**REVIEW ARTICLE**

**Medicinal Plant for Curing Alzheimer’s Disease**

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**ABSTRACT**

Neurodegenerative diseases of the human brain comprise a variety of disorders that affect an increasing percentage of the population. Some of these are age dependent (e.g. Alzheimer’s and Parkinson’s diseases) and some are infection dependent, e.g. human immunodeficiency virus (HIV/AIDS). Alzheimer’s disease (AD) is a complex, multifactorial, heterogeneous mental illness, which is characterized by an age-dependent loss of memory and an impairment of multiple cognitive functions. It is the most common type of dementia in the ageing population due to a severe loss of cholinergic neurons in selected brain area. In traditional practices of Ayurvedic and Chinese medicine, numerous plants have been used to treat cognitive disorders, including neurodegenerative diseases such as Alzheimer’s disease. An ethno-pharmacological approach has provided leads to identifying potential new drugs from plant sources, including those for cognitive disorders. Herbal remedies that have demonstrable anti-alzheimer activities have provided a potential to psychiatric pharmaceuticals and deserve increased attention in future studies. This article reviews different plants and their active constituents that have been used in traditional Ayurvedic medicine and for their reputed cognitive-enhancing or anti-ageing effects.

**Key Words:** Ethno-botanical herbs, Active constituent, Alzheimer’s disease.

**INTRODUCTION**

Alzheimer’s disease (AD), is a complex, multifactoral, progressive, neurodegenerative disease primarily affecting the elder population and is estimated to account for 50–60% of dementia cases in persons over 65 years of age [1-2]. The impairment of central acetylcholine (ACh) neurotransmission due to neural degeneration is believed to be a principal neuropathological feature of Alzheimer’s disease [3-4]. AD occurs in two forms: familial and sporadic. In familial AD, mutations in the amyloid precursor protein (APP), presenilin 1, and presenilin 2 genes are the currently known causal factors [5-6]. Familial AD constitutes only a small portion (2-3 %) of all AD patients [7] and it has an early age of onset (younger than 65 years). On other hand, sporadic AD, constitutes a vast majority of AD cases and is associated with a late age of onset (65 years and older). Although the specific causes of sporadic AD are still unknown [8] many causal factors seem to be involved in sporadic AD, including aging [9], mitochondrial defects [8], insulin-dependent diabetes [9-10], environmental conditions [11], and diet [12-13]. In familial AD, genetic mutations accelerate the disease process [5], whereas in sporadic AD due to absence of genetic mutation, cellular changes that control AD progression take more time to develop [14].

Histological, pathological, molecular, cellular, and gene expression studies of AD have revealed that multiple cellular pathways are involved in AD progression [14]. The pathological features identified in the central nervous system (CNS) in AD are amyloid plaques, neurofibrillary tangles, inflammatory processes and disturbance of neurotransmitters [5-6]. Pathologically, there are no differences between familial AD and sporadic AD [5]. In patients with sporadic AD, pathological changes occur latter than in patients with familial AD [10, 15-23]. Studies with AD brains and AD mouse models show that abnormal metabolism of amyloid precursor protein (APP) is a key mecha-
nism of AD pathogenesis\cite{7,8}. Cells in the brains of AD patients exhibit abnormally high amounts of oxidatively modified proteins, lipids and DNA; such free radical-mediated molecular damage is particularly prominent in the environment of senile plaques and in neurofibrillary tangle-bearing neurons, suggesting roles for reactive oxygen species in amyloid-mediated neuronal damage and neurofibrillary pathologies\cite{24}. Amyloid precursor protein (APP) is an integral membrane protein of uncertain function. The cellular proteolytic processing of amyloid precursor protein (APP), can lead to the generation of amyloid β-protein (Aβ) that readily form aggregates and that have neurotoxic activities under certain conditions in vitro and in vivo\cite{25-26}. The deposition of Aβ, a peptide that varies in size from 39 to 43 amino acids, in the senile plaques in the AD brain is believed to be the crucial step in AD pathogenesis (amyloid cascade hypothesis)\cite{5}. The imbalance between Aβ production and Aβ clearance is the basis for the formation of amyloid plaques\cite{5}. Amyloid β-protein (Aβ) acts as one of the various sources of reactive oxygen species. During the process of aggregation Aβ generates hydrogen peroxide; a process that requires oxygen and that is greatly potentiated by Fe^{2+} and Cu^{2+}\cite{27,28}. Lipid peroxidation induced by Aβ impairs the function of ion-motive ATPases, glucose and glutamate transporters, and also GTP-binding proteins\cite{29}. By disrupting cellular ion homeostasis and energy metabolism, relatively low levels of membrane-associated oxidative stress can render neurons vulnerable to excitotoxicity and apoptosis. The dysfunction and degeneration of synapses in AD may involve Aβ-induced oxidative stress because exposure of synapses to Aβ impairs the function of membrane ion and glutamate transporters and compromises mitochondrial function by an oxidative-stress-mediated mechanism\cite{30}.

<table>
<thead>
<tr>
<th>Medicinal plants having anti-Alzheimer’s potential</th>
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<tbody>
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<td>Genus-species</td>
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<td>Allium sativum</td>
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<td>Angelica sinensis</td>
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<td>Astragalus membranaceus</td>
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<td>Coptis rhizoma</td>
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<td>Dipsacus asper Wall</td>
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<td>Evodia rutaecarpa</td>
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<td>Galanthus nivalis L.</td>
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<td>Gastrodia elata</td>
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<td>Melissa officinalis</td>
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<td>Narcissus confusus</td>
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<td>Nicotiana tabacum</td>
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<td>Radix paeoniae rubra</td>
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<td>Radix polygoni multiflori</td>
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<td>Radix salviae miltiorrhiza</td>
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<td>Rhizoma acori</td>
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<td>Schizandrae chinensis</td>
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<td>Tripterygium wilfordii</td>
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<td>Uncaria tomentosa</td>
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<td>Vitis vinifera</td>
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<td>Withania somnifera</td>
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**CONCLUSION**

Most herbal medicines are complex mixtures of chemical components and have diverse biological and pharmacological actions. A number of medicinal plant have been used which demonstrate the properties of anti-aging herbs. According to the traditional theory, these herbs can help us to maintain the level of vital energy in our body; and they have multiple neuro-protective mechanisms that enable them to be used in different health stages for disease prevention and even curing. The information in this review explains number of herbal plants and their constituents that possess therapeutic effects of psychiatric illnesses may be used in a research for novel pharmacotherapies by the researchers.

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