

## A Review: On Various Medicinal Plants In The Management Of Alzheimer's Disease

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### ABSTRACT

Alzheimer's disease is an age associated neurodegenerative disorder characterized by memory deficits. Numerous studies have done to find therapeutic approaches for Alzheimer's disease. However, the proper treatment possibility to be not available. There is no cure for Alzheimer's disease, however symptomatic treatment may improve the memory and other dementia associated problems. The practise of using ancient medicine to improve memory dates back in time. Natural medicine including herbs and medicinal plants has been utilised in the treatment of memory deficits such as amnesia, dementia, as well as Alzheimer's disease since a long time. Medicinal plants are completely in different systems of medicine, particularly Unani system of medicines and exhibited their powerful roles within the management and cure of memory disorders. Most of herbs and plants are chemically evaluated and their efficacy additionally been proven in clinical trials. The actual mechanisms of action, nevertheless, continue to be average. During this paper, we have reviewed the role of various medicinal plants that play an important role in the treatment of Alzheimer's disease and memory deficits exploitation typical herbal therapy.

**KEYWORDS:** Alzheimer's disease, memory enhancing, medicinal plant,

disorder, depression, anxiety and the side effects of medication, and normal ageing[1].

Alzheimer's disease [AD] is a progressive neurodegenerative brain disorder that is slow in onset but leads to dementia, unusual behaviour, personality changes and ultimately death[2]. AD is characterized by the presence of excessive amounts of neurotic plaques containing amyloid  $\beta$  supermolecule loss of cholinergic markers in brain. Loss of cholinergic cells particularly in the basal forebrain, is accompanied by loss of the neurochemical acetylcholine[3]. A decrease in acetyl choline in the brain of patients with Alzheimer's disease appears to be a critical element in producing dementia [4].The cause of AD is not known clearly. Recently, the mainstay treatments for the Alzheimer's disease are acetylcholinesterase inhibitor which increase the availability of acetylcholine at cholinergic synapses. AChE inhibitors from general chemical classes such as galantamine, physostigmine, tacrine and heptylphysostigmine have been tested for the symptomatic treatment of AD[5]. However, non selectivity of these drugs, their limited efficacy, and poor bioavailability, adverse cholinergic side effects in the periphery, narrow therapeutic ranges and hepatotoxicity are among the sever limitations to their therapeutic success[6].Therefore it is worthwhile to explore the utility of traditional medicines for the treatment of various cognitive disorders[7].

### I. INTRODUCTION

A person's memory is their capacity to store sensory stimuli, events, knowledge, etc., keep them for a short or long time, and then recall them when necessary[1]. Learning is the process of learning about the world, and memory can be thought of as the retention of the learned information that can be recalled as needed. Memory function is vulnerable to a variety of pathologic processes including neurodegenerative diseases, strokes, tumours, head trauma, hypoxia, cardiac surgery, malnutrition, attention-deficit

### PATHOGENESIS

Patients with AD have two distinctive features in their brains.

1. Senile plaques contain extracellular deposits of amyloid-beta ( $A\beta$ ), a peptide synthesized by breakage of  $A\beta$  precursors (genetic locus 21q21–22). Abnormal deposits of  $A\beta$  are additionally found in Blood vessels.
2. Neurofibrillary tangles, dense bundles of abnormal fibers within the cytoplasm of neurons

that comprises associate altered type of the microtubular-associated protein are found in patients with AD [8,9,10].

#### SCIENTIFIC DOCUMENTATION OF HERBS:

In traditional practices of medicine, numerous plants have been used to treat cognitive disorders, including neurodegenerative diseases such as Alzheimer's disease (AD) and other disorders. Various studies been undergone to identifying potential new drugs from plant sources, including those for memory disorders. There are numerous drugs available in market that have been isolated from plants, e.g. alkaloids from plant sources have been investigated for their potential in AD therapy, and are now in clinical use. Usually herbal preparations are well tolerated but they may have harmful side-effects, including interactions with pharmaceuticals. Herbal medicines, such as, Ginkgo Biloba, Bacopamonnieri (Bramhi), Shankpushpi etc. has been found to increase memory power [11].

#### Curcuma longa

Curcuma longa belongs to the family Zingiberaceae. In Southeast Asian countries, prevalence of Alzheimer disease is low due to consumption of turmeric. It has anti-inflammatory activity that is additionally associated with reduced threat of AD [12]. Curcumin reduces the shrine deposition in the brain. Turmeric lowering oxidative stress and amyloid pathology [13]. In another study, administration of low doses of curcumin reduced A $\beta$  deposition up to 40% in mice with AD as compared to control drug [14]. Curcumin at low doses caused 43% reduced in the plaque burden that these A $\beta$  have on the brain of mice with AD [13]. A earlier study shows that low doses of curcumin administered for long duration are more effective in the treatment of AD as compared to higher doses of curcumin [15]. Curcumin has an ability to bind with A $\beta$  and inhibits its own assembly [16]. Curcumin has important anti-inflammatory and antioxidant effects [17]; according to the researchers, these effects help in treating Alzheimer's symptoms caused by inflammation and oxidation [18]. Hypercholesterolemia and hyperlipidemia enhance amyloid plaques by intracellular accumulation of cholesterol esters [19]. Scientists believe that curcumin might have remedies effects on AD by inhibiting cholesterol synthesis and reducing serum peroxides [20].



Figure No: 1

#### Centella Asiatica

The Apiaceae family includes Centella asiatica. It includes tannins, ascorbic acid, centoic acid, madecassoside, brahmoside, brahminoside, sasiaticoside, sitosterol, and asiaticosides. Thankuniside, centellic acid, brahmoside, brahminoside, siatic acid, thankuniside, glycoside, and brahminoside. Triterpine, thankunic acid, vellarin, asiaticosides, thankuniside, and isothankuniside are some examples of thankunisides [21]. Centella asiatica is used to treat epilepsy, rheumatism, mental weakness, and depression [22]. It has diuretic, anti-convulsant, anti-spasmodic, tonic, stimulant, emmenagogue, antioxidant, and spermatogenic properties [23]. The A pathology was reversed by Centella asiatica, and the oxidative stress response was decreased [24]. According to Rao et al. (2007) [25], Wistar rats were given therapy with fresh leaf extract from Centella asiatica (Linn), which improved their capacity for learning and memory retention. For this investigation, adult rats that were 2.5 months old were chosen. Three distinct Extract dosages (2, 4, and 6 mg/kg) were given for 2, 4, and 6 weeks. Spatial education (T-maze) And assessments of passive avoidance were conducted following the treatment period. Results were evaluated against Age-matched control rats' were higher. The dose of 6 mL of extract significantly improved spatial learning. Passive avoidance tests showed that the administration of Centella asiatica extract improved memory recall. This research demonstrated that Centella asiatica improves memory and learning. Adult rats' power. Centella asiatica's effectiveness in AD was reported by Veerendra and Gupta [26].



Figure No:2

### Ginkgo biloba

Ginkgo biloba plant it's belongs to the family Ginkgoaceae. It contains bilobalide that has a neuroprotective action [27]. Ginkgo biloba reduced free radical and enhance memory in patients with Alzheimer disease [28]. It contains flavonoids that are involved in memory improvement [29]. Ginkgo biloba inhibits hippocampus corticosterone-induced neurodegeneration and GABA inhibitory neurotransmission [30]. Administration of Ginkgo biloba significantly bettered memory and learning performance in albino rats [31].



Figure No:3

### Panax ginseng

Panax ginseng plant it's belongs to the family Araliaceae. A earlier study has indicate that learning ability increases in animals by consumptions of Panax ginseng. Additionally, recent studies using in vivo and in vitro models have demonstrated the effectiveness of Panax ginseng powder, extract, and several ginsenosides against Alzheimer's disease [32,33,34]. Patients receiving Korean white ginseng powder (4.5 g/d) or Korean red ginseng powder (9 g/d) showed significant enhancement in Clinical Dementia Rating, Mini-Mental State Examination scores and the AD assessment scale after Comparing those who received 96 days of ginseng treatment to those in the control group [32,35].



Figure No: 4

### Withaniasomnifera

Total alkaloid extract (ashwagandholine, AG) of Withaniasomnifera roots has been studied for its Effects on the central nervous system[36]. Male Wistar rats' brain cholinergic, glutamatergic, and GABAergic receptors were examined in relation to the effects of sitoindosides VII–X and withaferin, which were extracted from an aqueous methanol extract of the roots of cultivated cultivars of Withaniasomnifera[37]. Acetylcholinesterase (AChE) activity was found to be marginally lowered in the vertical diagonal band but slightly increased in the lateral septum and globus pallidus in response to the drugs. These modifications were followed by enhanced Frontal cortices, lateral and medial septum, and M1-muscarinic-cholinergic receptor binding, whereas the number of cortical areas with higher M2-muscarinic receptor binding sites including the retrosplinal cortex, frontal, piriform, parietal, and cingulate. Therefore, the evidence implies that certain substances have a preference for influencing cholinergic signalling processes in the cortical and basal forebrain. Cortical muscarinic acetylcholine receptor capacity was increased by the medication may help to explain how Withaniasomnifera works to improve memory and cognition. extracts in both animals and people [38].



Figure No:5

### Salvia Rosmarinus

The essential action of rosemary essential oil is in stimulation of the nervous system under sympathetic Control resulting in improved memorizing and concentrating abilities[39]. Rosemary essential oil was Causes moderate inhibition of acetylcholinesterase[40]. The olfactory impact of essential oils of Lavender and rosemary on cognitive performance and mood of volunteers. They reported that rosemary Produced a significant enhancement of performance in terms of overall quality of memory and Secondary memory factors, but also impaired the speed component of memory compared to the Control[41].



Figure No:6

### Zingiberofficinale

The family Zingiberaceae includes Zingiberofficinale. It is used to treat rheumatism, gastrointestinal issues, and headaches [42]. It enhances scopolamine-induced memory impairment by inhibiting acetylcholinesterase activity [43]. Zingiberofficinale plays a crucial function in the treatment of Alzheimer's disease and memory problems since it is an antioxidant booster and free radical reducer [44]. In a recent study, treatment and control groups of male rats (weighing 250–300 g) were created. After that, three groups were formed from the therapy group. In the first group, plant material mixed with meals at a ratio of 6.25% was given. Plant The second and third mice received intraperitoneal extract at 50 mg/kg and 100 mg/kg Segments, independently. The shuttle box test and the Y maze test were utilised to examine the actions of spatial recognition and acquisition-recall. After intraperitoneal and oral treatment of Zingiberofficinale, significant boosting effects on memory, retention, and acquisition were seen in male rats [45].



Figure No:7

### Bacopamonnieri

Bacosides A and B are the primary ingredients in Bacopamonnieri that have cognitive-enhancing properties [46-50]. The majority of study has concentrated on the mechanisms underlying these qualities of brahmi, which is most commonly used for therapeutic purposes to improve cognitive function. The enhancement of nerve impulse transmission by brahmi is due to the triterpenoidsaponins and related bacosides. The bacosides also promote kinase activity, neuronal synthesis, and recovery, which help to repair injured neurons of synaptic activation, and the transmission of nerve impulses [51].According to a 2012 study on aged individuals, Bacopamonnieri reduces AChE activity, enhancing cholinergic function, which in turn improves working memory, attention, and memory processing [52]. Similar studies were conducted on youngsters, and they showed that a 12-week Brahmi medication had a significant positive impact on their performance on tasks requiring paired association learning, logical memory, and phrase repetition [53].



Figure No:8

### Crocus sativus

Crocus sativus it's belongs to the family Iridaceae. There is an increasing trend to prescribe the Crocus Sativus in the treatment of Alzheimer

disease and memory poverties. In clinical trials, efficacy of Crocus Sativus was investigated in 54 subjected aged 55 times during a 22-week study period. Patients were Randomly assigned to administered donepezil 10 mg/d or capsule saffron 30 mg/d. Crocus sativus at 30 Mg/d was found to be effective analogue to donepezil in patients with mild to moderate AD after 22 Weeks of treatment. Adverse effects occurred at similar frequencies between donepezil-treated and Saffron-treated cases, with the exception of vomiting which occurred more in donepezil-treated cases[54]. Another similar study was conducted to examined the effectiveness of Saffron extract versus memantine in decreasing cognitive deterioration of cases with moderate to severe Alzheimer disease. In this clinical trial, 68 subjected received saffron extract (30 mg/d) or memantine (20 mg/d) for 1 year. Scales for Functional Assessment, Staging, and Severe Cognitive Impairment were applied to examine patients on a monthly basis, and any potential harmful consequences were noted. Crocus sativus at 30 mg/d was set up to be effective analogue to memantine in patients with moderate to severe AD after 1 year of treatment. There was no significant difference of adverse effects in both treatment groups [55].



Figure No: 9

## II. CONCLUSION:

In this review paper, we have reviewed further detail about the management of Alzheimer disease and the medicinal plants with potential remedial values. Despite the bulk of knowledge regarding this complex disease, there is no complete cure except characteristic treatment. So, the herbal remedy is now anticipated to control Alzheimer disease progression and help to relieve the symptoms related to Alzheimer disease. Herbal remedy can ameliorate the life quality of patients with Alzheimer disease and memory deficits. Global research is being done to find effective treatment of Alzheimer disease. This review reveals that herbal remedy is an encouraging choice

as alternative to treat Alzheimer disease. Medicinal plants used in different systems of drug particularly Unani system of medicines exhibit their important role in the management and cure of memory disease. Most of herbs and medicinal plants have been chemically evaluated and some of them are in the clinical trial stage. The results are magnificent and considerable. Still, the underlying mechanisms of action are still on the way. As reviewed in this paper, future clinical trials involving larger sample sizes are demanded to investigate the function of different medicinal plants and the underlying mechanisms.

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