaka
- Season specificity
- Recipe Range
- Pharmaco-dietary approach
Introducing SMART Diet

Satvika
Medhya
Deepana,
Pachana
Rasayana
Medhya Rasayana concept

- दीर्घमायः समृतं मेधामारोग्यं तुरुः वयः
  परममात्त्वर्णस्वरूपाधारः देहेनदृष्टिनिविन्यम् परम् ॥७॥
  वाकसदिधि पुर्णति कान्तिः लिखते ना रसायनाः
  लाभोपायो हि शेषस्तानं स्वादीनां स्वायत्तम् ॥८॥

- मणिकपरणाम: स्वस्त: पृथवीः कष्टीरे स्वषदेशपुष्करां चूरणम्
  रसो गुडूच्यः समूलपुष्प्याः चूरणम् पृथवीः खलु शंक्पुष्पपीः ॥३०॥
  आयु: परदान्याम्यानानां बलागुरुविद्यासुरसुरविधानाः
  मेधयानां चेतानां रसायनानां मेधया वशिष्णेन च शंक्पुष्पी ॥३१॥

- Centella asiatica – Mandook parni
- Glycyrrhiza glabra – yashti madhu
- Tinospora cordifolia – Guduchi
- Convolvulus pluricaulis – Shankhapushpi

20.09.19
LD & ADHD- EAA 2019
Concept of Medha

Medhri Sangme——

Medha
Medhya Rasa

• An unique concept in ayurveda.
• Specific herbs & specific formulations designed as memory boosters & enhancers.
• E.g. Brahmi, Shankhapushpi, Yashtimadhu, Mandookparni, Guduchi etc.
Medhya Rasayanas

- Intellect
  - Buddhi, Sandhya, Gyna, Smruti
- Mind
  - Mana
- Behaviour
  - Chesta, Aachara

20.09.19
Mode of action of medhya Rasayana

• Agni-Sadhakagni- Jyotismati
• Srotasa- Haritaki,
• Micronutrient/Nourishment- Brahmi,
  Yashtimadhu
Same goal- Different Rou

Rasayan
(Immunomodulator)

- Deepan i.e. Stimulant (to agni)
  & immunomodulator
  - E.g. Haritaki, Guduchi, Pippali

- Brumhan i.e. Nourishing (body & mental faculties)
  & immunomodulator
  - E.g. Ashwagandha, Yashti, Shatavari

LD & ADHD: EAA 2019
PATHYA AHAARA

पथ्यं पथो अनपेतं यद् यच्चोक्तं मनसः पूर्यिः।
मात्रा काल क्रिया भूमो देह दोष गुणांतरम् ॥

(च.सु.२५/४६-४६)
Nitya sevaneeya dravyas mentioned by “Acharya Charaka” in Sutra sthana which includes -

“षष्टिकान् शाली मुद्गांश्च सैंधव आमलके यवान्।
आंतरिक्षम् पयः सर्पि: जांगलम् मधु च अभ्यसेत्॥” (च.सु.५/१२)

- Shashtika (Variety of rice which matures in 60 days)
- Shali (Variety of rice)
- Mudga (*Phaseolus radiatus* L.)
- Rock salt
- Amalaki (*Emblia officinalis* Gaertn.)
- Antariksha jala (Rain water)
- Ghrita (Clarified butter)
- Jangala mansa rasa (Meat of wild animals)
- Madhu (Honey)
Importance of Kaala meal timing in Dietetics

Particular seasons of the year and condition of the body also have their impact on digestive capacity as follows :-

- **Nityag** - In this Ahara is consumed according to Ritusatmya.
  
  e.g. In Hemant Ritu, the digestive power gets aggravated so heavy food substances should be taken.

  In Varsha Ritu due to cold climate vata gets aggravated hence vatashamaka sweet, sour and salty food and drinks are preferred.

- **Awasthika** - Ahara taken according to healthy or diseased condition of body.
Diet to be followed in Learning Cognitive disorders as mentioned by “Bhaishajya Ratnavali” -

• Dadima (Sweet Pomegranate)
• Shobhanjan (Drumstick tree)
• Narikela (Coconut)
• Amlaki (Indian gooseberry.)
• Haritaki (Chebulic myrobalan)
• Tila Taila (Sesame oil)
• Draksha (Grapes)
• Antariksha jala (Rain water)
Wholesome foods to be followed in Learning Cognitive disorders mentioned by “Yogratnakara”

- Godhoom (Wheat)
- Mudga (Lentil)
- Rakt shali (Red rice)
- Gau Dugdha (Fresh milk)
- Shatdhaut Ghrita (100 Times washed clarified butter)
- Old Kushmand fruit (Winter melon/curbis)
- Patola (Pointed gourd)
- Brahmi leaves (Water hyssop/gotucola)
- Vastuka (Lamb’s quarters)
- Draksha (Grapes/resins)
- Amalaki (Emlica officinale)
Herbs for Management of Cognitive Learning Disorder

Some of those herbs are as follows:

- **Brahmi** - Improves impaired mental functions.

Aindri (Bacopa monniera) commonly called as Brahmi belongs to Scrophulariaceae family.[56] It is a small, creeping marshy herb grown throughout India.[57] [Figure 5]. Most beneficial therapeutic form is macerated whole plant juice. Properties are said to be similar to that of Mandukaparni.[58] Bacopa monniera is a well-known nootropic plant reported for its tranquilizing,[59] sedative action,[60] cognitive enhancer,[61] hepatoprotective,[62] memory enhancer[63] and antioxidant actions.[64–66] Neuroprotective activity may be ascribed to having its reactive oxygen species scavenging property.[67] Bacopa monniera is a saponin rich plant.[68] Bacosides are the main active nootropic principle present in the alcoholic extract of the plant.[69]
• Mandukparni—Increases learning capabilities. Possesses stress relieving properties.

*Mandukaparni (Centella asiatica Linn.)* is a prostrate, stoloniferous perennial herb rooting at nodes.[1] [Figure 1]. Fresh whole plant juice is used for therapeutic purposes as Medhya (cognitive enhancer).[2] Major constituents are saponin (medacoside, asiaticoside, medacassoside, asiatic acid, a new triterpenic acid).[3] They act on behaviour besides being neuroprotectives.[4] brain growth promoter.[5] Dendritic arborization is supposed to be the neuronal basis for improved learning and memory.[6] Anti seizure activity may result from direct or indirect modulation of ATPase activity.[7] *Centella asiatica* inhibits the memory impairment induced by scopolamine through the inhibition of AChE.[8] BR-16A (Mentat), a formulation containing *Centella asiatica* proved for its antistress effects.[2] Methanol extract of *Centella asiatica* 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). It also exhibited DNA damage protection activity on pRSETA plasmid DNA in TE buffer (10 mM Tris-Cl and 1 mM EDTA) pH 8.0. Chloroform extract of Centella showed highest poly phenolic activity followed by methanol extracts (9.04 µg/mg, 7.7 µg/mg, 6.76 µg/mg Gallic acid equivalents respectively); while flavinoids were abundant in water extracts, followed by chloroform extracts. These two namely poly phenols and flavinoids are responsible for potent anti oxidant and terminate free radicals.[10] Extracts of Centella are used in a herbal cosmetic cream for the improvement of skin viscoelasticity and hydration.[11] A study was conducted on Menotab, an effective herbomineral preparation containing *Centella asiatica* with other drugs from the Himalaya drug company, Bangalore. Study showed that Menotab is an ideal medication for relief of postmenopausal symptoms as a short-term therapy.[12] Administration of *Centella asiatica* at 1,000 mg/kg b. wt for a period of 30 days in albino rats, showed organ specific toxicity.[13]
• **Ashwagandha** – Decreases excitatory neurotransmitters and suppresses hyperactivity in brain.

### Background

Ashwagandha, a traditional Indian herb, has been known for its variety of therapeutic activities. We earlier demonstrated anticancer activities in the alcoholic and water extracts of the leaves that were mediated by activation of tumor suppressor functions and oxidative stress in cancer cells. Low doses of these extracts were shown to possess neuroprotective activities in *vitro* and in *vivo* assays.
• **Jyotishmati** – Increases memory power.

_Jyotishmati (Celastrus panniculata)_ is a large, woody, climbing shrub with ovate or obvovate leaves found all over India. Seeds are yellowish, ellipsoid or ovoid enclosed in a scarlet aril[77] [Figure 6]. Seed oil (Jyotishmati Taila) is known for Medhya action.[78] This oil contains several terpenoids like paniculatadiol, b-sitosterol, celastrol, b-amyrin, pristimerin, but its most investigated components are its many sesquiterpenoids, dihydroagarofuran-type polyols or esters.[79] _Celastrus paniculata_ showed antioxidant activity by decreasing the lipid peroxidation[80] and anti-arthritis activity in rat model.[81] Seed oil of _Celastrus panniculata_ (Malkangni) reversed scopolamine-induced deficits in navigational memory task in young adult rats.[82]
Guduchi (Tinospora cordifolia (Wild) Miers) is a large glabrous, deciduous, climbing shrub of Menispermaceae family found throughout tropical India[30] [Figure 3]. Juice of whole plant is used therapeutically as Medhya.[2] It is also used in the form of decoction, powder and Satwa (starch extract of stem). Its root is known for its anti stress, anti-leprotic and anti-malarial activities.[31,32] Chemical constituents’ classes are alkaloids, diterpenoid lactones, glycosides, steroids, sesquiterpenoid, phenolics, aliphatic compounds and polysaccharides.[33] Neuroprotective and ameliorative properties are due to their antioxidant and trace element contents.[34] Tinospora cordifolia 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.[35] It increases the blood profile and has lead scavenging activity.[36] Tinospora cordifolia has been claimed to possess learning and memory enhancing, [37] antioxidant,[38,39] and anti-stress activity.[40] Tinospora cordifolia enhanced the cognition in normal and cognition deficits animals in behavioural test Hebb William maze and the passive avoidance task.[41] Mechanism of cognitive enhancement is by immunostimulation and increasing the synthesis of acetylcholine, this supplementation of choline enhances the cognition.[42] Myriad actions of Guduchi may be attributed to its antioxidant[43,44] and immunomodulatory properties.[45]
• **Vacha** – Useful in clearing speech of children.

*Vacha (Acorus calamus)* of Araceae family is a semiaquatic, perennial, aromatic herb with its rhizome being horizontal, rounded, somewhat vertically compressed, spongy and leaves grass like and sword shaped; grown all over India[89] [Figure 8]. Rhizome is useful part having Medhya quality. It has been used in Indian and Chinese system of medicine for hundreds of years to cure diseases especially the central nervous system (CNS) abnormalities.[90–93] Active chemical principles are α-asarone, elemicine, cis-isoelemicine, cis and trans isoeugenol and their methyl ethers, camphene, P-cymene, b-gurjunene, α-selinene, β-cadinene, camphor,terpinen-4-ol, aterpineol and a-calacorene, acorone, acrenone, acoragermacrone, 2-deca-4,7 dienol, shyobunones, linalool and preisocalamendiol. Acoradin, galangin, 2, 4, 5- trimethoxy benzaldehyde, 2,5- dimethoxybenzoquinone, calamendiol,spathulenol and sitosterol are also present 2.[94,95]

It has been proved for its analgesic and anticonvulsant,[96] hepatoprotective,[97] antioxidant,[98,99] antimitogenic,[100] sedative and hypothermic effects.[101] Good in clearing speech to the children[102,103] and useful in schizophrenic psychosis.[104]
Sadavritta (Code of Conducts to be Followed)

Acharya Charaka has mentioned Sadavritta in Sutrasthana.

• If one does not follow Sadavritta regimen, it leads to development of Psychosomatic disturbances.

• Several practices have been mentioned under Sadavritta.
Sadavritta regarding taking diet:

- One should not take staled food.
- One should not take curd at night.
- One should not take roasted-grain-flour without mixing it up with ghee and sugar or in the night or after meals or in large quantity.
- .
Take Home Message

- Diet plays an important role in health and disease.
- Ayurveda focuses on consumption of a diet which is wholesome for body and mind.
- The diet should be according to Prakriti (individual), Kala (season), Agni (Digestive fire) and Desha (Place).
- There is direct relation of Diet with Mental faculties.

*Aahara Shuddo Satva Shuddi, Satva Shuddo Dhruva Smriti*

- Good diet taken with dietary code and conducts, daily routine, specific procedures in seasonal regimen, dietary changes and behavioral codes may help to enhance the mental capacity.

- Specific Medhya Herbs are also helpful for enhancing cognitive power.
Research paper on Evaluation of Brāhmī ghṛtam in children suffering from Attention Deficit Hyperactivity Disorder

Abstract

Introduction:
Attention Deficit Hyperactivity Disorder (ADHD) is characterized by a persistent pattern of inattention and/or hyperactivity-impulsivity. In view of the adverse effects associated with psycho-stimulants used for the treatment of this disorder, efficacy of Brahmī ghṛtam was evaluated in this condition.

Materials and Methods:
After following due ethical considerations, children of either sex between the age group of 6 and 12 years diagnosed to be suffering from mixed variety of ADHD as per The Diagnostic and Statistical Manual of Mental Disorders (DSM) IV criteria irrespective of other co-morbid psychiatric illnesses were recruited in the study. Initially a pilot study \( (n = 10) \) was carried out to confirm the efficacy of the identified dose of Brāhmī ghṛtam. Using this dose, further therapeutic confirmatory study \( (n = 27) \) was carried out, wherein Brahmī ghṛtam was compared with methylphenidate. Effect on ADHD symptoms was assessed using the DuPaul ADHD rating scale and this was the main efficacy parameter.

Results:
In the pilot exploratory study, Brahmī ghṛtam showed 66% decrease in total ADHD score. In the therapeutic confirmatory study, only 16% improvement was seen with Brahmī ghṛtam, which was similar to methylphenidate, standard treatment for ADHD that was used as a comparator in the present study. No side-effects were reported in both studies.

Conclusion:
Our study thus has adequately demonstrated efficacy and safety of Brahmī ghṛtam in ADHD.

KEY WORDS: DuPaul Attention Deficit Hyperactivity Disorder rating scale, psychometry
THANK YOU!

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