REVIEW ARTICLE

A brief insight into the pathogenesis and management of Alzheimer's disease in Ayurvedic parlance

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Abstract

Alzheimer's disease (AD) is the most important of all the degenerative diseases of the nervous system comprising about 50-70% of dementias characterized by progressive impairment of the cognitive functions. It is clearly an age-related disorder more frequent after middle age. More than 90% of cases of AD are sporadic and occur in individuals older than 60 years. Insidious and subtle onset of the disease is presented by disturbances of the higher cortical functions with memory impairment. The situation gradually worse, and finally, the patient becomes totally department. Ayurveda has explained three methods for understanding specific characteristic of a disease through authoritative instruction, direct observation, and inference, which can be employed to analyze AD. In Ayurveda, disease involving mental faculties has been broadly classified into two through, those affecting intellectual capacities (*buddhinasa*) and those affecting consciousness (*sanja nasa*) under the headings of *Unmada* and *Apasmara*. By utilizing the classical versions of *Unmada* and *Atatwabhinivesa*, a probable pathogenesis of Alzheimer's can be formulated by Ayurveda methodology. An attempt is made in the current paper to explore the pathogenesis of AD in ayurvedic parlance and to modulate an effective line of management.

Key words: Alzheimer's disease, Atatwabhinivesha, *Unmada*

INTRODUCTION

Alzheimer's disease (AD) is a complex neurodegenerative disorder with major clinical hallmarks of memory loss, dementia, and cognitive impairment, comprising about 50-70% of dementias.[1] However, only one in four people with AD has been diagnosed.[2] AD is initially thought to represent relatively uncommon of pre-senile dementia, but later became clear that it can occur at any decade of adulthood. More than 90% of cases of AD are sporadic and occur in individuals older than 60 years. Familial cases constitute less than 10% of AD overall.[3] AD deserves special attention because it bags a big amount of current annual cost of caring for patients with dementia, which is equivalent to 1% of the entire world's gross domestic product.[2]

AD is characterized by memory impairment as a prominent and early feature, and on advancing profound, cognitive impairment which leads the patient to be totally dependent.[4]

In Ayurveda, disease involving mental faculties has been broadly classified into two namely, those affecting intellectual capacities (*buddhinasa*) and affecting consciousness (*sanja nasa*). The persons who are generally predisposed as having *avarasara* (inferior excellence) of *majja* (bone marrow) and *satwa* (quality of mind) are susceptible to AD.

Available management in modern medicine is effective in reducing some aspects of cognitive decline, but they do not greatly influence the course of the disease. However, the holistic and medicinal approach in Ayurveda offers some possibilities to slow down the cognitive and pathological

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changes of AD, thereby restoring the normal brain function in affected patients.

An attempt is made in the current paper to explore the pathogenesis of AD in Ayurvedic parlance and to modulate an effective line of management.

MATERIALS AND METHODS

Classical books on Ayurveda and modern medicine, journals, and e-publications were consulted for the present work.

OBSERVATIONS

Etiopathogenesis of AD

The cause of AD is unknown. Converging environmental and genetic risk factors trigger a pathophysiologic cascade, over decades, leads to Alzheimer pathology and dementia.[5]

Risk factors

The role of genetic factors is understood to play a part in the development of the disorder in around 40% of patients who are having a positive family history. Mutations in genes such as amyloid precursor protein gene on chromosome 21 or presenilin 1 gene on chromosome 14 or presenilin-2 gene on chromosome 1 unequivocally cause early-onset autosomal dominant AD.[6]

Although so many risk factors for AD are identified, the age-related risk factor cause early, progressive, and is related to glial dysfunction. Glial dysfunction and myelin breakdown occur as early as midlife and progress over the next 30-40 years.[7] An increasing body of evidence suggests that glial cells, namely astrocytes, microglia, NG2 glia, and oligodendrocytes, play an important role in the pathogenesis of disease.[1] Midlife hypertension is another established risk factor.[8]

Pathophysiology

A continuum exists between the pathophysiology of normal aging and that of AD.[9] The disease affects three processes that keep neurons healthy: Communication, metabolism, and repair.[9] Pathologically, in AD, there is gross diffuse atrophy of the cerebral cortex with secondary enlargement of ventricular system. The microscopic findings are senile plaques, neurofibrillary of tangles, neuronal loss (particularly in cortex and the hippocampus), synaptic loss (perhaps as much as 50%), and granulovacuolar degeneration in the cortex.[10] In this, plaques develop in the hippocampus, a structure deep in the brain that helps to encode memories, and in other areas of the cerebral cortex that are involved in thinking and making decisions. Whether the plaques themselves cause AD or whether they are a by-product of the AD process remains unknown.[11]

Pathogenesis of AD - An Ayurveda view

Ayurveda, while explaining the effects of aging on decades, describes the loss of "*Medha*" (cognitive ability) by the end of 4th decade and loss of *manashakti* (mental strength) and *budhi* (intelligence) by the end of 9th decade.[12] *Medha* is the capacity to grasp or earn new information for storage.[13] *Mana* (mind) and *budhi* are terms for intellectual capacities. Ancient Ayurvedic Scholar, Charaka has noted the psychological changes after 60 years as a diminution of body tissues, strength of sense organs, energy, valor, power of understanding, retention, and memorizing and analyzing facts, which substantiate the aging theory in AD.[14]

Since AD is not a disease having cardinal symptoms such as unconsciousness (*Apasmaranth*), paroxysmal attack (*Vega*), and convulsions (*Beebhatsa chestha*), the *Apasmara* type of pathogenesis can be ruled out. An independent pathology can be formulated by tracing the different textual descriptions of *Unmada* (insanity), *Atatwabhinivesa* (obsessive compulsive disorders), *mada* (intoxication), *murcha* (fainting), and *sanyasa* (coma).

Six cognitive domains that are commonly disturbed in AD are memory, executive functioning, language, visuospacial functioning, attention, and affect. Of these, memory impairment is the central problem, especially short-term/working memory.[15] Memory impairment is of two types, to learn the new information and to recall previously learned information (diagnostic and statistical manual).[16] Mechanism of memory is done by a comprehensive physiology of *indriyas* (sensorium), *mana* and *atma* (soul). *Atma* perceives information using *mana* (mind), *budhi* (intellect), *jnana* and *karmendriyas* (cognitive and conative sense organs). The collected information is stored by *samskara* (processing) in the form of *smriti* (memory). *Smriti* is explained as a remembrance of things directly perceived, heard, or experienced earlier, which is the property of *atma*.[17] *Indriyas* are controlled by *mana,* and *mana* is itself under the control of *vata.*[18] *Vata* restrains and impels mental faculties, coordinates sense faculties, and prompts speech. On aging, *vata* (body humor) gets vitiated which leads to improper functioning of mental faculties leads to humility and delirium.[19] With the vitiation of *vata dosha, alpasmrthi* (impaired memory) develops.[20]

AD vis-a-vis Unmada

Unmada is characterized by *vibhramsa* (perversion) of *mana, budhi, sanja* (consciousness), *smrithi, bhakti* (desire), *sheela* (manner), *chesta* (behavior), and *achara* (conduct).[21] In the early stages of AD, *smriti bhramsa* (memory loss) is the main symptom. As the disease progresses cognitive function interface with daily activities due to *vibhramsa* of other faculties. It is tabulated in chronological order as

Table 1: Symptomwise analysis of AD

S. No.	Symptoms	Faculty impaired
1	Memory loss	*Smriti bhramsa*
2	Language impaired and word finding difficulty (aphasia)	*Smrthi bhramsa*
3	Frustration and anxiety in some patients having anosognosia	*Sheela vibhramsa*
4	Difficulty in sequential motor act like dressing, eating, etc., the slowness and awkwardness of movement (apraxia)	*Cheshta vibhramsa*
5	Hallucinations and delusions, e.g., not recognizing an old friend, thinks visitor a burglar	*Budhi vibhramsa*
6	Help needed for the simplest tasks like eating, dressing, toileting, etc.	*Chesta vibhramsa*
7	Complete loss of judgment, confusion, insight often lost	*Budhi vibhramsa*

shown in Table 1. In *Unmada,* the involvement of different mental faculties is almost altogether or in a rapid sequence. However, in AD, the onset is very subtle and insidious, slowly progresses with disturbance of higher cortical functions, gradually worsen, leading to the patient totally dependent.

AD vis-a-vis Atatwabhinivesha

Lack of *smriti* can be attributed due to the *samvarana swabhava* (obscuring nature) of *thamas*.[22] *Rajas*, *thamas,* and *satwa* are the qualities of mind, the proportion, and interplay of which determine the character of a person. *Budhirnirodha* (impaired cognitive functions) is also a *thamasika* quality.[23] There is an eternal union between the *rajas* and *thamas. Thamas* cannot manifest its actions without *rajas*.[24] *Vata* is described as *rajobahula* (excessive *rajas*).[23] When functioning of *vata* in the *vatavahasiras* is clear, *budhikarmas* (intellectual functioning) becomes intact.[25] On aging, *vata* gets increased in the body compared to other *doshas* which leads to comparative *rajovrdhi* (increased *rajas*) in mind. Due to the eternal union nature of both psychic *doshas, tamas* also get imbalanced by *rajovridhi.* Pathologically, *rajastamovridhi* (increased *rajas* and *tamas*) and subsequent *avarana* of *budhi* and *mana* happen when the *rasavaha, raktavaha,* and *sanjavaha strotas* (channels conducting nutrition, oxygenation, and sensation) get obstructed.[26] This is an acute pathogenesis and consciousness is affected. On the contrary, in the context of *Atatwabhinivesa,* the same samprapti is happening in a chronic manner, and cognitive functions are affected.[27] In *smriti, vibhramsa* also impairment is happening in *tatwajnana*.[28] Comparing with AD, it is having a lengthier and slower course of pathogenesis than that of *Athawabhinivesha*.

By comprehending the above points, the pathogenesis of AD can be formulated as shown in Figure 1.

Management of AD

According to modern science, management of AD is difficult and frustrating because there is no specific treatment and the main focus is on the long-term amelioration of associated behavioral and neurological problems. Here, Ayurveda can offer better care, on preventive as well as promotive aspects of health, of the patient. Persons having familial trends of the disease can adopt ayurvedic medication in an early adulthood itself to prevent the possibility of the disease.

The treatment of *Atatawabhinivesa* can be effectively employed for the management of AD. The patient should be undergone oleation and fomentation, followed by purificatory treatments and *samsarjanakrama* (specific dietetics). The dietetics of the patients should be having *medhya* (intellect promoting) qualities. *Medhyarasayanas* (herbal intellect rejuvenators) should be administered along with sympathetic care and mental support. Here, *rasayana* therapy deserves special mention as it provides longevity, memory, intellect freedom from diseases, youth, excellent potentiality of body, and sense organs.[29] Charaka mentions juice of *Mandookaparni* (*Centella asiatica* Linn.) powder of *Yashtimadhu* (*Glycyrrhiza glabra* Linn.) juice of *Guduchi* (*Tinnospora cordifolia* Willd.) Miers and paste of *Shankhupushpi* (*Convolvulus pluricalis* Linn.) as *medhya rasayanas,* out of which *Shankhupushpi* is explained as drug par excellence for the promotion of *Medha* (intellect). Formulations such as *Panchagavya ghrita, Brahmi rasayana,* and *Triphala rasayana* can be effectively utilized.[30] *Jivaniya* as well as *ojovardhaka* drugs helps in slowing down of the degeneration of *dhatus* and promotes immunity. *Panchakarmas* including *sirodhara, sirolepana, pizhichil,* and *nasya* gives excellent results.

DISCUSSION

Ayurveda has explained three methods for understanding specific characteristics of a diseases, namely, authoritative instruction, direct observation, and inference.[31] By utilizing the classical versions of *Unmada* and *Atatwabhinivesa,* a probable pathogenesis of Alzheimer's can be formulated on the basis of these ayurvedic methodologies.

- *Prakopa* (provoking factors) - *Ruksha* (dry), *khara* (rough) *gunas* due to *vaya* (age)
- *Adibalapravarthi* (heriditory predisposition)
- *Mithyaharavihara* (faulty dietaryhabits and regimens)
- *Yoni* (*doshas* involved) - *Raja* and *tama, vata* predominant
- *Uthana* (mode of manifestation) - *Smriti vibhransha* (forgetfulness)
- *Atmana* (mode of onset and seriousness) - *Chirakari* (chronic) and *dharuna* (serious)

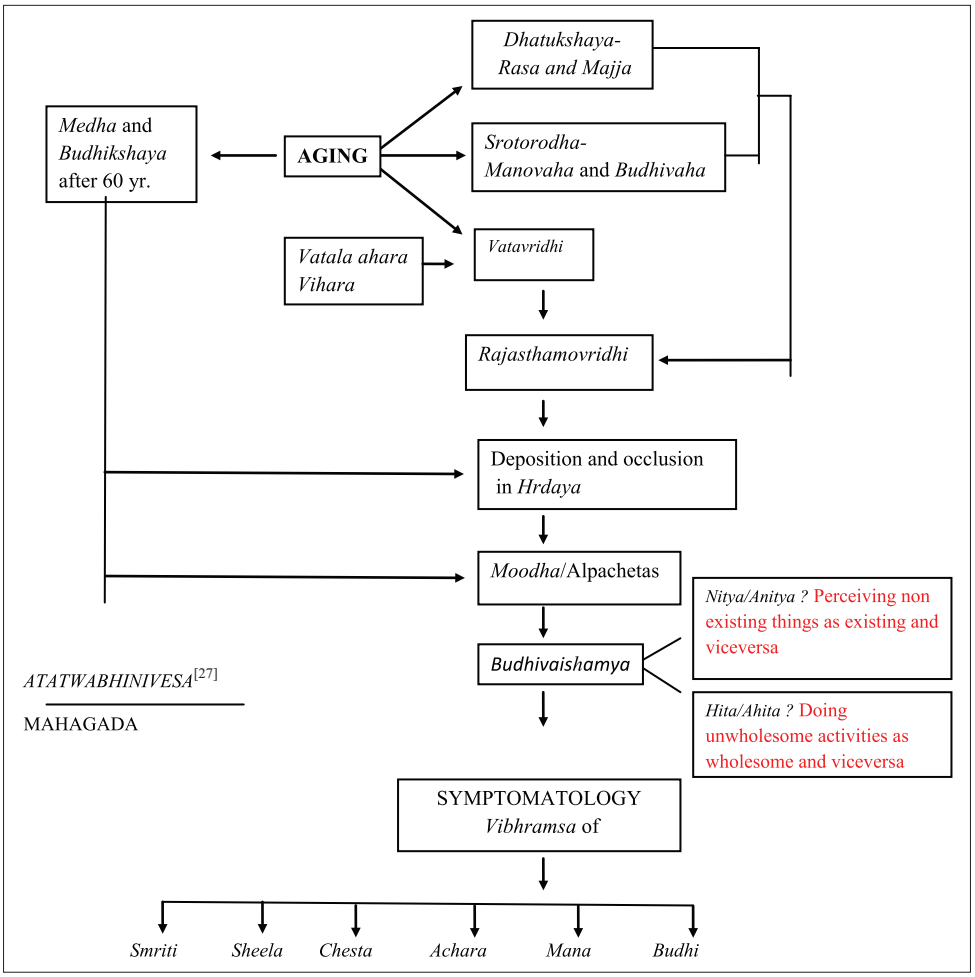

Figure 1: Pathophysiology of *Atatwabinivesa*

- *Adhisthana* (location) - *Mana* (mind) and *indriya* (sensorium)
- *Vedana* (pain) - Not specific
- *Samsthana* (symptoms) - *Buddhinasa* (cognitive impairment) *moodhata alpachetasa, moha, krodha vishada, cheshta vibhramsa*
- *Vridhi* (aggregating factors) - *Vata* vitiating factors, *chinta, bhaya* etc., age
- *Kshaya* (relieving factors) - *Satwana* (caring + support)
- *Medhya rasayanas*
- *Udaraka* (prognosis) - *Marana* (death)
- *Nama* (nomenclature) - *Atatwabhinivesha.*

CONCLUSION

The following conclusion can be drawn from this study.

1. The pathogenesis of AD can be better understood in terms of *Atatwabhinivesa*. The symptomatology can be analyzed by splitting the involvement of different mental faculties in terms of *Unmada*.
2. Ayurveda can offer better management for AD in preventive as well as promotive aspects by routine purificatory treatments and *medhyarasayanas*.

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