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Role of lifestyle as a modifiable risk factor in the development of alzheimer's disease- a literary review.

Madhuri Prakash Kubal, Assistant Professor (Dept. Of Swasthavritta), K.G. Mittal Ayurved college, Mumbai, Maharashtra.

Author Correspondence: Mob. No. 8452900646 Email ID- maddykubal22@gmail.com

ABSTRACT

Alzheimer's disease is a progressive neurodegenerative condition, primarily affecting the elderly, that impacts memory, cognitive abilities, and behavior. The challenges posed by this disease not only deteriorate personal health but also place a significant strain on public health systems. Evaluating changeable risk factors associated with Alzheimer's is essential for preventing or postponing the development of the disease. **Objective-** To evaluate the association of lifestyle in the development Alzheimer's disease. **Methodology-** Medial literature related to Alzheimer's disease, medical journals, e-publications as well as Ayurveda classics been scrutinized to review interrelation of lifestyle and Alzheimer's disease. **Results-** Evidential studies entangles cardiovascular, cerebrovascular disease, Diabetes, undernourished diet, dormant lifestyle as predispositions for AD. Enhancing lifestyle choices can influence the prevalence of Alzheimer's disease both directly—by consuming foods rich in antioxidants and low in cholesterol—and indirectly, by reducing other risk factors like high blood pressure, elevated cholesterol levels, and diabetes. Adherence to a healthy lifestyle may affect AD directly or indirectly by preventing these diseases. **Conclusion-** However, there is no precise evidence yet of the role of lifestyle behaviors and AD. Risk factors like hypertension, high cholesterol, low cognitive activities, and diabetes, are associated with subsequent development of AD can be modified by adaption of healthy lifestyle. Although current scientific documentation is inadequate, substantial evidence suggests that, a combination of healthful diet steps and regular physical exercise may reduce the risk of developing Alzheimer's disease.

KEYWORDS- Alzheimer's disease, Ayurveda, Lifestyle, Risk Factor.

INTRODUCTION-

The World Health Organization (WHO) reports that over 55 million people worldwide are living with dementia, with nearly 10 million new cases diagnosed annually. Dementia ranks as the seventh leading cause of death worldwide and is a major contributor to disability and dependence among older adults. Alzheimer's disease (AD) is the most common form of dementia, responsible for 60–70% of all cases. [1]

Alzheimer's disease impacts an estimated 27 million globally, a figure expected to quadruple by 2050.[2] From 1990 to 2019, the incidence and prevalence of Alzheimer's disease and other dementias increased by 147.95 and 160.84%, respectively. [3] In India, a substantial body of evidence highlights that neurodegenerative disorders are a major public health concern, with more than 4 million individuals affected. [4] For the past two decades, the prevalence of Alzheimer's disease (AD) is growing rapidly in India that may due to the significant lack of health-care services and poor knowledge of AD and another form of dementia. By 2030, older adults in India are projected to account for over 45% of the country's healthcare burden. Furthermore, by 2045, the population aged 60 and above may surpass the number of individuals aged 0–14. [5]

Pathophysiology of Alzheimer's disease[6]-

The histopathological features include the loss of neurons, accompanied by the buildup of amyloid plaques within neurons and neurofibrillary tangles between cells. The amyloid plaques are made up of aggregates of Aβ42, a toxic breakdown product of amyloid precursor protein. Meanwhile, the neurofibrillary tangles are composed of aggregates of hyperphosphorylated tau proteins.

Typically AD presents with episodic memory loss, followed by disorientation in time and then place. With progression of disease, other domains like language & praxis gets involved. Variance in the clinical presentation is common.

- Occipital variant with visual symptoms,
- Temporal variant with aphasia,
- Frontal variant with behavioural symptoms.

Early stage- very mild dependence for activities of daily living

Moderate stage- more & more dependency for activities of daily living & self-care with advancing loss of cognitive domains

Severe stage- completely dependency for all activities of daily living.

Risk Factors-

Age related neurodegenerative changes like decreased capillary density and basement membrane thickening play encouraging role in pathophysiology of AD. The risk of AD increases exponentially with age, doubling every five years for individuals over the age of 65 until at least the age of 90 years. [7] Common incidence of AD is observed among senile age group. Family History of AD is also considered as risk factor for AD, as Individuals having positive family history of AD have 3.5 times

greater the risk of developing AD is been observed.[7]

Several genetic mutations predispose to AD. Early onset familial AD is partly the result of genetic mutations in chromosomes 21, 14, and 1. People with Down's syndrome possess an extra copy of the beta-amyloid precursor gene on chromosome 21, typically leading to Alzheimer's-like brain changes before the age of 40, and around 50% of them develop dementia by the age of 60. Late-onset AD appears to result from multiple mutations that create a predisposition for the disease. The most widely studied mutation is the polymorphism for ApoE, a lipoprotein responsible for transporting and metabolizing cholesterol and other lipids to the neurons and for repairing injured neurons. [7]

Traumatic head injury with loss of consciousness has been associated with AD in some studies, with risk being highest for injuries in adults over 70 years of age. [8]

Retrospective case-control and cross-sectional studies suggest that engaging in cognitive activities during midlife is linked to better cognitive function in later years, indicating that mental stimulation may lower the risk of Alzheimer's disease. [7]

Vasculature is considered as important factor in the development of AD. Evidence implicates both cardiovascular and cerebrovascular disease as predispositions for AD. Both diseases cause decreased cerebral perfusion (oxygenation), which leads to lowered brain metabolism, brain lesions, and initiation of chronic pathophysiologic processes, all of which are implicated in AD. [7] Hypertension, a well-recognized risk factor for stroke and multi-infarct dementia, is now a suspected risk factor for AD. [7] According to many studies relation of diabetes and AD is been suspected because of higher rate of AD among diabetics. [8] Two population studies found that impaired glucose tolerance and hyperinsulinemia were associated with cognitive impairment and AD. [7] High-serum cholesterol is strongly associated with vascular disease and has recently become a suspected risk factor in AD research. Although results are conflicting in cross-sectional studies, longitudinal studies consistently implicate high cholesterol in AD development. [7]

High homocysteine is a major risk factor for vascular disease, and as per case control studies association is seen between high homocysteine level and AD. [7] Normal homocysteine levels are regulated through two main pathways: remethylation of homocysteine to methionine, which depends on enzymes requiring folic acid and vitamin B12, and its breakdown to cysteine via a vitamin B6-dependent enzyme.

Various factors increase the risk of developing late-onset Alzheimer's disease, such as advanced age, genetic factors (particularly the APOEε4 allele), family history, previous head injuries, hypertension in midlife, obesity, diabetes, high cholesterol, and elevated homocysteine levels. [9]

Manifesting role of lifestyle in the development of Alzheimer's disease-

Conditions like hypertension, obesity, diabetes, hypercholesterolemia and High homocysteine levels are mainly related with unhealthy lifestyle habits like improper food intake, lack of exercise, disturbed sleep cycle, overstress, substance abuse etc.

Multiple (though not all) prospective studies have suggested a link between the consumption of saturated or trans fats and the development of Alzheimer's disease. Further evidence linking saturated or trans fat consumption to Alzheimer's risk comes from the fact that the APOEε4 allele, which is closely associated with the disease, produces a protein essential for cholesterol transport. Additionally, high-fat diets and the resulting increases in blood cholesterol levels may contribute to the production or aggregation of beta-amyloid in brain tissues. [9]

Higher vegetable consumption has been linked to slower cognitive decline. Many plant-based foods are rich in B-vitamins, with folate and vitamin B6 being particularly notable for their ability, along with vitamin B12, to reduce homocysteine levels. A higher intake of vitamin E from food sources has been associated with a lower risk of Alzheimer's disease, though vitamin E supplements have not been shown to reduce the risk. Most common supplements provide only alpha-tocopherol, which does not replicate the range of vitamin E forms found in foods. Vitamin B12 is vital for brain and nervous system health, as well as for the formation of blood cells.

Observational studies suggest that individuals who exercise regularly have a lower risk of developing Alzheimer's disease. Adults who engaged in physical activity during midlife were shown to have a lower risk of developing dementia after age 65 compared to those who were inactive. Moreover, sleep disturbances have been associated with cognitive decline in older individuals. [9]

RESULT-

Early adoption of healthy lifestyle can be considered to slow down the degenerative changes of ageing. While enlisting the risk factors for development of AD is been observed prominent association of lifestyle disorders (like cardiovascular disease, hypertension and diabetes) and Alzheimer's disease

Recent prospective studies have revealed that factors such as saturated fat intake, vitamin E consumption, and physical exercise are linked to the risk of Alzheimer's disease, indicating that preventive strategies could be effective for these factors. Enhancing dietary habits can impact the prevalence of Alzheimer's disease both directly—by consuming foods high in antioxidants and low in cholesterol—and indirectly, by helping to prevent other risk factors like high blood pressure, elevated cholesterol, and diabetes. [7] Intake of Vitamins B6 and B12 and folate are the major dietary determinants of plasma homocysteine levels, although other lifestyle factors, such as smoking, coffee, and alcohol consumption are also associated with high levels. [7]

Protective effect of Increased physical activity on AD is been observed

in many studies. [7] Stress has a consistent negative effect on hypertension and heart disease, may be a risk factor in cognitive decline & AD. Stress management, mental stimulation, active social life can be further considered while managing the risk of AD.

CONCLUSION-

However, there is no precise evidence yet of the role of lifestyle behaviours and AD. Risk factors like hypertension, high cholesterol, low cognitive activities, and diabetes, are associated with subsequent development of AD can be modified by adaption of healthy lifestyle.[10] Although current scientific documentation is inadequate, substantial evidence suggests that, a combination of healthful diet steps and regular physical exercise may reduce the risk of developing Alzheimer's disease.

Need of further longitudinal studies on lifestyle modification using holistic science of Ayurveda in prevention aspect of AD, is very important in varied population in varied ways. To elucidate AD scenario time to time updated & comparative study in developing and developed population is necessary.

CONFLICT OF INTEREST- None to declare.

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