Role of Herbal plants for the Treatment of Alzheimer’s Disease

Abstract: Today era most of the disease are treated by Allopathic drugs. The dependency of treatment of most of the disease are gradually enhanced on allopathic drugs because of They are induced the fast effect and give the instant relief to patient also. But at the same time these drugs also given some serious side effect to patients even is death also in some cases. Thus, the interest of researchers are growing day by day towards medicinal plants. It has been viewed that some herbal plant giving their therapeutic and pharmacological In the therapy of Alzheimer's disease, it has a positive impact. The initial studies, which have been carried out by different researches, given a very prominent results and given a hope that Alzheimer like CNS disease can be cured by herbal medicinal plants and such studies pave the way for the treatment of other serious diseases. In this article the author has focused on those plant which are specially used in the treatment of Alzheimer disease.

Introduction

Alzheimer's disease is a neurodegenerative illness which causes patient’s strange behaviour, change in personality, decline in mental ability and significant memory loss [1-2]. Alzheimer's disease has no cure, and the medications now available to treat it are useless [3-4]. In the next 50 years, the number of instances of Alzheimer's disease is predicted to drop substantially if a treatment intervention can postpone the onset or course of the illness. [5].

With over a hundred new compounds in clinical trials, it has found in initial studies that Ayurvedicmedicinal plants will have the best option without any adverse effects for the treatment of Alzheimer's illness [6-8]. Several studies have indicated that Ayurvedic medicinal herbs and their components,Alzheimer's disease can be treated using this drug. [7]. During the studies, it has also found that in medicinal plant several medicinal constituents have been isolated from the plant by the extraction and isolation process like, glycosides, alkaloids, flavonoids, tennis, polyphenols, triterpenes, sterols [8-9]. These compounds not only use in the treatment of Alzheimer's disease, but also in anti-inflammatory, anti-amyloidogenic, anti-cholinesterase, hypolipidemic, and anti-amyloidogenic pharmacological actions. [10].

In the preliminary studies and data obtained from various plants, it has been observed that through biological, and cellular activities of these plants, as well as their clinical applications and in order to provide adequate baseline data for drug discovery and development campaigns, resulting in novel functional leads for Medicinal herbs have the potential to treat Alzheimer's disease without causing any negative side effects. [11-13].

What Is Alzheimer's Disease and How Does It Affect You?

Alzheimer's disease is a memory-related degenerative brain disease., cognition, and ability to do even basic tasks. The majority of persons who have the disease begin to develop in their mid-sixties with symptoms (those with the late-onset form).[14] Alzheimer's disease It's a rare occurrence when it affects persons between 30- and 60-years old Alzheimer's disease is the most common cause of dementia among the elderly. [15].

Dr. Alois Alzheimer's illness is named after him. After a lady died of an unusual mental illness in 1906, Dr. Alzheimer detected abnormalities in her brain tissue [16]. Her symptoms included memory loss, language problems, and unpredictable behaviour.After she died, he discovered many aberrant clumps (now known as in her brain, she had amyloid plaques and twisted bundles of fibres (now called neurofibrillary, or tau, tangles)[17].

These plaques and tangles in the brain are still regarded as pathological. to be among of Alzheimer's disease's most visible signs. Another indication is a condition in which nerve cells (neurons) in the brain lose their connections. [18-19]The brain, as well as the brain, muscles, and organs throughout the body, have neuronal connections, interact with one another [20]. A variety of additional more complicated brain alterations are considered to Alzheimer's disease might be caused [21].

Memory is controlled by the hippocampus, a part of the brain. formation, appears to be the source of the injury. As neurons die, they affect other parts of the brain. Damage is widespread as Alzheimer's progresses, and brain tissue has decreased significantly [22-23].

One of the most frequent early indicators of Alzheimer's disease is memory difficulties, however the severity of symptoms varies from person to person [24]. Other indications of Alzheimer's disease in its early stages include recognize the correct texts, eye side and words fixation problems, and slow learners or judgement. MCI is a disorder that can progress to Alzheimer's dementia, however not everyone with MCI develops the illness [25].

Simple chores in daily routine works even, not properly prepare meal, making payment, travel from one to another place etc. are challenging for Alzheimer's sufferers. Such patients having short memory and repeat the same thing again and again, not properly keep the things at right place moreover, cannot bale to solve the simple and find even simple things perplexing. As the illness will be progressive, the patient getting irritation, and frequent mood swings occur.[26]

Causes and Risk Factors

The reasons of Alzheimer's disease are trying to find by many researchers in various ways. It has found that a number of genes are being caused for Alzheimer’s disease [27]. It has been also studies that along with hereditary factors, a variety of environmental variables have also been associatedfor the development of Alzheimer's disease. There are other causing factors also being found like, long-term exposure to metal likesilicon or aluminium, chemicals, free radicals and traumatic head injury [28].

The origin of Alzheimer's disease is caused by a disruption of bio metal homeostasis (Cu, Zn, Fe) and oxidative stress in brain cells. [29-30] In the 1960s and 1970s, aluminium was discovered as a possible cause of Alzheimer's disease. Concerns regarding aluminium contamination in everyday products such as cooking pots, foil, beverage cans, antacids, and antiperspirants arose as a result of this assumption [31]. Although studies have found no indication that aluminium plays a role in Alzheimer's disease since then, few experts feel that long-term exposure to aluminium sources poses a concern. According to an increasing body of data, vascular risk factors for illness Diabetes, hypertension, and high cholesterol and stroke are all risk factors for Alzheimer's disease and dementia. [32]]

Symptoms and Sign of Alzheimerdisease

Memory loss is the most common sign of Alzheimer's disease.,and characterised by behaviours such as forgetting appointments, being away from home, misplacing belongings, and asking the same questions again and over. In addition to memory difficulties, sleeplessness, anxiety, melancholy, disruptive behaviour, and hallucinations are all symptoms of Alzheimer's disease. Numerous investigations suggested, evidence that brain metabolic activity reduction is caused or exacerbated of Alzheimer's disease [33-35].

Three steps are most crucial for Alzheimer's disease, may be divided into, each with its own set of signs and symptoms [36]. The common symptoms of disease are dilemma, amnesia, disorientation, recent reminiscenceharm, and behaviour change are all symptoms mostly occurs from lasts two to four years [37]. On second stage, might span anywhere from two to 10 years,loss in recognition, decreased heed span, phantasms, impatience, muscular tremors, reduced explanation ability, high level of anger, and increased difficulty to organise ideas are allcommonsymptoms.In Stage Three, which lasts one to three years and is linked to risk factors including age and brain damage, self-gratification, difficulties, in chewing and swallowing the development of topical problem related to skin, and seizures are prevalent. [38]

Diagnosis

There is no early sign of disease at early stage therefore, it is very difficult to recognize Alzheimer's disease at preliminary stage so that treatment may not begin as soon as possible. To optimise the chances of enjoying a normal and healthy life, these herbal therapies should begin as soon as possible following diagnosis (together with regular brain exercises) [40-41].

A comprehensive examination that includes the following tests can correctly identify Alzheimer's disease:

• A neurological examination

• Various test of anaemia, vitamin deficiencies, and other diseases so that rule out chances of these disease.

• Complete medical and psychological history [42].

• A mental state assessment to assess a person's ability to think and remember things Having a conversation with family members or carers [43].

Psychiatric Assessment The following tests are used to diagnose Alzheimer's disease: Mental Status Examination (MSE), One of the most significant diagnostic tests for dementias like Alzheimer's disease.[44]

For Alzheimer's disease, The Mini-Cog test is performed which takes around three minutes and is widely used in emergency departments for individuals [45].

Urine analysing test: To determine whether you have Alzheimer's disease or another kind of dementia., the doctor will do a variety of tests, including a urine study. Urinalysis (urine testing) detects abnormalities in the urine. Urinalysis can identify a variety of illnesses or disorders, including severe renal disease, that have

symptoms that are similar to dementia [46].Mild Cognitive Impairment (MCI) is a condition in which a person's capacity to think and remember things is impaired (MCI): -People may dread the beginning of dementia while, in reality, they are suffering from moderate cognitive impairment.People may dread the beginning of dementia when, in reality, they are suffering from moderate cognitive impairment [47].

Dementia Diagnosis Visual Cues:There are several visible indicators that someone is suffering from Alzheimer's disease, is a kind of dementia. It's conceivable that your personal hygiene, clothes, and look will deteriorate. Although visual clues are helpful, they only disclose one element of human behaviour and appearance that might lead to a diagnosisThe Mini Mental State Examination (MMSE) is the most common memory test, and it can aid in dementia diagnosis. [48]

Lumbar Puncture test

Although lumbar puncture is not commonly used in dementia testing, it might identify unusual illnesses that resemble dementia symptoms. The Mini Mental State Examination (MMSE) is the most frequent memory test, and it can help in dementia diagnosis.

The electroencephalogram (EEG) is a valuable tool for Alzheimer's disease diagnosis. The EEG shows a widespread and symmetrical slowing of the brain waves in those who have the illness. [49]

Side effect of allopathic drugs in Alzimer’s disease

In the allopathic treatment lots of options are there for the treatment of Alzimer disease treatment but these drugs do have some serious side effect as well, therefore, the belief of people are shifting towards herbal drugs[50].

Alzheimer's illness and medicinal herbs

A wide range of phytocompounds found in medicinal plants can be isolated and utilised as a raw material in various scientific approaches. In Pharmaceutical field, Secondary metabolites from plants are also significant commercially, and are utilised. Medicinal plants have recently acquired widespread popularity as a result of their fewer negative effects as compared to manufactured medications and the need to satisfy the medical needs of an ever-increasing human population.[51]However, owing to a number of circumstances, maintaining a steady supply of source material is challenging. such as geographical dispersion, climate variations, cultural traditions, labour costs, the Overexploitation by pharmaceutical firms and the selection of better plant stock [52]*Centella asiatica, Ginkgo biloba, Withania somnifera, Bacopa monnieri, Salvia officinalis, Melissa officinalis, Tinospora cordifolia, Glycyrrhiza glabra, Centella asiatica, Ginkgo biloba, Withania somnifera, Bacopa monnieri, Salvia officinalis, Melissa officinalis, Tinospora cordifolia, Glycyrrhiza glabra,* and other medicinal herbs can help with Alzheimer's disease[53]

***Withania somnifera* (Ashwagandha)**

Nerve tonic *Withania somnifera* is a renownedAyurvedic herbhelpful to overcomeoradjust to stress of body. It is a member of the Solanaceae family, root is frequentlybeing utilised.It has scavenging free radicals, antioxidants,

and the immune system boosting properties.W. somnifera has a calming effect, whilst other adaptogens have a stimulating effect, hence has beneficial for patients.

A recent research of *W. somnifera* revealed that it reduced tension and difficulty to focus, as well as corrected amnesia, in a dose-dependent way, with no side effects [10]. Among the phytocompounds discovered in *W. somnifera* are withanolides A to Y, withasomidienone, withasomniferin A, dehydro withanolide R, withaferin A, withasomniferols A to C, and withanone, phytosterols sitoindosides VII to X, beta-sitosterol, alkaloids, amino acids, and substantial amounts of iron, phytosterols sitoindosides VII to X, phytosterol [54].

Free radicals produced at the start and throughout the process of Alzheimer's disease have been discovered as scavenged by withanamides. It reduced amyloid plaque-induced neuronal cell death. 12 The -amyloid (A 25-35) active motif is bound by withanamides A and C in particular, inhibiting fibril formation, according to molecular modelling studies [55].

Aacetylcholine content and cholineacetyl transferase activity will be enhanced while Aqueous extracts of *W. somnifera* are being used and it also enhanced cognition and memory in rats. In addition to methanol extracts of W. somnifera restored amyloid peptide-induced memory loss by restoring pre- and post-synapses in neurons. impairment in mice. It has also been seen inthat;in vivo effects lasted longeven after the drug was withdrawn [56].

***Bacopa monnieri* (Brahmi)**

The Scrophulariaceae family includes Bacopa monnieri. This plant grows in wet, marshy areasIt is commonly used as a nerve tonic in Ayurvedic medicine. Apart from its this activity, it also exhibits other activities like, cardiotonic, diuretic, anti-asthma, sleeplessness, epilepsy, and rheumatism treatment. Betulic acid, sterols, alkaloids, polyphenols, and sulfhydryl compounds, betulic acid, sterols, alkaloids, polyphenols, and sulfhydryl compounds, betulic acid, sterols, alkaloids, polyphenols, and sulfhydryl compounds, betulic acid, sterols, alkaloids, polyphenols, and sulfhydryl compounds, as well as sterols, alkaloids, polyphenols, and sulfhydryl compounds, all. *B. monnieri* has traditionally been Memory and cognitive function are aided by this supplement. The neuropharmacological and nootropic effects of *B. monnieri* extracts have been widely researched.*B. monnieri* increases activity of protein kinases in the hippocampus, which contributes to its memory-enhancing effects. The rat models revels that,*B. monnieri*is very effective for prevention of cholinergic degradation and improved cognition [57].

A standardised *B. monnieri* extract was shown to restore cognitive impairments caused by intra-cerebroventricular administration of Ibotenic acid and colchicines were injected enters the basalis magnocellularis nucleus. In the frontal cortex of the hippocampus, B. *monnieri* restored acetylcholine depletion, decreased choline acetyltransferase activity, and reduced muscarinic cholinergic receptor binding in the same researchBy reducing cellular acetylcholinesterase activity, B. monnieri extracts protected neurons against amyloid-induced cell death.The presence of reactive oxygen species was decreased in neurons treated with *B. monnieri extract,* suggesting that it suppressed oxidative stress within the cell [58].

***Centella asiatica* (Gotu Kola)**

Centella asiatica is a plant that may be found in India, Sri Lanka, and Bangladesh, and belongs to the Apiaceae family. Triterpenes, asiatic acid, asiaticoside, adecassoside, sapogenins, glycosides, madecassic acid, vellarin, and centelloside are among the bioactive chemicals identified in it. In vitro, asiatic acid and asiaticoside reduced hydrogen peroxide-induced cell death, free radical concentrations, and prevented -amyloid cell death, suggesting that they may have a role in Alzheimer's disease therapy and toxicity prevention. In mouse brains, *Centella asiatica* extracts decreased -amyloid disease and changed oxidative stress response components.It is a necessary plant for nerve brain cells to function properly, also improve intelligence, memory, and lifespan [59].

Ginkgo biloba

Ginkgo biloba is a kind of plant that belongs to the *Ginkgoaceae*intimate and is endemic, China. Blood circulation issues, awareness loss, depression, and headaches are all treated with ginkgo biloba extract. 28 According to the researchers, this extract included around Flavonoid's account for 24% of the total, whereas terpene lactones account for 6%.Apoptosis inhibition, preventing membrane lipid peroxidation, anti-inflammatory actions, and lowering -amyloid aggregation are only a few of the benefits.all molecular and cellular neuroprotective mechanisms that standardised ginkgo extract has been shown to have.There have been a lot of clinical studies done on its possible involvement in cognitive problems [60]. Ginkgo biloba treatment enhanced the acquiring, storing, and recalling of a two-response food reward sequence in mice.*Ginkgo biloba* improves cognitive performance without affecting the histopathological implications of overexpression in an Alzheimer's disease animal model of amyloid precursor protein.AChE inhibition alleviated scopolamine-induced passive avoidance deficits, and *ginkgo biloba* extract decreased the acetylcholinesterase activity in the brain significantly. Increased baseline acetylcholine levels are associated with decreased acetylcholinesterase activity.

***Curcuma longa* (Turmeric)**

Curcuma longa, a Zingiberaceae plant Anti-inflammatory property has been linked to a lower risk of Alzheimer's disease.*Curcumin longa*inhibits plaque formation as a result, oxidative stress and amyloid disease develop in the brain. are reduced.In Southeast Asian nations,usually eat turmeric regularly, it has found that,have a 4.4-fold decreased risk of Alzheimer's disease [61].

Research was conducted on mice, with modest dosages of Curcumin administered and it was found that,a level of 40% in Alzheimer's disease decreased when they were to a control medication. Curcumin caused a 43 percent reduction in plaque load when administered at a lower dose, in the brains of animals with Alzheimer's illness. Another study was also suggested that the property of anti-inflammatory ofturmeric one the reason to lower incidence of disease [62].

Glycyrrhiza glabra

This plant,in scopolamine-induced dementia, it has been found to enhance memory.. Linalool oxide, geraniol, glycyrrhizin, tannin, trimethylpyrazine, trimethyl are the content which are responsible for given the Anti-Alzheimer effect. During the study it has also been found that*Glycyrrhiza glabra* improves the memory in mice. While study three dosage of extract were given in the levels of 75, 150, and 300mg/kg, for the seven days, among all doses, the 150mg/kg dose was proved to be the most effective Therefore, appropriate quantity of dose could be beneficial in Alzheimer's disease treatment [63].

Lepidium meyenii

It is a member of the *Brassicaceae* family and is renowned for enhancing memory and learning ability. It was found to improve cognition in Alzheimer's sufferers. It improves memory by raising acetylcholine levels in the brain. Because of its acetylcholinesterase inhibitory and antioxidant properties, it improves memory impairment caused by ovariectomy [64].

Magnolia officinalis

It comes from the *Magnoliaceae* family and helps with scopolamine-induced memory loss. It suppresses the action of acetyl cholinesterase. Magnolol and honokiol, both produced from *Magnolia officinalis*, can boost choline acetyltransferase activity. Inhibits the cleavage of acetylcholine and has been demonstrated to release acetylcholine from the hippocampus. Honokiol works by preventing the formation of reactive oxygen species (ROS).which has anti-inflammatory properties. Magnolia officinalis' antioxidant and anti-inflammatory properties are important in Alzheimer's therapy [65].

***Tinospora cordifolia* (Giloy)**

Tinospora cordifolia, a member of the *Menispermaceae* family, has been shown to improve memory in both normal and memory-impaired animals. Choline supplementation improves cognitive performance by stimulating the immune system and boosting acetylcholine production. *Tinospora cordifolia is a learning and memory booster according to Ayurveda. Tinospora cordifolia* roots aqueous extract enhanced logical memory and verbal learning [62-63].

***Convolvulus pluricaulis* (Shankhpushpi)**

*Convolvulus pluricaulis*is the member of is a memory booster that belongs to the *Convolvulaceae family.* According to a research, *Convolvulus pluricaulis* aqueous extract and ethyl acetate improve memory and enhance the learning capacities. The use of this plant is found to maintain the calmness by regulating the level of stress hormone like cortisol and adrenaline in the body. During the studies, it was observed that it enhances the level of learning and memory in rats while giving ethanolic extract to them. *Convolvulus pluricaulis* administration enhanced acetylcholinesterase activity in hippocampal CA1 and CA3 areas linked to memory and learning skills [64].

Conclusion

Due to the various serious side effect of allopathic drug, ayurvedic medicine drown the attention of patients owing to that the herbal medicine becoming more popular day by day. Medicinal plants have a wide range of bioactive chemicals that,it's possible to utilise it to treat Alzheimer's disease. instead of manufactured drugs.Therefore, there an alternative for patients to opt the herbal medicine instead of synthetic product in order to treat Alzheimer's illness that is what, this article has discussed the use and scope many medicinal plants which can be frequently used in Alzheimer's disease therapy. Still, big issue is that there are no specific mechanisms of action of herbal plant has not been found, this is the area of concern which has to addressed by

researcher. Although, the preliminary studies have been carried out only on small animals but it has to be elaborated and further, the extract of herbal plant should be tested on larger population for establishing this plant as a drug with a valid proof.

NOTE:

The study highlights the efficacy of "Ayurved" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

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