Ilam University of Medical Sciences

Plant Biotechnology Persa

Online ISSN: 2676-7414

Homepage: https://pbp.medilam.ac.ir

Phytopharmacology in Alzheimer's Disease: A Review of Iranian Traditional Medicine

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Article Info

Article type:

Review Article

Article History:

Received: 10 April 2025
Revised: 29 September 2025
Accepted: 27 October 2025
Published: 17 October 2025

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A B S T R A C T

Objectives: Alzheimer's disease (AD) is among the most prevalent neurodegenerative disorders affecting the elderly, characterized by memory decline, impaired cognitive function, and behavioral alterations. Given the limited efficacy and potential side effects of conventional pharmacological treatments, there is increasing interest in complementary therapies, particularly medicinal plants. Iranian traditional medicine (ITM), as a rich repository of therapeutic knowledge, contains extensive clinical experience and recommendations for enhancing memory and preventing cognitive decline. This review aims to examine both classical ITM sources and contemporary scientific literature regarding medicinal plants with potential efficacy in preventing and managing Alzheimer's disease.

Methods: This study is a literature review based on authoritative ITM sources, the works of prominent Persian scholars, and recent scientific publications indexed in databases including PubMed, Scopus, Google Scholar, SID, and Magiran.

Results: According to ITM texts, several plants including white mulberry, black mulberry, rosemary, sage, frankincense, parsley, thyme, lavender, peppermint, chamomile, walnut, beetroot, apple, sainfoin, saffron, St. John's wort, jujube, turmeric, bitter almond, fig, thyme-leaved savory, cinnamon, green tea, spinach, lettuce, lemon balm, grape, coconut, ginger, damask rose, bergamot, sesame, Persian hogweed, borage, hyssop, valerian, basil, and chicory have been reported to exert beneficial effects in the context of Alzheimer's disease.

Conclusion: This review demonstrates that many plants cited in ITM contain bioactive phytochemicals such as flavonoids, terpenoids, alkaloids, and phenolic compounds. Through mechanisms including acetylcholinesterase inhibition, reduction of oxidative stress, modulation of neuroinflammation, and improvement of cerebral blood flow, these plants may contribute to the prevention or slowing of Alzheimer's disease progression. Administration of rosemary, sage, saffron, frankincense, lemon balm, and turmeric in the form of herbal medicines or dietary supplements represents a potentially safe and effective adjunctive approach. Nevertheless, further clinical trials are essential to confirm their safety, optimal dosing, and potential drug interactions.

Keywords: Alzheimer, Phytopharmacology, Iranian Traditional Medicine, Medicinal plants, Memory; Remedy

➢ **How to cite this paper**

Kiani A. Phytopharmacology in Alzheimer's Disease: A Review of Iranian Traditional Medicine. Plant Biotechnology Persa ۲۰۲۶; ۸(2): Proof.

Publisher: Ilam University of Medical Sciences

Introduction

Psychiatric and neurological disorders profoundly impact behavior, cognition, and quality of life. Therefore, timely diagnosis and management are essential to reduce both individual and societal burdens [1-3].
Alzheimer's disease (AD) is one of the most common neurodegenerative disorders among older adults. It causes progressive and irreversible decline in memory, thinking, and other cognitive functions [4]. Beyond personal health effects, AD also places a heavy social and economic burden on families and healthcare systems (4). With the rise in life expectancy and aging populations, it is estimated that by 2050, more than 130 million people will be affected by AD worldwide [4].

Symptoms of AD appear gradually and vary by disease stage. In the early phase, patients often experience short-term memory loss, difficulty finding words, and problems managing daily activities [5]. As the condition advances, cognitive and behavioral impairments worsen. Patients may become disoriented, fail to recognize familiar people or places, and develop mood swings. In later stages, swallowing difficulties, incontinence, and complete dependence on caregivers are common [5].

The exact cause of AD remains unclear, but several molecular and cellular mechanisms contribute to its development. These include beta-amyloid plaque accumulation, tau protein hyperphosphorylation, oxidative stress, chronic inflammation, and neurotransmitter imbalance [6]. Other risk factors such as genetics, age, sex, lifestyle, cardiovascular health, head injuries, social isolation, and poor sleep quality may also influence disease onset [7].

Diagnosis depends on clinical assessment and medical history because there is no single definitive test [8]. Neurologists use various tools, including neurological examinations, brain imaging (CT, MRI, PET, FDG), balance and motor assessments, and amyloid imaging, to evaluate brain function and detect abnormalities [9].

Currently, there is no definitive cure for AD. Available treatments mainly aim to relieve symptoms [10]. Cholinesterase inhibitors such as donepezil, galantamine, and rivastigmine help improve memory and learning. Memantine reduces excessive neuronal stimulation in moderate to advanced stages, while antidepressants help manage mood and behavioral symptoms [11]. Despite these options, drug efficacy is limited, and side effects are common [12].

The search for safer and more effective therapies especially plant-derived medicines has become a key research priority in AD management [13]. Iranian traditional medicine (ITM), with thousands of years of history, provides a vast source of plant-based remedies and therapeutic knowledge [14]. Many ITM plants contain bioactive compounds with neuromodulatory effects that may influence AD-related molecular pathways [15]. Modern phytopharmacological studies have also confirmed that some of these plants exhibit antioxidant, anti-inflammatory, anti-amyloid, and neuroprotective properties, making them potential adjuncts or alternatives in AD treatment [16].

This review aims to summarize and analyze existing evidence on ITM-based medicinal plants and their biological mechanisms related to AD. The findings may help expand scientific understanding of plant-derived therapies and support the development of safe, natural interventions for AD management

Methods

This systematic review aimed to identify and analyze medicinal plants effective in alleviating or modulating AD symptoms according to Iranian traditional medicine and to explore their potential biological mechanisms. The study followed a multi-step, methodologically rigorous process [17–25].

Sources Examined: Initially, primary ITM sources were comprehensively reviewed. Subsequently, to align findings with contemporary scientific data, searches were conducted in international and domestic databases including PubMed, Scopus,

Google Scholar, SID, and Magiran to identify relevant studies on herbal AD treatments.

Search Strategy: Keywords in both Persian and English such as "Alzheimer's," "cognitive disorder," "herbal medicine," "phytotherapy," "Iranian traditional medicine," and "mechanism of action" were combined using Boolean operators (AND, OR) to ensure a precise and comprehensive search.

Inclusion Criteria: Studies assessing the effects of medicinal plants on cognitive, behavioral, or neurological symptoms of AD were included. ITM sources referencing plants with potential memory-enhancing, neuroprotective, or mood-modulating effects were also considered.

Exclusion Criteria: Studies lacking full text, non-peer-reviewed research, non-AD-related studies, and non-herbal interventions were excluded. Reviews without empirical data were omitted from final analysis.

Data Analysis and Organization: Extracted data were categorized by plant species, active compounds, reported effects, and potential mechanisms. Findings were organized into summary tables and analytical charts to facilitate comparison and scientific interpretation.

Results

Based on authoritative ITM sources and contemporary scientific literature, numerous plants have been reported to prevent or ameliorate AD symptoms. The following species were most frequently cited and studied:

Morus alba L., Morus nigra L., Salvia rosmarinus L., Salvia officinalis L., Boswellia sacra Flückiger & Riedel, Petroselinum crispum (Mill.) Nyman, Thymus vulgaris L., Lavandula angustifolia Mill., Mentha piperita L., Matricaria chamomilla L., Juglans regia L., Beta vulgaris L., Malus domestica Borkh., Ferula assa-foetida L., Crocus sativus L., Hypericum perforatum L., Ziziphus jujuba Mill., Curcuma longa L., Prunus amygdalus var. amara, Ficus carica L., Rosmarinus officinalis L., Cinnamomum verum J. Presl, Camellia sinensis (L.) Kuntze, Spinacia oleracea L., Lactuca sativa L., Melissa officinalis L., Vitis vinifera L., Cocos nucifera L., Zingiber officinale Roscoe, Rosa damascena Mill., Aloysia citrodora Paláu, Sesamum indicum L., Heracleum persicum Desf., Borago officinalis L., Hyssopus officinalis L., Valeriana officinalis L., Ocimum basilicum L., Cichorium intybus L.

These plants contain bioactive phytochemicals such as flavonoids, terpenoids, phenolics, and alkaloids, which may exert neuroprotective and therapeutic effects through mechanisms including acetylcholinesterase inhibition, reduction of oxidative stress, modulation of neuroinflammation, and enhancement of cerebral blood flow.

Table 1 provides a comprehensive list of medicinal plants reported to prevent or treat AD, based on ITM sources.

Table 1: List of Medicinal Plants Effective in the Prevention and Treatment of Alzheimer's Disease Based on Iranian Traditional Medicine Sources

Persian Name	English Name	Scientific Name	Family	Summary of Anti-Alzheimer's Mechanisms [26]
Tootesefid	White Mulberry	*Morus alba* L.	Moraceae	Arylbenzofuran derivatives and flavonoids inhibit AChE, BACE1, and GSK-3β; exhibit antioxidant and neuroprotective effects in experimental models
Tootesiah	Black Mulberry	*Morus nigra* L.	Moraceae	Potent antioxidant activity, reduction of ROS generation, neuroprotection, and improvement of cognitive performance in limited animal and clinical studies
Rozmari	Rosemary	*Salvia rosmarinus* L.	Lamiaceae	Antioxidant, anti-inflammatory, inhibition of oxidative stress and Aβ aggregation; enhancement of endogenous antioxidant enzymes and synaptic protection
Maryamgoli	Sage	*Salvia officinalis* L.	Lamiaceae	Inhibition of AChE, memory enhancement in mild-to-moderate AD clinical trials, antioxidant and anti-inflammatory properties
Kondor	Frankincense	*Boswellia sacra* Flückiger & Riedel	Burseraceae	Boswellic acids reduce microglial inflammation, inhibit NF-κB inflammatory pathways, promote neuroprotection, and reduce apoptosis (preclinical evidence)
Jafari	Parsley	*Petroselinum crispum* (Mill.) Nyman	Apiaceae	Rich in flavonoids and antioxidants; reduces oxidative stress and may inhibit acetylcholinesterase (limited preclinical evidence)
Avishan	Thyme	*Thymus vulgaris* L.	Lamiaceae	Phenolic extracts show antioxidant, anti-inflammatory, and AChE-inhibitory effects with neuroprotection in animal models

Ostokhodous	Lavender	*Lavandula angustifolia* Mill.	Lamiaceae	Exhibits anxiolytic, antioxidant, and anti-stress properties; may improve behavioral symptoms and quality of life in AD (limited supportive data)
Naenafelfeli	Peppermint	*Mentha piperita* L.	Lamiaceae	Anti-inflammatory and antioxidant effects; improves cognitive performance in animal models; menthol compounds may modulate neuroimmune responses
Babouneh	Chamomile	*Matricaria chamomilla* L.	Asteraceae	Sedative, anti-inflammatory, and antioxidant effects; may alleviate anxiety and insomnia, indirectly reducing cognitive burden; limited direct anti-Aβ evidence
Gerdou	Walnut	*Juglans regia* L.	Juglandaceae	Omega fatty acids and polyphenols exhibit antioxidant, anti-inflammatory, and synaptic protective effects, potentially reducing Aβ deposition (animal/epidemiological data)
Ghoghondar	Beetroot	*Beta vulgaris* L.	Amaranthaceae	Nitrates and antioxidants improve cerebral blood flow, reduce oxidative stress, and confer organ protection; limited direct anti-Aβ evidence
Sib	Apple	*Malus domestica* Borkh.	Rosaceae	Polyphenols (flavans) reduce oxidative and neuroinflammatory damage, enhance synaptic protection, and lower toxic protein aggregation in models
Saadekofi	Asafoetida	*Ferula assa-foetida* L.	Apiaceae	Sulfur and phenolic compounds provide antioxidant and anti-inflammatory effects; limited preclinical evidence for direct anti-AD activity
Zafaran	Saffron	*Crocus sativus* L.	Iridaceae	Multiple RCTs and meta-analyses show cognitive improvement comparable to reference drugs; mechanisms: antioxidant, anti-inflammatory, anti-apoptotic, Aβ aggregation inhibition, and BDNF upregulation

Goleraei	St. John's Wort	*Hypericum perforatum* L.	Hypericaceae	Antioxidant and anti-inflammatory properties; acts as an antidepressant via serotonin/norepinephrine modulation, improving behavioral symptoms; notable drug interactions
Anaab	Jujube	*Ziziphus jujuba* Mill.	Rhamnaceae	Antioxidant and anti-inflammatory effects; neuroprotection and cognitive improvement observed in preclinical studies
Zardchobeh	Turmeric	*Curcuma longa* L.	Zingiberaceae	Curcumin inhibits Aβ aggregation, reduces microglial inflammation, and prevents τ-hyperphosphorylation; potent antioxidant with mixed clinical outcomes due to low bioavailability
Badamekouhi	Wild Almond	*Prunus amygdalus* var. *amara*	Rosaceae	Source of structured lipids and polyphenols; limited evidence for neuroprotective and antioxidant activity, sparse data on AD mechanisms ([ScienceDirect][5]).
Anjir	Fig	*Ficus carica* L.	Moraceae	Polyphenolic antioxidants confer neuroprotection and reduce oxidative stress in preclinical AD models
Aklilekouhi	Rosemary (syn.)	*Rosmarinus officinalis* L.	Lamiaceae	Similar to *S. rosmarinus* antioxidant, anti-inflammatory, Aβ aggregation inhibition, and enhancement of endogenous antioxidant defenses
Darchin	Cinnamon	*Cinnamomum verum* J. Presl	Lauraceae	Cinnamaldehyde and polyphenols inhibit Aβ aggregation, improve brain insulin sensitivity, and reduce oxidative and inflammatory damage (animal studies)
Chayesabz	Green Tea	*Camellia sinensis* (L.) Kuntze	Theaceae	EGCG and catechins inhibit Aβ aggregation, promote plaque clearance, reduce oxidative/inflammatory stress, and enhance synaptic function; supported by epidemiological data
Esfenaj	Spinach	*Spinacia oleracea* L.	Amaranthaceae	Rich in vitamins and carotenoids; reduces oxidative and inflammatory damage and supports vascular and synaptic health (epidemiological/preclinical data)

Kahou	Lettuce	*Lactuca sativa* L.	Asteraceae	Antioxidant and mild sedative properties; limited preclinical evidence for direct anti-AD effects, possibly indirect through anxiety/sleep improvement
Badranjbouye	Lemon Balm	*Melissa officinalis* L.	Lamiaceae	Inhibits AChE, exhibits anxiolytic and antioxidant effects; clinical studies report memory improvement and reduced behavioral symptoms
Angour	Grape	*Vitis vinifera* L.	Vitaceae	Resveratrol and polyphenols act as strong antioxidants and anti-inflammatory agents, reduce Aβ aggregation, and enhance neuronal protective pathways
Nargil	Coconut	*Cocos nucifera* L.	Arecaceae	Medium-chain triglycerides may alter brain energy metabolism; antioxidant and metabolic benefits with limited and controversial anti-Aβ evidence
Zangabil	Ginger	*Zingiber officinale* Roscoe	Zingiberaceae	6-Gingerol and 6-Shogaol show antioxidant, anti-inflammatory, anti-apoptotic, and synaptic protective effects in AD and cognitive impairment models
Golemohammadi	Damask Rose	*Rosa damascena* Mill.	Rosaceae	Phenolic and gallic acid derivatives exhibit antioxidant and anti-inflammatory effects; limited evidence for direct anti-AD mechanisms
Behlimou	Lemon Verbena	*Aloysia citrodora* Paláu	Verbenaceae	Antioxidant and sedative effects; limited preclinical or physiological evidence for direct anti-AD activity
Kinjed	Sesame	*Sesamum indicum* L.	Pedaliaceae	Lignans (sesamol, etc.) exert antioxidant, anti-lipid peroxidation, and neuroprotective effects; limited evidence for direct anti-Aβ activity
Golpar	Persian Hogweed	*Heracleum persicum* Desf.	Apiaceae	Phenolic content exhibits antioxidant activity; very limited evidence for anti-AD mechanisms

Gavzaban	Borage	*Borago officinalis* L.	Boraginaceae	Source of omega-6 fatty acids and antioxidants; limited preclinical neuroprotective evidence
Zoufa	Hyssop	*Hyssopus officinalis* L.	Lamiaceae	Contains phenolic antioxidants; limited preclinical data on direct anti-AD effects
Sonboloteib	Valerian	*Valeriana officinalis* L.	Valerianaceae	Sedative and anxiolytic effects may improve behavioral symptoms in AD; limited direct anti-Aβ evidence
Rehyan	Basil	*Ocimum basilicum* L.	Lamiaceae	Antioxidant and anti-inflammatory properties with neuroprotection in animal models; limited anti-Aβ evidence
Kasni	Chicory	*Cichorium intybus* L.	Asteraceae	Polyphenols and inulin exert antioxidant/anti-inflammatory effects and modulate gut microbiota, contributing indirectly to cognitive resilience

The graphical abstract of the mechanisms is presented in Figure 1.

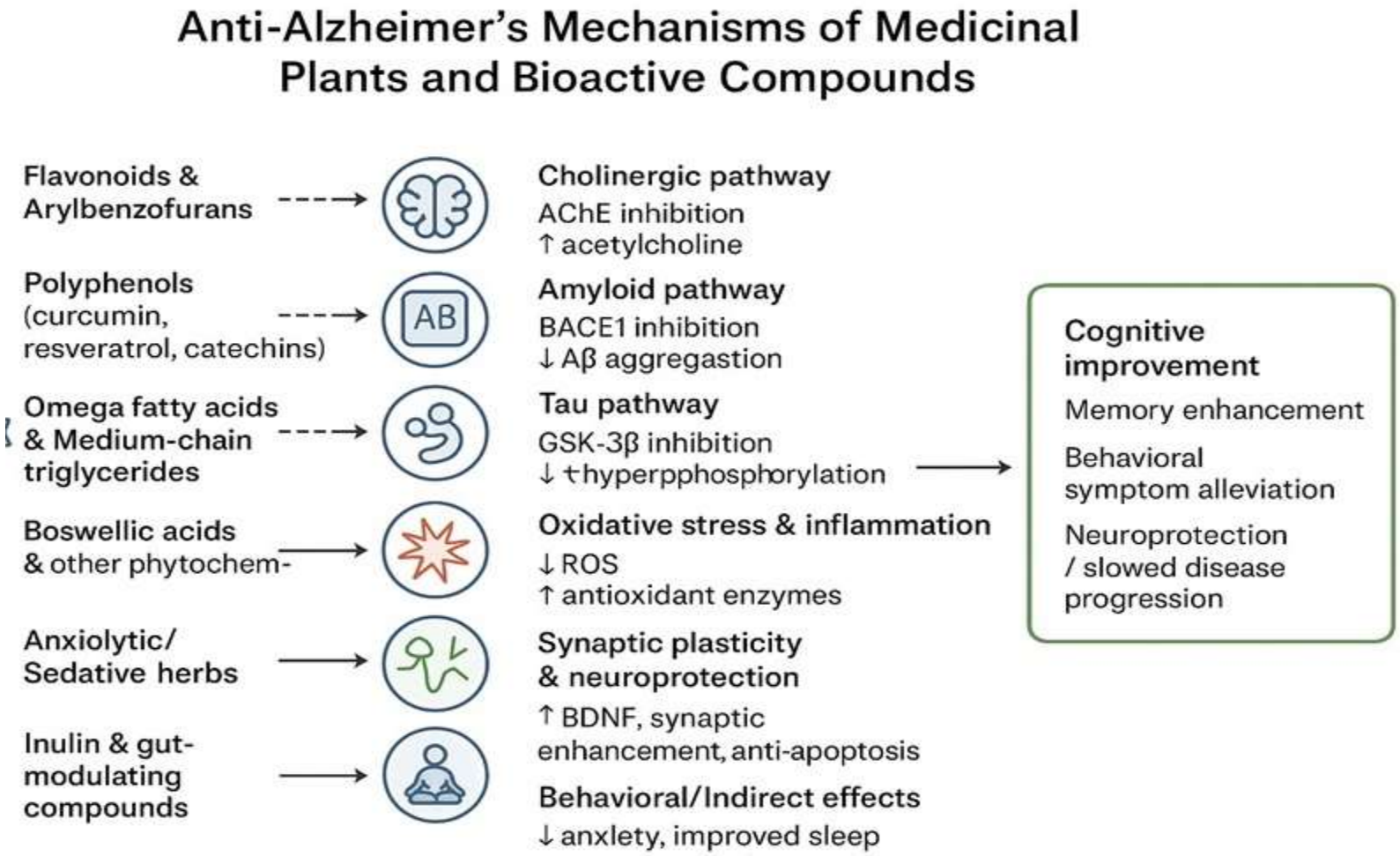

Figure 1: The graphical abstract of the mechanisms

Anti-Alzheimer's medicinal plants along with their major bioactive compounds, chemical formulas, and molecular formulas are presented in Table 2.

Table 2: Anti-Alzheimer's Medicinal Plants with Major Bioactive Compounds and Their Chemical and Molecular Formulas

Scientific Name	Major Bioactive Compound	Chemical Formula	Picture
Morus alba L.	Moracin	$C_{17}H_{26}O_3$	
Morus nigra L.	Anthocyanin	$C_{15}H_{11}O_6$	

Salvia rosmarinus L.	Rosmarinic acid	$C_{18}H_{16}O_8$	
Salvia officinalis L.	Carnosic acid	$C_{19}H_{26}O_4$	

Boswellia sacra Flückiger & Riedel	Boswellic acid	$C_{30}H_{48}O_4$	
Petroselinum crispum (Mill.) Nyman	Apigenin	$C_{15}H_{10}O_5$	

Thymus vulgaris L.	Thymol	$C_{10}H_{14}O$	
Lavandula angustifolia Mill.	Linalool	$C_{10}H_{18}O$	

Mentha piperita L.	Menthol	$C_{10}H_{20}O$	
Matricaria chamomilla L.	Apigenin	$C_{15}H_{10}O_5$	
Juglans regia L.	Eugenol	$C_{10}H_{12}O_2$	

Beta vulgaris L.	Betalain	$C_{19}H_{23}N_2O_{11}$	
Malus domestica Borkh.	Anthocyanin	$C_{15}H_{11}O_6$	

Ferula assa-foetida L.	Allicin	$C_6H_{10}OS_2$	
Crocus sativus L.	Crocin	$C_{78}H_{130}O_{76}$	

Hypericum perforatum L.	Hypericin	$C_{14}H_{10}O_5$	
Ziziphus jujuba Mill.	Saponin	$C_{18}H_{30}O_{10}$	
Curcuma longa L.	Curcumin	$C_{24}H_{24}O_6$	

Prunus amygdalus var. amara	Amygdalin	$C_{20}H_{27}NO_{13}$	
Ficus carica L.	Ficuside	$C_{16}H_{26}O_{13}$	

Rosmarinus officinalis L.	Carnosic acid	$C_{19}H_{26}O_4$	
Cinnamomum verum J.Presl	Cinnamaldehyde	C_6H_6O	

Camellia sinensis (L.) Kuntze	Catechin	$C_{18}H_{18}O_8$	
Spinacia oleracea L.	Lutein	$C_{66}H_{104}O_{16}$	

Lactuca sativa L.	Lutein	$C_{66}H_{104}O_{16}$	
Melissa officinalis L.	Limonene	$C_{10}H_{16}$	

Vitis vinifera L.	Resveratrol	$C_{14}H_{12}O_3$	
Cocos nucifera L.	Lauric acid	$C_{12}H_{24}O_2$	

Zingiber officinale Roscoe	Gingerol	$C_{10}H_{16}O_3$	
Rosa damascena Mill.	Glycoside	$C_{18}H_{18}O_8$	

Aloysia citrodora Paláu	Limonene	$C_{10}H_{16}$	
Sesamum indicum L.	Sesamolin	$C_{18}H_{30}O_6$	
Heracleum persicum Desf.	Furocoumarin	$C_{18}H_{18}O_8$	

Borago officinalis L.	Punicic acid	$C_{18}H_{30}O_2$	
Hyssopus officinalis L.	Ocimene	$C_{10}H_{14}O$	

Valeriana officinalis L.	Valerenic acid	$C_{15}H_{22}O_2$	
Ocimum basilicum L.	Eugenol	$C_{10}H_{12}O_2$	

Cichorium intybus L.	Intybin	$C_{15}H_{10}O_6$	

Discussion

Alzheimer's disease (AD) is one of the most prevalent neurodegenerative disorders among the elderly, characterized by memory impairment, cognitive dysfunction, and behavioral changes, all of which significantly affect patients' and their families' quality of life [26]. Despite advances in pharmacotherapy, conventional drugs primarily alleviate symptoms and may be associated with notable side effects. Consequently, the use of natural resources and plant-derived compounds rich in antioxidants has gained attention as a complementary or alternative therapeutic approach.

Plant-based antioxidants can mitigate oxidative stress, protect neurons, and enhance cognitive function, potentially slowing disease progression while producing fewer adverse effects than synthetic drugs. Moreover, their accessibility, lower cost, and higher patient acceptance further underscore the benefits of natural interventions in AD management. Several studies have demonstrated that bioactive compounds in medicinal plants such as turmeric (*Curcuma longa*), with its antioxidant and anti-inflammatory properties can reduce AD-related lesions and support neuroprotection [27]. Similarly, damask rose (*Rosa damascena*), due to its phenolic content and antioxidant and anti-inflammatory effects, has been shown to improve memory and may serve as a potential adjunctive therapy for preventing or slowing disease progression [28]. Medicinal plants used in traditional Chinese medicine, including *Ginkgo biloba*, *Polygala tenuifolia*, *Melissa officinalis*, and sesame, can enhance cognitive performance in AD patients by reducing neuroinflammation, providing neuroprotection, and inhibiting relevant enzymes. However, further studies are required to validate the long-term efficacy and safety of these complementary treatments [29]. Extracts and essential oils of *Ferula haussknechtii* have also demonstrated significant inhibitory effects on acetylcholinesterase activity [30]. Other studies indicate that dietary interventions and Iranian traditional medicinal plants such as saffron, ginger, belileh, amla, and ashpand can alleviate AD symptoms through anti-inflammatory, antioxidant, and anti-amyloid aggregation effects. Pharmacological evaluations and additional clinical trials are essential to confirm the efficacy of these compounds [31]. For instance, the combination of hyssop (*Hyssopus officinalis*) extract with donepezil in a mouse model of AD improved spatial memory deficits induced by streptozotocin (STZ), suggesting that integrating herbal extracts with conventional drugs may offer more effective therapeutic strategies [32]. Animal studies further indicate that plants such as frankincense, jujube, red pepper, turmeric, arone, and ginseng can enhance memory and learning by inhibiting acetylcholinesterase, reducing amyloid accumulation, and exerting antioxidant effects. Investigating the effects of these plants and their bioactive constituents in human trials is recommended [33]. Traditional medicinal plants, including *Ginkgo biloba*, *Salvia officinalis*, and *Melissa officinalis*, possess antioxidant, neuroprotective, and cholinergic properties that can improve cognitive performance. Integrating traditional approaches with modern scientific findings can advance our understanding of AD pathophysiology and facilitate the development of more effective therapies [34]. A review conducted in Iran reported that plants such as cinnamon, ginger, helileh, frankincense, saffron, long pepper, saad, clove, valerian, oud, mastic, rose, vagh, amla, bahman, asaroon, lavender, belileh, raisin, lemon balm, and aqerqarha have been used in AD management [35]. Moreover, medicinal plants including *Ginkgo biloba L.*, *Salvia officinalis L.*, *Huperzia serrata (Thunb. ex Murray)*, *Acorus calamus L.*, *Angelica archangelica L.*, *Bacopa monniera Wettst.*, *Biota orientalis L.*, *Celastrus paniculatus Willd.*, *Centella asiatica L.*, *Clitoria ternatea L.*, *Codonopsis pilosula Franch.*, *Convolvulus pluricaulis Chois.*, *Coptis chinensis Franch.*, *Crocus sativus L.*, *Curcuma longa L.*, *Evodia rutaecarpa (Juss.) Benth.*, *Hypericum perforatum L.*, *Magnolia officinalis Rehd. & Wils.*, *Melissa officinalis L.*, *Piper methysticum Frost.*, *Polygala tenuifolia Wild.*, *Rheum spp. L.*, *Salvia lavandulaefolia Vahl.*, *Salvia miltiorrhiza Bung.*, *Terminalia chebula L.*, and *Withania somnifera L.* have demonstrated anti-Alzheimer effects and may

be considered as complementary or alternative options in disease management [36]. Considering current research, several limitations exist in the use of medicinal plants for the management of Alzheimer's disease. First, the bioavailability of many active compounds is low, which may limit their clinical efficacy. Second, the standardization of extracts remains challenging, and variability in the content of active compounds can lead to inconsistent outcomes. Third, species differences, as well as variations in harvesting and processing methods, may affect therapeutic effectiveness. Fourth, potential interactions with conventional medications necessitate careful evaluation. Finally, most studies to date are limited to animal models or in vitro experiments, and robust clinical evidence in humans is still insufficient.

Conclusion

Despite substantial phytopharmacological evidence, more extensive clinical trials are necessary to evaluate the safety, establish effective dosages, and assess potential drug interactions of these plants. Integrating the knowledge of Iranian traditional medicine with modern scientific findings can facilitate the development of safe and natural therapeutics for AD management and enhance our understanding of the disorder's pathophysiological mechanisms. Medicinal plants, due to their bioactive compounds and multifaceted effects, represent promising candidates for the prevention and treatment of Alzheimer's disease and may be employed as adjunctive or alternative options alongside conventional therapies. Further studies, particularly controlled clinical trials, are crucial to confirm the efficacy and safety of these approaches.

Declarations

Conflict of Interest

The author declares no conflict of interest related to the publication of this article.

Acknowledgements

The author extends sincere appreciation to Urmia University of Medical Sciences, Urmia, Iran for their valuable support and contributions to this research.

Consent for Publication

The author confirms that the final version of the manuscript has been reviewed and approved for publication.

Funding/Support

None.

Authors' Contributions

AK was responsible for conceptualization, review, data collection, analysis, writing, and manuscript preparation.

Ethical Approval

As this study is a review article, it does not involve human or animal subjects and therefore does not require ethical approval or informed consent.

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