



# An overview of the most important medicinal plants effective on the strength of memory and mind in Iranian ethnobotany

[Una revisión de las plantas medicinales más importantes, eficaces en el fortalecimiento de la memoria y la mente en la etnobotánica iraní]

Behrooz Farzan<sup>1</sup>, Saber Abbaszadeh<sup>2,3,4</sup>, Gholam Basati<sup>5</sup>, Hassan Teimouri<sup>1\*</sup>

<sup>1</sup>Department of Anesthesiology, Lorestan University of Medical Sciences, Khorramabad, Iran.

<sup>2</sup>Razi Herbal Medicines Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran.

<sup>3</sup>Student Research Committee, Lorestan University of Medical Sciences, Khorramabad, Iran.

<sup>4</sup>Hepatitis Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran.

<sup>5</sup>Clinical Microbiology Research Center, Ilam University of Medical Sciences, Ilam, Iran.

\*E-mail: [hassan.teimouri@gmail.com](mailto:hassan.teimouri@gmail.com)

## Abstract

**Context:** Physiologically, memory is created by changes in the synaptic conductivity from one neuron to the next neuron, leading to the emergence of new or facilitating pathways to guide messages in the neuronal circuits of the brain. Throughout the life in today's industrial conditions in which memory impairment is occurring at a faster pace, humans seek to figure out methods that prevent the development of related disorders and improve memory. The role of medicinal plants in learning and memory is one of the areas that have drawn substantial attention. Hence, this study introduces some of the most effective medicinal plants with memory improving properties according to Iranian ethnobotanical documents.

**Aims:** To analyze some of the most effective medicinal plants with memory-enhancing properties according to the Iranian ethnobotanical documents.

**Methods:** The data for this systematic review were collected from six popular databases including Institute for Scientific Information, PubMed, Google Scholar, Scientific Information Database, Magiran, and Scopus and included in the search terms the words "memory enhancement", "ethnobotany", "herbal drug", "Iran", "medicinal plants", "extracts", and "essential oils". The present dataset finally included 43 published articles.

**Results:** Based on the available evidence of the studies on Iranian ethnobotany, certain medicinal plants such as *Achillea wilhelmsii*, *Avena sativa*, *Boswellia papyrifera*, *Eruca hispanica*, *Helianthus annuus*, *Ixiolirion tataricum*, *Lagochilus acutilobus*, *Pistacia atlantica*, *Pistacia khinjuk*, *Sinapis abyssinica*, *Spinacia oleracea*, and *Vicia sativa* are among the plants that improve the mind.

**Conclusions:** According to the findings found in this review, there is evidence that the plants that grow in Iranian territory have beneficial effects on the memory enhancement.

**Keywords:** ethnobotany; Iran; medicinal plants; memory; mind.

## Resumen

**Contexto:** Fisiológicamente, la memoria se crea por cambios en la conductividad sináptica de una neurona a la siguiente neurona, lo que lleva a la aparición de nuevas o facilitadoras vías para guiar los mensajes en los circuitos neuronales del cerebro. A lo largo de la vida en las condiciones industriales actuales en las que el deterioro de la memoria se produce a un ritmo más rápido, los humanos buscan descubrir métodos que prevengan el desarrollo de trastornos relacionados y mejoren la memoria. El papel de las plantas medicinales en el aprendizaje y la memoria es una de las áreas que ha atraído una atención sustancial. Por lo tanto, este estudio presenta algunas de las plantas medicinales más efectivas con propiedades de mejora de la memoria según los documentos etnobotánicos iraníes.

**Objetivos:** Analizar algunas de las plantas medicinales más efectivas con propiedades que mejoran la memoria de acuerdo con los documentos etnobotánicos iraníes.

**Métodos:** Los datos para esta revisión sistemática se recopilieron de seis bases de datos populares, incluido el Instituto de Información Científica, PubMed, Google Académico, la Base de Datos de Información Científica, Magiran y Scopus, y se incluyeron en los términos de búsqueda las palabras "mejora de la memoria", "etnobotánica", "drogas herbales", "Irán", "plantas medicinales", "extractos" y "aceites esenciales". El presente conjunto de datos finalmente incluyó 43 artículos publicados.

**Resultados:** Basado en la evidencia disponible de los estudios sobre la etnobotánica iraní, ciertas plantas medicinales como *Achillea wilhelmsii*, *Avena sativa*, *Boswellia papyrifera*, *Eruca hispanica*, *Helianthus annuus*, *Ixiolirion tataricum*, *Lagochilus acutilobus*, *Pistacia atlantica*, *Pistacia khinjuk*, *Sinapis abyssinica*, *Spinacia oleracea* y *Vicia sativa* se encuentran entre las plantas que mejoran la mente.

**Conclusiones:** De acuerdo a los hallazgos encontrados en esta revisión, existe evidencia que las plantas que crecen en territorio iraní presentan efectos beneficiosos sobre el aumento de la memoria.

**Palabras Clave:** etnobotánica; Irán; plantas medicinales; memoria; mente.

## ARTICLE INFO

Received: April 7, 2019.

Received in revised form: April 11, 2019.

Accepted: April 12, 2019.

Available Online: April 22, 2019.

Declaration of interests: The authors declare no conflict of interest.

Funding: This study was supported by the project 2429 (Lorestan University of Medical Sciences, Iran).



---

## INTRODUCTION

---

Learning and memory are of the most important abilities of the nervous system, without which life is disturbed. Learning is a neurological phenomenon in which creatures change their behavior through exercise, while memory refers to the process of storing the learned materials (Berne and Levy, 1993). Learning and memory are very close at both cellular level behavioral levels (Lee, 2008).

Learning and memory play a fundamental role in the everyday life of humans. Memory is the basis of all teaching and learning. By identifying the compounds that can strengthen these two behaviors, many people who suffer from mental slowness and poor memory will be substantially assisted (Cown, 2009). Physiologically, memory is created by changes in the synaptic conductivity from one neuron to the next neuron, leading to the emergence of new or facilitating pathways to guide messages in the neuronal circuits of the brain (Berman and Dudai, 2001).

Available old and new documents in the history of herbalism and traditional and modern pharmacology contain valuable experiences and information about medicinal plants and phytotherapy (Jamshidi-Kia et al., 2018). Herbal drugs are usually the essences or extracts of plants found in nature that are used, as a rich source of active ingredients, to treat many diseases (Abbasi et al., 2007; 2017; Froushani et al., 2016; Bahmani et al., 2017; 2018; Shokri et al., 2018; Tajbakhsh et al., 2018). Throughout the life in today's industrial conditions in which memory impairment is occurring at a faster pace, humans seek to figure out methods that prevent the development of related disorders and improve memory.

The role of medicinal plants in learning and memory is one of the areas that have attracted the attention of many researchers (Vasudevan and Parle, 2007; Kimani and Nyongesa, 2008; Dehbani et al., 2019; Pirzad Jahromi et al., 2019). Studies have shown that many drugs are effective on

memory and learning. For example, cholinergic drugs have positive effects on memory, while anticholinergic drugs, antipsychotic drugs, anesthetic drugs, etc. can cause adverse impacts on memory (Atrons and Curthoys, 1982). Due to the side effects of these drugs on the body, and the high cost of some of these drugs for the treatment of central nervous system disorders, learning disabilities, and memory disorders, further attention has recently been paid to the use of medicinal plants (Bacciottini et al., 2001; Beheshti and Shahmoradi, 2018).

In this paper, we have reviewed the role of different medicinal plants that play an important role in the treatment of strength of memory and mind using conventional herbal therapy. Therefore, this study will report some of the most effective medicinal plants with memory-enhancing properties according to the Iranian ethnobotanical documents.

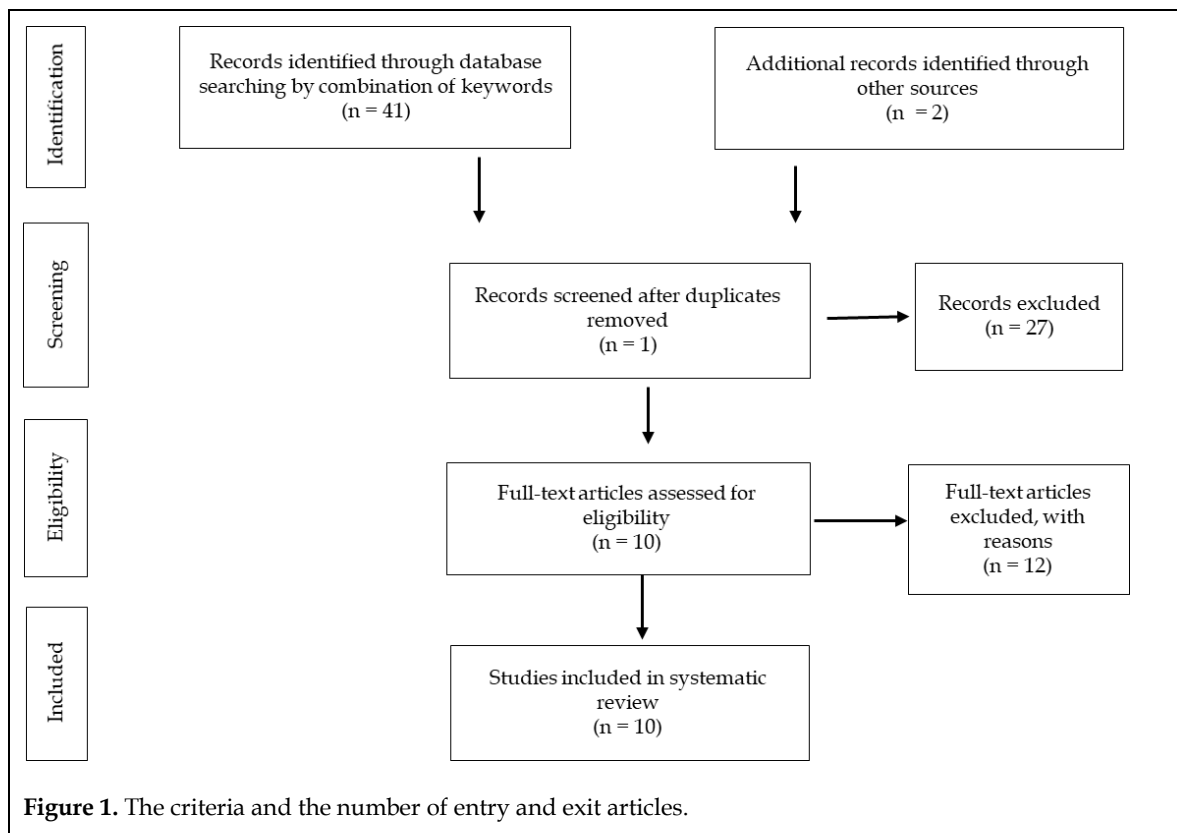
---

## METHODOLOGY

---

### Literature search

To conduct this review, information was obtained from potential eligible articles indexed in databases such as the Institute for Scientific Information, PubMed, Scopus, Scientific Information Database, Magiran, and Google Scholar using the keywords "memory enhancement", "ethnobotany", "herbal drug", "Iran", "medicinal plants", "extracts" and "essential oils". A total of 46 articles were retrieved in the initial search. The articles were reviewed. Forty-three articles were found to be potentially eligible for our analysis (Fig. 1), 10 of which were finally included in the final analysis with respect to mind- and memory-enhancing properties in Iranian ethnobotany. Of the 43 ethnobotanical papers, only 10 articles containing the information needed to enhance memory were used for review. In the other 33 articles of ethnobotanical papers, there was no traditional information in this regard.



### Selection criteria

The search strategy was based on Iran's ethnobotany documents. There are articles about ethnobotany, but no plants have been mentioned in their memory enhancement, so these articles have been deleted. In fact, the criterion was the study of ethnobotany in Iranian populations, and the criteria for the withdrawal of the ethnobotany paper, which had no information about memory enhancement.

### Data assessment

No specific analysis has been done on the data. It was merely extraction of medicinal herbs with the enhancement of memory in the text and the tables of studied articles. A total of 43 articles were retrieved articles from databases. After analysis, full-

text articles assessed for eligibility were 10 papers. In the end, 33 articles were related to ethnobotany but lacked information about memory enhancement.

## RESULTS AND DISCUSSION

Based on the results from studies on Iranian ethnobotany, some medicinal plants like *Achillea wilhelmsii* K.Koch, *Avena sativa* L., *Boswellia papyrifera* (Caill. ex Delile) Hochst., *Erucaria hispanica* (L.) Druce, *Helianthus annuus* L., *Ixiolirion tataricum* (Pall.) Herb, *Lagochilus acutilobus* (Ledeb.) Fisch. & C.A.Mey., *Leonurus cardiaca* L., *Pistacia atlantica* Desf., *Pistacia khinjuk* Stocks, *Sinapis abyssinica* A. Braun, *Spinacia oleracea* L., and *Vicia sativa* L. var. *sativa* have mind-improving properties (Table 1).

**Table 1.** Medicinal plants with strengthening the mind effects according to Iranian ethnobotany.

Family	Scientific name	Domestic name	Used organs	Region (Reference)
<i>Amaranthaceae</i>	<i>Spinacia oleracea</i> L.	Esfanaj	Leaf	Khuzistan (Abbasi et al., 2012)
<i>Anacardiaceae</i>	<i>Pistacia atlantica</i> Desf.	Pesteh kouhi	Fruit	Ilam (Ghasemi Pirbalouti et al., 2013)
	<i>Pistacia khinjuk</i> Stocks	Kolkhenak	Fruit, Gum	Abadeh (Abbasi et al., 2012)
		Khinjuk	Fruit	Joupar (Mozaffari Nejad et al., 2013)
		Baneh	Fruit	Joupar (Mozaffari Nejad et al., 2013)
<i>Brassicaceae</i>	<i>Erucaria hispanica</i> (L.) Druce	Mandabi	Aerial parts	North East of the Persian Gulf (Mozaffari Nejad et al., 2013)
	<i>Sinapis abyssinica</i> A. Braun	Khardal vahshi	Seed	Abadeh (Abbasi et al., 2012)
<i>Burseraceae</i>	<i>Boswellia papyrifera</i> (Caill. ex Delile) Hochst.	Kondor	Resin	Khuzistan (Abbasi et al., 2012)
<i>Compositae</i>	<i>Achillea wilhelmsii</i> K.Koch	Boumadaran	Aerial parts	Fasa (Mirdalimi et al., 2015)
	<i>Helianthus annuus</i> L.	Aftabgardan	Flower and seed	North East of the Persian Gulf (Mozaffari Nejad et al., 2013)
<i>Ixioliriaceae</i>	<i>Ixiolirion tataricum</i> (Pall.) Schult. & Schult.f.	Khiaarak	Inflorescence	North East of the Persian Gulf (Mozaffari Nejad et al., 2013)
<i>Lamiaceae</i>	<i>Lagochilus acutilobus</i> (Ledeb.) Fisch. & C.A.Mey.	Lab khargoushi	Flower	Natanz Kashan (Abbasi et al., 2012)
	<i>Leonurus cardiaca</i> L.	Domeh shir	Aerial parts	Behbahan (Razmjoue et al., 2018)
<i>Leguminosae</i>	<i>Vicia sativa</i> L. var. <i>sativa</i>	Aftabgardan	Flower and seed	North East of the Persian Gulf (Mozaffari Nejad et al., 2013)
<i>Poaceae</i>	<i>Avena sativa</i> L.	Jo dosar	Fruit	Fasa (Mirdalimi et al., 2015)
		Jo dosar	Flower	Sistan (Ranmanesh et al., 2010)

The scientific names of plants were confirmed using The Plant List (<http://www.theplantlist.org>).

Despite the many studies conducted to explain the mechanisms involved in memory and learning, all of the dimensions remain to be sufficiently elucidated (Hosseini et al., 2017). The presence of polyphenols with antioxidant property, such as flavonoids and resveratrol, in some plants is one of the most important reasons for their effects in improving memory and treating forgetfulness (Moradi et al., 2018).

In the past, people have been helping of nature to improve their health. They discovered the benefits of plants to make them healthier. The properties that have mostly been proved by various methods (Bahmani et al., 2016; Sarrafchi et al., 2016; Shayganni et al., 2016; Rahimi-Madiseh et al., 2017; Rouhi-Boroujeni et al., 2017; Nazarian-

Samani et al., 2018). However, in the modern world, we have well-equipped hospitals and chemical drugs, but still medicinal herbs have not lost their importance in protecting human health. They have antioxidant activities, anti-inflammatory properties and active compounds that reduce the risk of various diseases (Asgharzade et al., 2015; Karimi et al., 2016; Kazemi et al., 2018; Kravchenko et al., 2019).

Today we want to review what plants enhance the memory and function of the brain. Memory stability, the best options that, without any excess calories and no fat, will not only add flavour to the food but also countless benefits for the brain. The most important reasons why some medicinal plants are used to strengthen memory and relieve

obesity or forgetfulness include the presence of large quantities of lysine, a phosphorus fat, and essential elements for strengthening the central nervous system and intellectual power (Ghasemi Pirbalouti et al., 2013). The high levels of phosphorus, potassium, magnesium, lime, sulphur, chlorine, sodium, iron in these plants are also important for their benefits (Moradi et al., 2018). The presence of chemicals to demonstrate antidepressant and also the ability to reduce symptoms of stress in some of these plants is important (Ranmanesh et al., 2010). A lot of chemicals to help stimulating the brain, resulting in an increase in the efficiency of the areas where recovery and retrieval are found in some plants (Ranmanesh et al., 2010). The presence of high levels of natural sugars in these plants or fruits that the brain needs most of them, as well as the direct and immediate effects of warm plants and fruits on the neutralization of depressive symptoms, weakness of the nerves, low brain function, among others is of particular importance for helping to resolve these symptoms (Sarrafchi et al., 2016).

### Future perspectives

It seems that ethnobotanical studies could be a good indication of the effect of having medicinal herbs on memory enhancement. It is suggested that such studies be expanded in the future so that the ideas mentioned in these studies can be used to produce effective and natural drugs for memory enhancement and solve this problem.

### CONCLUSIONS

Medicinal herbs today are of great importance for their beneficial effects on human health. There is also evidence of the beneficial effects of medicinal plants on memory enhancement, but pharmacological studies and the need for more controlled clinical studies are needed. It is recommended that the effect of the mentioned medicinal plants and their effective substances in this study should be performed in order to investigate memory enhancement in controlled clinical studies and with appropriate design.

### CONFLICT OF INTEREST

The authors declare no conflict of interest.

### ACKNOWLEDGMENTS

The authors wish to express their gratitude to all the lecturers in Lorestan University of Medical Sciences at Lorestan province, for their support (project 2429).

### REFERENCES

- Abbasi N, Azizi Jalilian F, Abdi M, Saifmanesh M (2007) A comparative study of the antimicrobial effect of *Scrophularia striata* Boiss. extract and selective antibiotics against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. J Med Plants 6(suppl. 1): 10-18.
- Abbasi N, Mohammadpour S, Karimi E, Aidy A, Karimi P, Azizi M, Asadollahi K. (2017). Protective effects of *smyrnium cordifolium* boiss essential oil on pentylenetetrazol-induced seizures in mice: Involvement of benzodiazepine and opioid antagonists. J Biolog Regul Homeos Agents 31(3): 683-689.
- Abbasi SH, Afsharzadeh S, Mohajeri AR (2012) Introduction of plant species with medicinal properties of Natanz region (Kashan). J Herbal Drugs 3(3): 147-156.
- Asgharzade S, Rafieian-Kopaei M, Mirzaeian A, Reisi S, Salimzadeh L (2015) *Aloe vera* toxic effects: expression of inducible nitric oxide synthase (iNOS) in testis of Wistar rat. Iranian J Basic Med Sci 18(10): 967-973.
- Atrens DM, Curthoys IS (1982) The neurosciences and behaviour. 2nd ed. Sydney: Academic Press 49-90.
- Bacciottini L, Passani MB, Mannaioni PF, Blandina P (2001) Interactions between histaminergic and cholinergic systems in learning and memory. Behav Brain Res 124(2): 183-194.
- Bahmani M, Sarrafchi A, Shirzad H, Asgari S, Rafieian-Kopaei M (2017) Cardiovascular toxicity of cyclooxygenase inhibitors and promising natural substitutes. Curr Pharm Des 23(6): 952-960.
- Bahmani M, Sarrafchi A, Shirzad H, Rafieian-Kopaei M (2016) Autism: Pathophysiology and promising herbal remedies. Curr Pharm Des 22(3): 277-285.
- Bahmani M, Khaksarian M, Rafieian-Kopaei M, Abbasi N (2018) Overview of the therapeutic effects of *Origanum vulgare* and *Hypericum perforatum* based on Iran's ethnopharmacological documents. J Clin Diagn Res 12(7): 1-4.
- Beheshti S, Shahmoradi B (2018) Therapeutic effect of *Melissa officinalis* in an amyloid- $\beta$  rat model of Alzheimer's disease. J Herbmed Pharmacol 7(3): 193-199.
- Berman D, Dudai Y (2001) Memory extinction, learning anew, and learning the new: dissociations in the molecular machinery of learning in cortex. Science 291(5512): 2417-2419.



- Berne RM, Levy MN, Eds. (1993) Physiology. 3rd ed. New York: Mosby-Yearbook; p.260-278.
- Cown N (2009) What are the differences between long-term, short-term and working memory? *Prog Brain Res* 169: 323-380.
- Dehbani Z, Komaki A, Etaee F, Shahidi S, Taheri M, Komaki S (2019) Effect of a hydro-alcoholic extract of *Melissa officinalis* on passive avoidance learning and memory. *J Herbmmed Pharmacol* 8(2):120-125.
- Froushani SMA, Zarei L, Ghaleh HEG, Motlagh BM (2016) Estragole and methyl-eugenol-free extract of *Artemisia dracunculus* possesses immunomodulatory effects. *Phytomed* 6(5): 526-534.
- Ghasemi Pirbalouti A, Momeni M, Bahmani M (2013) Ethnobotanical study of medicinal plants used by Kurd tribe in Dehloran and Abdanan districts, Ilam province, Iran. *Afr J Tradit Complement Altern Med* 10(2): 368-385.
- Hosseini Z, Lorigooini Z, Rafieian-Kopaei M, Shirmardi HA, Solati K (2017) A review of botany and pharmacological effect and chemical composition of *Echinophora* species growing in Iran. *Pharmacogn Res* 9(4): 305-312.
- Jamshidi-Kia F, Lorigooini Z, Amini-Khoei H (2018) Medicinal plants: past history and future perspective. *J Herbmmed Pharmacol* 1: 1-7.
- Karimi A, Mohammadi-Kamalabadi M, Rafieian-Kopaei M, Amjad L, Salimzadeh I (2016) Determination of antioxidant activity, phenolic contents and antiviral potential of methanol extract of *Euphorbia spinidens* Bornm (Euphorbiaceae). *Trop J Pharmac Res* 15(4): 759-764.
- Kazemi S, Shirzad H, Rafieian-Kopaei M (2018) Recent findings in molecular basis of inflammation and anti-inflammatory plants. *Curr Pharm Des* 24(14): 1551-1562.
- Kimani ST, Nyongesa AW (2008) Effects of single daily khat (*Catha edulis*) extract on spatial learning and memory in CBA mice. *Behav Brain Res* 195(1): 192-197.
- Kravchenko I, Eberle L, Nesterkina M, Kobernik A (2019) Anti-inflammatory and analgesic activity of ointment based on dense ginger extract (*Zingiber officinale*). *J Herbmmed Pharmacol* 8(2): 126-132.
- Lee J (2008) Memory reconsolidation mediates the strengthening of memories by additional learning. *Nat Neurosci* 11(11): 1264-1266.
- Mirdalimi SZ, Heshmati GHA, Barani H (2015) Ethnobotanical and ethnoecological survey on medicinal species (case study Kechik Rangelands in the Northeast Golestan Province). *Indig Know* 1(2): 129-154.
- Moradi F, Sewell RDE, Lorigooini Z, Rafieian-Kopaei M (2018) Immunosuppression-lipid metabolism interplay and medicinal plants in atherosclerosis: A review. *Curr Pharm Des* 24: 1-5.
- Mozaffari Nejad AS, Kamkar A, Giri A, Pourmahmoudi AA (2013) Ethnobotany and folk medicinal uses of major trees and shrubs in Northern Iran. *J Med Plant Res* 7(7): 284-289.
- Nazarian-Samani Z, Sewell RDE, Lorigooini Z, Rafieian-Kopaei M (2018) Medicinal plants with multiple effects on diabetes mellitus and its complications: a systematic review. *Curr Diab Rep* 18: 72.
- Pirzad Jahromi G, Imani E, Nasehi M, Shahriari A (2019) Effect of *Achillea millefolium* aqueous extract on memory deficit and anxiety caused by stroke in ovariectomized rats. *J Herbmmed Pharmacol* 8(2): 153-159.
- Rahimi-Madiseh M, Lorigooini Z, Zamani-Gharaghoshi H, Rafieian-Kopaei M (2017) *Berberis vulgaris*: specifications and traditional uses. *Iranian J Basic Med Sci* 20(5): 569-587.
- Ranmanesh M, Najafi SH, Yousefi M (2010) Ethnobotanical study of medicinal plants of Sistan region. *J Herbal Drugs* 2: 61-68.
- Razmjoue D, Zarei Z, Armand R (2018) Ethnobotanical study (identification, medical properties and how to use) of some medicinal plants of Behbahan city of Khuzestan province, Iran. *J Med Plants* 16(4): 33-49.
- Rouhi-Boroujeni H, Heidarian E, Rouhi-Boroujeni H, Deris F, Rafieian-Kopaei M (2017) Medicinal plants with multiple effects on cardiovascular diseases: A systematic review. *Curr Pharm Des* 23(7): 999-1015.
- Sarrafcchi A, Bahmani M, Shirzad H, Rafieian-Kopaei M (2016) Oxidative stress and Parkinson's disease: New hopes in treatment with herbal antioxidants. *Curr Pharm Des* 22(2): 238-246.
- Shayganni E, Bahmani M, Asgary S, Rafieian-Kopaei M (2016) Inflammaging and cardiovascular disease: Management by medicinal plants. *Phytomed* 23(11):1119-1126.
- Shokri Z, Khoshbin M, Koohpayeh A, Abbasi N, Bahmani F, Rafieian-Kopaei M, Beyranvand F (2018) Thyroid diseases: Pathophysiology and new hopes in treatment with medicinal plants and natural antioxidants. *Intern J Green Pharmacy* 12(3): 473-482.
- Tajbakhsh M, Karimi A, Tohidpour A, Abbasi N, Fallah F, Akhavan MM (2018) The antimicrobial potential of a new derivative of cathelicidin from *Bungarus fasciatus* against methicillin-resistant *Staphylococcus aureus*. *J Microbiol* 56(2): 128-137.
- Vasudevan M, Parle M (2007) Memory enhancing activity of Anwala churna (*Embllica officinalis* Gaertn.): An Ayurvedic preparation. *Physiol Behav* 91(1): 46-54.

**AUTHOR CONTRIBUTION:**

Contribution	Farzan B	Abbaszadeh S	Basati G	Teimouri H
Concepts or ideas		x		x
Design	x	x	x	x
Definition of intellectual content				
Literature search	x	x	x	x
Experimental studies				
Data acquisition		x		
Data analysis		x		
Statistical analysis				x
Manuscript preparation	x	x		
Manuscript editing			x	x
Manuscript review	x	x	x	x

**Citation Format:** Farzan B, Abbaszadeh S, Basati G, Teimouri H (2019) An overview of the most important medicinal plants effective on the strength of memory and mind in Iranian ethnobotany. *J Pharm Pharmacogn Res* 7(3): 156-162.