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A REVIEW ON ALZHEIMER'S DISEASE AND HERBAL PLANTS USED FOR THE TREATMENT

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ABSTRACT

Alzheimer's disorder is an age-associated, irreversible, innovative neurodegenerative ailment characterised via excessive memory loss, unusual behavior, private changes, and a decline in cognitive function, resource of the deposition of β amyloid plaques and neurofibrillary tangles, and the degeneration of the cholinergic basal forebrain. The first neurotransmitter illness determined in AD worried acetylcholine as cholinergic function is needed for short-term memory. Oxidative pressure also can underlie the revolutionary neurodegeneration characteristic of AD. The neurodegenerative way in AD might also additionally moreover comprise β amyloid toxicity appears to comprise oxidative pressure.

Natural treatment including herbs and medicinal vegetation has been used withinside the remedy of memory deficits together with dementia, amnesia, as well as Alzheimer's illness for the reason that a prolonged time. Medicinal flowers were utilized in unique systems of medicine, specifically Unani device of drug remedies and exhibited their powerful roles withinside the management and remedy of memory disorders. Most of herbs and plants were chemically evaluated and their efficacy has moreover been confirmed in medical trials.

Indeed, limitless medical studies have defined the usage of some of Ayurvedic medicinal plant life and their components for treatment of Alzheimer's disease. In this paper, we've reviewed the location of exquisite medicinal flowers that play an important role in the remedy of Alzheimer's sickness and memory deficits the usage of conventional herbal therapy.

Keywords: Medicinal plants, Alzheimer's disease, Phyto Constituents, Brain disorder

INTRODUCTION

Alzheimer's disease (AD) is a progressive and neurodegenerative disease associated with the presence of senile plaques withinside the hippocampal region of the mind. The disorder is the maximum not unusual place shape of dementa amongst middle-elderly and older adults, affecting greater than 10 million peoples, a number of expected to growth to 7.7 million with the aid of using 20301.

AD by and large influences the aged populace of over sixty five years of age, and is expected to account for 50 - 60% of the dementia cases **[2]**. The incidence has been determined to upward

push exponentially with age, starting from 3.0% in sufferers elderly sixty five to seventy four years to as plenty as 47.2% in the ones elderly eighty five years **[3]**. This AD circumstance is characterised with the aid of using a lack of short-time period reminiscence, lack of ability to examine new facts, temper swings, trouble in locating words, forgetting names, and dropping items. Frustration, hostility, and irritability are not unusualplace emotional features.

The beta-amyloid peptide, with 39 - forty two amino acid residues (BAP), performs a kry function withinside the improvement of AD.

Several research have discovered that herbal antioxidants, along with nutrition E, nutrition C, and beta-carotene, might also additionally assist in scavenging loose radicals generated at some point of the initiation and development of this disease **[4]**. The lack of reminiscence is taken into consideration to be the end result of a scarcity of the nerve transmitter acetylcholine. It is viable to growth the extent of this transmitter withinside the mind with the aid of using inhibiting the interest of the enzyme acetylcholinesterase, which splits or breaks down the transmitter substance. Drugs that inhibit the breakdown of the messenger or transmitter acetylcholine put off the improvement of the disease **[5]**.

Herbal remedy is indigenous to India and in Ayurveda numerous arrangements of medication were advanced for numerous disorder treatments. Various medical investigations have proven the significance of numerous herbs and their features and energetics for anxious device disorders, such as reminiscence loss.

The present review provides the description of medicinal plants that possesses promising role in Alzheimer. The review summarizes information of various plants in order to provide sufficient baseline information that could be used in drug discovery campaigns and development processes, thereby providing new functional leads for AD.

Medicinal Plants used in AD

A range of clinical researches had been done on medicinal herbs. Herbs have anti inflammatory and antioxidant sports that can be used in the remedy of AD. Alzheimer's sufferers have an acetylcholine deficiency. Anti-inflammatory herbs might also additionally lessen irritation of the mind tissue in Alzheimer's: German chamomile, Ginseng, licorice, turmeric, and white willow bark.

Acetylcholine is a neurotransmitter that performs a key position in cognitive characteristic and reasoning. The brains of these with mild-to-slight Alzheimer's sickness, a innovative sort of dementia, have abnormally low acetylcholine concentrations. This approach that any compound that complements the cholinergic gadget withinside the mind can be beneficial in treating Alzheimer's sickness and comparable mind malfunctions. The herbs that inhibit Acetylcholinesterase (AchE) incorporate herbal COX-2 inhibitors, additionally said as medicinal herbs, for AD indication. Some ayurvedic herbs slowing down the brain cell degeneration caused by Alzheimer's **[6]**. They enhance the brain's ability to function, and therefore, provide stability when used consistently.

Bacopa monniera

Brahmi is a bitter-tasting creeper plant belongs to Scrophulariaceae family discovered in damp and marshy regions and is typically utilized in Ayurvedic medication as a nerve tonic, diuretic, and cardiotonic and as a healing agent towards epilepsy, insomnia, asthma, and rheumatism **[7]**.

The principal constituents of Bacopa monnieri (BM) are sterols, saponins, alkaloids, monnierin, hersaponin acid A, herpestine and brahmine Other saponin glycosides consist of the jujubogenin bisdesmosides bacopasaponins D, E, and F. Other materials consist of alkaloids, plant sterols, betulic acid, polyphenols, and sulfhydryl compounds that confer antioxidant interest **[8, 9]**.

BM complements protein kinase interest which can make a contribution to its nootropic movement and cholinergic degeneration and displayed a cognition-improving impact in a rat version of AD.

A crew of researchers additionally suggested that a standardized extract of BM reversed the cognitive deficits brought about with the aid of using intracerebroventricularly administered colchicines and ibotenic acid into the nucleus basalis magnocellularis **[10, 11]**. BM depletion of acetylcholine, discount in choline acetyltransferase interest, and lower in muscarinic cholinergic receptor binding withinside the frontal cortex and hippocampus. BM extracts included

neurons from beta-amyloid-brought about cellular dying with the aid of using suppressing mobile acetylcholinesterase interest. In addition, BM extract-dealt with neurons expressed a decrease degree of reactive oxygen species, suggesting that Brahmi restricted intracellular oxidative stress **[12-15]**.

On the basis of the above-mentioned study establish the efficacy of BM as memory enhancer, BM has now been introduced in the Indian market for treatment of memory and attention deficit disorders **[16-18]**.

Curcuma longa

Curcuma longa belongs to Zingiberaceae family and a good source of Curcumin (diferuloylmethane), an orange-yellow component of turmeric or curry powder. Studies have proved that Curcumin has anti inflammatory and antioxidant activities, and it allows in fighting Alzheimer's Disease (AD) **[19, 20].**

Epidemiologic research display a 4.4-fold decrease prevalence of AD in Southeast Asian nations in which turmeric is normally used as a nutritional spice **[21]**. Regular intake of this herb reduces deposition of plaque withinside the brain. It decreases oxidative strain and amyloid pathology an AD transgenic mouse **[22, 23]**.

Direct injection of curcumin into the brains of the mice with AD now no longer simplest hampered similarly improvement of plaque however additionally decreased the plaque degrees **[24]**. AD signs characterised through irritation and oxidation had been additionally eased through curcumin's effective antioxidant and anti inflammatory houses **[25].** Curcumin's in vitro capacity to inhibit lipid peroxidation and neutralize reactive oxygen species can be numerous instances stronger than that of diet E **[26].**

Ginkgo biloba

Ginkgo Biloba is the best known herb for Alzheimer's disease belongs to Ginkgoaceae family. Research suggest that *G. biloba* used to treat inadequate blood circulation complications, consciousness loss, depression and headaches **[27]**. *Ginkgo Biloba* is a potent vaso dilator, lower blood pressure and inhibit platelet aggregation. Chronic treatment on learning and memory in mice demonstrated that *G. biloba* enhanced acquisition, storage, and retrieval of two-response sequence for food reward **[28]**. *G. biloba* extract significantly repress acetylcholinesterase activity in the brain and AChE activity inhibition corresponded with improvement scopolamine-induced deficits in passive avoidance.

In controlled clinical trials, *ginkgo biloba* extracts showed therapeutic benefits in treatment of Alzheimer's, with minimal undesirable side effects. The gingkolides is the chief chemical constituent of *gingko biloba* pertinent antioxidant, with

neuroprotective and cholinergic activities that help in the management of AD. *Ginkgo biloba* work against Aβ protein-induced oxidative damages (degrading hydrogen peroxide, preventing lipids from oxidation, and trapping the reactive oxygen species) **[29, 30]**.

Salvia officinalis

Salvia officinalis belongs to the family Lamiaceae. It fight against AD and enhances memory retention by interacting with muscarinic and cholinergic pathways that are involved in memory retention process **[31]**. A study was conducted to investigate the efficacy of *Salvia officinalis* in 42 patients in Tehran, Iran. After 4 months of treatment, significant efficacy was observed in *Salvia officinalis* treated patients than in the placebo-treated patients. The findings indicate the effectiveness of *Salvia officinalis* in the treatment of AD and memory deficits **[32]**.

Rosmarinus officinalis

Rosemary commonly known as *Satapatrika belong to Lamiaceae.* Apigenin, carvacrol, eugenol, oleanolic acid, thymol, and ursolic acid are some phtochemical constituents present in the plant. In addition, it contains nearly two dozen antioxidants and another dozen anti-inflammatory compounds. Some of the strongest antioxidant substances in the herb are carnosic acid and ferulic acid. Leaf extract improves memory impairment and affects acetylcholinesterase and butyrylcholinesterase activities in rat brain **[33]**.

Matricaria recutita

Matricaria recutita belong to family Asteraceae. *Matricaria recutita is used to* relieve anxiety, and in higher doses, leads to drowsiness, according to the University of Maryland Medical Center. The neuroprotective effect of German chamomile against aluminium fluoride (AlF_4^-)-induced oxidative stress in rats **[34]**.

Centella asiatica

Centella asiatica belong to family *Umbelliferae.* This is one of the important rejuvenating herbs for nerve and brain cells and is believed to be capable of increasing intelligence, longevity, and memory **[35, 36]**. Asiatic acid and asiaticoside, were shown to reduce hydrogen peroxide-induced cell death, decrease free radical concentrations, and inhibit beta-amyloid cell death *in vitro*, suggesting a possible role for gotu kola in the treatment and prevention of AD and beta-amyloid toxicity **[37]**.

Melissa officinalis

Melissa officinalis belong to family *Lamiacea.* Lemon balm improve cognitive decline as well as improve the mood for Alzheimer's patients. A study concluded that *Melissa officinalis* is one of several plants that may be useful in the prevention

and treatment of Alzheimer's disease due to its ability to inhibit acetylcholinesterase and its antioxidant activity. Patients with mild to moderate AD receiving *M. officinalis* extract experienced significant benefits in cognition after 16 weeks of treatment **[38, 39]**.

Glycyrrhiza glabra

Glycyrrhiza glabra belong to family *Fabaceae.* The herb contains pentanol, hexanol, linalool oxide, tetramethyl pyrazine, terpinen, terpinol, geraniol, propionic acid, benzoic acid, ethyl linolenate, methyl ethyl ketone, butanediol, feuferaldehyde, furfuryl formate, trimethylpyrazine, maltol, glycyrrhizin, tannin, and glycyrrhizic acid **[40]**. Memory enhancing activity of *Glycyrrhiza glabra* was reported in scopolamine induced dementia **[41]**.

Galanthus nivalis

Galanthus nivalis belongs to Amaryllidaceae. Galanthamine, is an isoquinoline alkaloid is the chief chemical constituent of *Galanthus nivalis* . It has a potent Acetylcholinesterase (AChE) inhibiton activity and have been recently approved as an promising treatment approach for AD. Galanthamine has been found to be the long-acting and specific inhibitor of the AChE enzyme and to potentiate cholinergic nicotinic neurotransmission by allosterically modulating the nicotinic acetylcholine receptors, which may be of additional value in the treatment of AD **[42]**.

Huperzia serrata

Huperzia serrata belongs to family Huperziaceae. This genus, is known to contain a large group of alkaloids called 'Lycopodium alkaloids'. Huperzine A, a novel alkaloid extracted from Huperzia serrata, is well known as a reversible, potent, and selective AChE inhibitor.

Huperzine-A is proven for its significant role in memory, concentration, and the learning capacity. Research has also shown that Huperzine-A substantially reduces the abnormally high radical activity both in the brains of elderly animals as well as in the blood of Alzheimer's patients **[43]**.

Commiphora whighitti

Commiphora whighitti commonly known as Guggulu belong to family Burseraceae , the major constituent of guggulipid, which is guggulsterone.

It is a potent cognition enhancer for memory improvement in scopolamine induced memory deficits **[44]** Another study shows that brain pathology develops in cholesterol fed rabbits similar to AD **[45]**, supported by clinical trials done in human, showing that statin treatment decreases the risk of AD. Memory enhancing and AD activity of *Commiphora whighitti* has been reported due to reduction in acetylcholinesterase contents in the hippocampus **[46]**.

Panax Ginseng

Panax Ginseng belong to family *Araliaceae. The herb* contains saponins protopanaxadiol, protopantriol, and oleanolic acid saponins that are reported to have memory-enhancing action induced by scopolamine **[47]**. The Ginseng root has been used in folk medicine from ancient time. The ginseng extract has many uses, and traditionally claim to achieve and maintain both physical and mental health.

Recent studies have shown the efficacy of *Panax ginseng,* Patients receiving Korean white ginseng powder (4.5 g/d) or Korean red ginseng powder (9 g/d) showed significant improvement in Clinical Dementia Rating, Mini-Mental State Examination scores and the Alzheimer's Disease Assessment Scale after 12 weeks of ginseng treatment in comparison with those in the control group **[48]**.

Lipidium Meyenii Walp

Lipidium Meyenii, is known as Maca belong to family *Brassicaceae*. Black maca improves experimental memory impairment, induced by ovariectomy, due in part, to its antioxidant and AChE inhibitory activities. Recent studies suggested that black maca can enhance learning and memory in ovariectomized mice **[49]**.

Acorus calamus

Acorus Calamus belong to family *Araliaceae* possesses a beneficial memory enhancing property for memory impairment, learning performance. The herb inhibits the acetylcholinesterase (AChE) due to presence of α-and β-asarone. As per Ayurveda medicine system, Acorous Calamus also known for its anti-inflammatory, antioxidant, antispasmodic, cardiovascular hypolipidemic, immuno-suppressive, cytoprotective, antidiarrheal, antimicrobial, and anthelmintic properties **[50]**.

Tinospora cordifolia

Tinospora Cordifolia belong to family ***Menispermaceae*** possesses a memory enhancing property for learning and memory. *It enahnce* cognitive parameter by immunostimulation and synthesis of acetylcholine.Administration of *Tinospora cordifolia* increases the cognitive function in patients with AD **[51, 52]**.

Magnolia officinalis

Magnolia Officinalis belong to family *Magnoliaceae*. In Chinese medicine its used for the treatment of neurosis, anxiety, stroke, and dementia. It also inhibits the memory impairment induced by scopolamine through the inhibition of AChE due to presence of magnolol and honokiol **[53]**.

Collinsonia canadensis]

Horsebalm belong to family *Lamiaceae,* prevent the breakdown of acetylcholine and used for AD due to presence of carvacol

and thymol **[54]**.

Urtica dioica

Urtica dioica belong to family *Clusiaceae.* It contains biologically active compounds that reduce inflammation. A study on Neuroprotective Effects of Herbal Extract on Rat Model of Sporadic Alzheimer's Disease was induced a significant change in spatial learning seen in the rat model group were improved in herbal-treated group **[55]**.

Withania somnifera

Withania somnifera belong to family Solanaceae. Ashawgandha have a significant antioxidant function, which is accomplished by increasing the activities of superoxide dismutase, catalase, and glutathione peroxidase. The assessment of cholinesterase inhibition was carried out using a colorimetric method based on Ellman's reaction and demonstrated that the *W. Somnifera* extract significantly inhibited AChE in a concentration-dependent manner **[56, 57]**. *Ashwagandha* is also known as a Nervine tonic which rejuvenates the cells and boosts energy.

These are some most common medicinal herbs proven for their efficacy in the treatment of AD and those reported in literature are *Bacopa monniera, Curcuma longa, Ginkgo biloba L., Salvia officinalis, Rosmarinus officinalis, Matricaria recutita Centella asiatica, Melissa officinalis, Glycyrrhiza glabra, Galanthus nivalis ,Huperzia serrata ,Commiphora whighitti, Panax Ginseng, Lipidium Meyenii Walp, Acorus calamus, Tinospora cordifolia, Magnolia officinalis, Collinsonia canadensis ,Urtica dioica, Withania somnifera* and so on.

CONCLUSION

Herbs play a promising role in the early stage of Alzheimer's and different situations regarding poor memory and dementia. Herbal therapy improve the life quality of patients with no or minimal side effect. Worldwide studies is being completed to locate powerful remedy of AD. In this paper, we've reviewed extra element approximately the control of AD and the medicinal herbs with potential therapeutic values.

The consequences are awesome and considerable. However, the underlying therapeutic effects are nevertheless at the way. As reviewed in this paper further studies should involving larger sample sizes to investigate the role of different medicinal plants and the underlying mechanisms.

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