

ALZHEIMER'S DISEASE : AN AYURVEDIC PERSPECTIVE

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ABSTRACT:

Alzheimer's disease is a progressive Neuro-degenerative disorder in which a gradual decline in the memory along with one area of higher intellectual function is involved. Although AD develops differently for every individual, there are many common symptoms. Early symptoms are often mistakenly thought to be 'age-related' concerns or manifestations of stress. According to Ayurveda, *tridosha* (humours) and *triguna* (mental humours) are the main cause for maintenance of health and manifestation of diseases, learning or acquisition of knowledge is a result of successive and complex interaction and coordination of *Indriyas* (cognitive and motor organs), *Indriyarth* (sense organs), *Mana* (psyche), *Buddhi* (intellect) and *Atma* (soul). Ayurvedic drugs can help in the management of Alzheimer's by making the *Tridosha* and *Triguna* in a well-balanced state and also by providing *Medhya* (intellect promoting) effect to improve the memory of the patients. Drugs mentioned as *Medhya* (intellect promoting) and those indicated to improve cognitive functions can be used successfully in cases of Alzheimer's disease.

Key Words: Alzheimer's, Mana, Indriya, Atma, Medhya.

INTRODUCTION:

Alzheimer's disease is a progressive Neuro-degenerative disorder in which a gradual decline in the memory along with one area of higher intellectual function is involved. The domains affected are cognition, daily functioning and behavior. The cognition includes memory orientation and judgment^[1]. Alzheimer's disease is the most common form of dementia, among middle-aged and older adults.

Although AD develops differently for every individual, there are many common symptoms^[2]. Early symptoms are often mistakenly thought to be 'age-related' concerns, or manifestations of stress^[3]. In the early stages, the most common symptom is difficulty in remembering recent events, known as short term memory loss. When AD is suspected, the diagnosis is usually confirmed with tests that evaluate behaviour and thinking abilities, often followed by a brain scan if available^[4]: however, examination of brain tissue is required for a definitive diagnosis. As the disease advances, symptoms can include confusion, irritability, aggression, mood swings, trouble with language, and long-term memory loss. As the person's condition declines they often withdraw from family and society.^[5] Gradually, bodily functions are lost, ultimately leading to death^[6].

According to Ayurveda, learning or acquisition of knowledge is a result of successive and complex interaction and coordination of *Atma*, *Indriyas* (cognitive organs), *Mana* (psyche) and *Indriyarth* (sense organs)^[7]. 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^[8]. Any disturbance in these *Tridosha* and *Triguna* will cause disordered functioning of *Indriya*, (cognitive and motor organs) *Mana* (psyche) and *Buddhi* (intellect) leading to impaired memory^[9]. Ayurvedic drugs can help in the management of Alzheimer's by making these *Tridosha* and *Triguna* in a well-balanced state and also by providing *Medhya* (intellect promoting) effect to improve the memory of the patients.

OBJECTIVES:

1. To analyse and understand the Alzheimer's Disease in Ayurvedic perspective.
2. To review the Ayurvedic herbs acting on the Alzheimer's disease.

METHODS:

Literary sources

All major text book of Ayurveda were used for literary

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survey and different websites and the various journal references were analyzed and used for the study.

Tridosha's and Cognitive Functions

Dosha's play vital role in maintaining cognitive functions. Any factors that impair the *shareerika bhava's* (physical factors) will affect the *Manasika bhava's* (mental factors) also. *Vata* regulates the proper functioning of the *Buddhi* (intellect), *Indriya* (cognitive and motor organs) and *Manah* (psyche). While *pitta* (body humour) enhances *Medha* (intellect) and *Kapha* (body humour) nurture *dhee* (intelligence), *dhriti* (fortitude) and *smrithi* (memory). Thus the normalcy of *tridosha* (bodily humours) is essential for maintaining the cognitive functions^[10].

Causative Factors for Good Memory

Charaka samhita narrates eight factors for improving the memory, namely, *nimitta* (knowledge of cause and effect), *rupagrahanth* (knowledge of form), *saadrashya* (knowledge of similarity), *saviparyayat* (knowledge of contrast), *sattvanubandha* (knowledge of mind), *abhyasa* (repetition), *jnana yoga* (attainment of metaphysical knowledge) and *punahshrutat* (subsequent partial communication), repeated practice of above said factors will improve *smriti* (memory)^[11].

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In Ayurvedic classics there are mounting evidences regarding the drugs and compounds which are indicated in various domains of cognitive deficits. The four *Medhya Rasayana* viz., *Mandukaparni* (*Centellaasiatica*), *Shankhapushpi* (*Convolvulus pluricaulis*), *Madhuyashti* (*Glycyrrhiza glabra*) and *Guduchi* (*Tinospora cordifolia*) are especially mentioned as intellect promoting drugs. Also various compound preparations like *Smriti sagara rasa*, *Vachadi Ghrita*, *Sarasvatha arista*, *Brahmi ghrita*, *Manasamitravati* and *kushmanda avaleha*. These drugs can be used to enhance the memory power in the diseased. Various clinical and experimental studies with these Ayurvedic nootropic drugs provide evidences regarding improvement in cognitive functions and intellect promoting which may be helpful in improving the memory. The review is based on the principle that the results of clinical studies providing evidences can be

applied to manage the different conditions of cognition and memory deficits.

DRUGS USED TO IMPROVE MEMORY AND COGNITIVE FUNCTIONS

1) *Brahmi* (*Bacopa Monniera*)

In an experimental study, neonatal rat pups 10-day-old were given different doses of *Bacopa monniera* (BM) extract orally for different periods of time. These rats were then subjected to spatial learning (T-maze) and passive avoidance tests along with the age matched normal and gum acacia control rats. The data were compared with those of control rats. The result showed improvement in spatial learning and enhanced memory performance in neonatal rats treated with extract of BM. The result provides evidence that treatment with BM extract during growth spurt period of neonatal rats enhances learning and memory^[12].

In a study, 61 subjects of both sexes with an age range of 62 to 75 years were selected. Twenty eight aged had cognitive deficits particularly the memory loss. Where as 33 subjects were normal aged. The subject of both group were treated with organic extract of BM in effective doses continuously for 6 months and evaluated on various neuropsychological parameters. The results obtained at the end of 6 months revealed beneficial effect in improving memory and attention span and also associated behavioural problems among demented elderly people. The neuron chemical loss was checked and enhanced in senile dementia cases. The test drug has potentiality to improve memory and other cognitive deficits among the aged suffering from dementia and associated behavioural problems^[13].

In a clinical study on the effects of *Brahmi* (BM) on human memory, 76 adults aged between 40 and 65 years took part in a double blind randomized, placebo control study in which various memory functions were tested and levels of anxiety measured. The results showed a significant effect of the BM on a test for the retention of new information. Follow up tests showed that the rate of learning was unaffected suggesting that BM decreases the rate of forgetting of newly acquired information^[14].

BM: Also demonstrated a significant memory promoting effect in animal models of Alzheimer's disease^[15].

2) *Mandukaparni* (*CentellaAsiatica*)

In an experimental study, fresh *centella asiatica* plant extract was given orally to rat pups (n = 5), from P7-P49 (6 weeks, 2 ml/kg/day). These and age matched normal control (n = 5) rats were subjected to learning tests in T-maze and passive avoidance test. Following this, rats were sacrificed and amygdaloidal nucleus was

processed for Golgi staining. Results showed a significant increase in the percent correct response (control: 86.44 + 2.33% vs. Expt. 93.44 + 3.90%) in plant extract-treated rats. Passive avoidance retention test revealed a significantly memory retention, dendritic intersection was significantly increased at all concentric circles, except at 100 µm. Dendritic branching points also significantly increased in the inner three zones. These results indicate a correlation between improved learning capacity and increased dendritic arborisation in amygdaloid nucleus. This may be the neural basis for enhanced learning in *C. asiatica*-treated rats^[16].

Subfractions of *C. asiatica* ethanolic extract were tested (100 µm mL – 1) for neurite elongation in the presence of nerve growth factor (NGF). Greatest activity was found with a nonpolar fraction (GKF4). Relatively polar fractions (GKF 10 and GKF 13) also showed activity, although less than GKF4. The findings indicate that components in Centella ethanolic extract may be useful for accelerating repair of damaged neurons^[17].

Treatment during postnatal developmental stage with *C. asiatica* extract can influence the neuronal morphology and promote the higher brain functions of juvenile and young adult mice^[18].

Treatment with *C. asiatica* fresh leaf juice during growth spurt period of neonatal rats enhances memory retention^[19].

An aqueous extract of *C. asiatica* is effective in preventing the cognitive deficits, as well as the oxidative stress^[20].

3) *Madhuyashti (GlycyrrhizaGlabra)*

To investigate the effect of *Glycyrrhiza glabra* on learning and memory, the elevated plus- maze and passive avoidance paradigm were employed to evaluate learning and memory parameters. Three doses (75, 150 and 300 mg/kg p/o) of aqueous extract of *G. Glabra* were administered for 7 successive days in separate groups of mice. The dose of 150 mg/kg of the aqueous extract of liquorice significantly improved learning and memory of mice. Further more, this dose reversed the amnesia induced by diazepam 1 mg/kg i.p.), scopolamine (0.4 mg/kg i.p) and ethanol (1 mg/kg i.p)^[21].

4) *Shankhapushpi (Convolvulus Pluricaulis)*

Shankhapushpi (C.pluricaulis) induces an increase in brain protein content thus increasing acquisition efficiency^[22].

5) *Jatamansi (Nordostachys Jatamansi)*

Rats were fed with *N. Jatamansi* for 15 days resulted significant increase in the levels of NE, DA, 5-HT,

5-HIAA and GABA. These data indicate that the alcoholic extract of the roots of *N. Jatamansi* causes an overall increase in the levels of central monoamines and inhibitory amino acids^[23].

6) *Ashwagandha (Withania Somenifera)*

In an experimental study, daily administration of *Ashwagandha* root extract (50, 100 and 200 mg/kg orally) for 6 days significantly improved memory-consolidation in mice receiving chronic electro convulsive shock (ECS) treatment. *Ashwagandha* administered on day 7, also attenuated the disruption of memory consolidation, produced by chronic treatment with ECS. On the elevated plus maze *Ashwagandha* reversed the scopolamine (0.3 mg/kg) induced delay in transfer latency on day 1. On the basis of these findings it is suggested that *Ashwagandha* exhibits a nootropic-like effect in naive and amnesic mice^[24].

7) *Guduchi (TinosporaCordifolia)*

An experimental study undertaken with the objective of studying the effect of *T. cordifolia* (Tc) on learning and memory in normal rats and on cyclosporine-induced memory deficits, both alcoholic and aqueous extract of *T. cordifolia* enhanced the cognition in normal rats as were seen in behavioral tests-Hebb William maze and the passive avoidance task^[25].

8) *Jyotismati (CelastrusPaniculatus)*

Ethanol extract of *C. paniculatus* was administered at the rate of 2 g/kg body weight orally 16 days before trial experiment in male Wister albino rats of 3, 12 and 20 months old animals. They were studied for learning and memory process as well as for any change in the serum biochemistry. All animals were trained on Y-maze. Each animal received a daily session of 10 trials for 5 days i.e., a maximum of 50 trials. Increase in response of 5th session as compared to 1st session was taken as criteria of learning and memory. There was a significant increase in learning and memory in the treated group with respect to its control. Results showed that *C. paniculatus* preferentially affects learning and recall of memory and also regulate the serum biochemistry^[26].

Diagnostic aspects of Alzheimer's disease as per Ayurveda

Depending on the *lakshanas* (signs and symptoms) exhibited by the patient diagnosis should be done, patient complaining of *smritinasha* (loss of memory), weakness in perception of subjects and loss of concentration in daily activities due to *nidana sevana* (etiological factors) and other predisposing factors. AD falls under the category of *jara* (old age) it is swabavika

roga (natural), during *jara*, Vata vikrutha lakshanas are seen, these *lakshans* (signs and symptoms) help in diagnosis of AD.

Management of AD

There is no cure for Alzheimer's disease; available treatments offer relatively small symptomatic benefit but remain palliative in nature. Current treatments can be divided into pharmaceutical, psychosocial and care giving.

Medications: Three-dimensional molecular model of donepezil, an acetylcholinesterase inhibitor used in the treatment of AD symptoms, four are acetylcholinesterase inhibitors (tacrine, rivastigmine, galantamine and donepezil) and the other (memantine) is an NMDA receptor antagonist^[27].

Psychosocial intervention

A specifically designed room for sensory integration therapy, also called snoezelen; an emotion oriented psychosocial intervention for people with dementia Psychosocial interventions are used as an adjunct to pharmaceutical treatment and can be classified within behaviour, emotion, cognition or stimulation-oriented approaches^[28].

Care giving

During the early and moderate stages, modifications to the living environment and lifestyle can increase patient safety and reduce care taker burden^[29].

Ayurvedic treatment

The drugs which enhance memory and cognitive power should be administered. AD affects in older age, so *Basti* (medicated enema) will be more beneficial apart from this as per *lakshanas* of the patient treatment modality differs. *Rasayanas*, *shirodhara* and *shiropichu* are beneficial.

DISCUSSION:

Medhyarasayana^[30] are extensively used for the ailments of mental and cognitive disorders, the four *Medhya Rasayana* viz., *Mandukaparni* (*Centellaasiatica*), *Shankhapushpi* (*Convolvulus pluricaulis*), *Madhuyashti* (*Glycyrrhiza glabra*) and *Guduchi* (*Tinospora cordifolia*) are especially mentioned as intellect promoting drugs. The mode of action of *Rasayana* drugs and its benefits were discussed in the present article.

Why Rasayana?

Rasayana is considered as an appropriate choice because of the following facts:

- It corrects the structural deformity of the *Dhatus* (tissues) there by normalizing their functions.

- Prevent the instinct of recurrence.
- Prevent occurrence of secondary disease.
- Prevent early aging process.

Four folds of *Rasayana*

- Maintenance of Positive Health
- Improvement of 3 mental Faculties *Dhee- Dhruthi - Smruti*
- Resistance against Disease
- Longevity

Drugs helping in learning and memory

Rasayana oushadhas are not having a common *rasa* (taste), *veerya* (potency) or *guna* (qualities) but all are *deepana* (appetizers) and *Srotosodhana* (cleans the channels). Normal functioning of *srotas* (channels) depends on healthy *dhatu*s (tissues). *Sroto soushtava* (normalcy of *dhatu*s) is highly essential to convey the nutrients to each and every cell. *Shodhana* (purificatory therapies) therapy acts at the level of *doshas* (humours) but *rasayana* drugs acts still deeper that is at the level of *dhatu*s (tissues). Hence in deep seated disease where severe vitiation of *dhatu*s (tissues) occurs such as AD, *rasayana chikitsa* is the regemin of choice.

Rasayana Therapy- How it works?

The possible mechanism of action of *Rasayana* drugs:

- Nutraceutical action- nourishes and maintains the cell life.
- Regenerative action – encourages the growth of new cells.
- Immuno-modulatory action – prevents recurrent infections expelling the damaged cells.
- Antioxidant action – eliminates the toxic metabolites and pollutants.
- Adaptogenic – maintains the balance between mind and body.

Thus it may be postulated that *rasayana* drugs acts at the subcellular level.

CONCLUSION:

AD is classified as a neuro-degenerative disorder. The cause and progression of the disease are not well understood; it is associated with plaques and tangles in the brain. Current treatments only help with the symptoms of the disease. According to Ayurveda, learning is a result of successive and complex interaction and coordination of *Indriyas* (cognitive and motor organs), *Indriyarthas* (sense organs), *Mana* (psyche), *Atma* and *Buddhi* (intellect). Drugs mentioned as *Medhya* (intellect promoting) and those indicated to

improve cognitive functions can be used successfully in cases of AD. The review indicates the Ayurvedic drugs like *Brahmi*, *Mandookaparni*, *Shankhapushpi*, *Jyotishmati*, *Ashwagandha*, *Jatamansi*, *Madhuyashti* and *Guduchi* have the potential to provide a significant improvement in memory and learning capacity of the elders suffering from AD. All these drugs improve the brain functions and also the sensory and motor systems as a result of their *medhya* properties and thereby can help in management of various cognitive disorders mainly AD.

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