Seizures and Phytotherapy: The Most Important Medicinal Plants Used for Seizures in Children and Adults in Iranian Ethnobotanical Documents

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Abstract

Due to the relatively high prevalence of seizures (8%), the cases of prescribing these drugs are very high and usually have many side effects, so in this review study, the use of medicinal plants in different regions of Iran in ethnobotanical documents was extracted and reported. In this study, for this purpose, keywords such as convulsion (seizure), medicinal plants, ethnobotany, identification of medicinal plants, region and Iran were performed. Databases such as ISI Web of Science, PubMed, Scopus, ISC, Magiran and Google Scholar were used to review articles and resources. Based on the results, *Anthemis nobilis* L.*, Leonurus cardiac* L.*, Lotus corniculatus* L.*, Hyoscyamus niger* L.*, Salvia* spp.*, Grammosciadium platycarpum* Boiss. & Hausskn.*, Nigella sativa* L.*, Anethum graveolens* L.*, Papaver fugax* Poir.*, Lotus corniculatus* L.*, Verbascum thapsus* L.*, Ferula assa-foetida* L.*, Ferula gumosa* Boiss.*, Heracleum persicum* Desf.ex Fischer.*, Angelica archangelica* L.*, Vicia faba* L.*, Verbascum pseudonobile* Stoj & Stef.*, Melissa officinalis* L.*, Teucrium polium* L.*, Datura stramonium* L.*, Hymenocrater* spp. and *Melissa officinalis* L., are medicinal plants that are used in different parts of Iran to treat seizures. The data collected in this study were analyzed using Microsoft Excel program. According to the results, the plants of this study belong to 11 plant families. The aerial part with 32% is the most plant part used for seizures. Also, most of the medicinal plants used to treat seizures were related to the northern region of Khuzestan. Ethnobotanical knowledge can provide pure ideas for modern pharmacological knowledge and lead to the production of effective natural anticonvulsant drugs.

***Keywords*:** *Nervous system disorders, Seizures, Medicinal plants, Children, Adults Ethnobotany, Iran*

Introduction

Seizures are one of the most important and common neurological diseases [1]. Seizures are a sign of a simultaneous, abnormal, and intense neuronal activity in the brain that can manifest as changes in mental state, level of consciousness, tonic, and clonic movements. A seizure is a sudden onset of signs or symptoms of the disease. This term is especially used for epilepsy. Of course, seizures also have non-epileptic causes such as hypoglycemia, convulsion febrile seizure, hypotension, migraine and concussion [2]. Seizures are generally divided into focal and general categories, based on the area of the brain where neurons exhibit their abnormal activity. If only one part of the brain is involved in intense activity, it is called a focal seizure, and if the whole brain is involved, it is called a general seizure [3]. High fever, stroke, hypoglycemia, concussion, migraine, brain tumor, alcohol abuse, vitamin D deficiency, illicit drug or drug use, sleep deprivation, hyponatremia, sodium-induced cerebral hemorrhage, head trauma Taking certain medications and lowering blood pressure are among the causes of seizures [4, 5]. Convulsions are usually accompanied by fever [6, 7]. The prevalence of seizures is usually 4 to 6 per thousand in children [8]. The prevalence of seizures in Iran is about one percent [9]. Primary treatment for seizures is valproic acid, lamotrigine and topiramate. For partial seizures,

carbamazepine and phenytoin are most commonly used. In addition, phenobarbital is often the drug of choice for seizures in young children [10, 11]. To treat it, various drugs are used, especially anticonvulsant drugs. Since other therapeutic properties have been proven for this group of drugs, so now there are various uses of neurological, dermatological, etc. for them [12]. Medicinal plants are plants whose various organs such as roots, stems, leaves, flowers and branches contain effective substances that have a variety of medicinal activities and can be effective for various diseases and disorders of the body organs [19- 13]. Due to the relatively high prevalence of seizures in our society and the many applications of other anticonvulsant drugs, the number of prescriptions of these drugs is very high [2,9]. They usually have many side effects, so using a natural source of medicine with fewer side effects can be very important.

The main purpose of this review study is to identify and report of medicinal plants which are used in Iranian ethno-botany knowledge to treat seizures in children and adults.

Method

In this study, it was used to review articles in Iranian ethnobotanical medicine sources. For this purpose, keywords such as seizures, medicinal plants, ethnobotany, identification of medicinal plants, region and Iran were used. Databases such as ISI Web of Science, PubMed, Scopus, ISC, Magiran and Google Scholar were used to review articles and resources (articles of 2001 to 2020). In this study, 47 articles were found. Three articles also lacked full text. There were two duplicate articles that were deleted. Finally, 43 articles were reviewed to review the texts. Out of 43 articles, only 8 articles contained ethnobotanical information on seizures.

Results

Medicinal plants *Anthemis nobilis* L., *Leonurus cardiac* L., *Lotus corniculatus* L., *Hyoscyamus niger* L., *Salvia* spp., *Grammosciadium platycarpum* Boiss. & Hausskn., *Nigella sativa* L., *Anethum graveolens* L., *Papaver fugax* Poir., *Lotus corniculatus* L., *Verbascum thapsus* L., *Ferula assa-foetida* L., *Ferula gumosa* Boiss., *Heracleum persicum* Desf.ex Fischer., *Angelica archangelica* L., *Vicia faba* L., *Verbascum pseudonobile* Stoj & Stef., *Melissa officinalis* L., *Teucrium polium* L., *Datura stramonium* L., *Hymenocrater* spp. and *Melissa officinalis* L. are some of the medicinal plants in different parts of Iran. Used to treat seizures.

***Anthemis nobilis* L. (Asteraceae):**

Plant organs flower in the area Arasbaran are used to treat seizures. The main active ingredient of this plant is α-bisabolol [20].

***Leonurus cardiac* L. (Labiatae):**

Plant organs aerial organs in the area Arasbaran are used to treat seizures. The main active ingredient of this plant are benzoic acid, transilin, isosalicin, soyasaponin I, dehydrosoyasaponin I, medicarpin-3-O-β-D-glucopyranoside, pharbitoside A and p-coumaric acid [20].

***Lotus corniculatus* L. (Papilionaceae):**

Plant organs flowers and fruits in the area Arasbaran are used to treat seizures. The main active ingredient of this plant are atropine, scopolamine, hyoscine [20].

***Hyoscyamus niger* L. (Solanaceae):**

Plant organs seed in the area Arasbaran are used to treat seizures. The main active ingredient of this plant are atropine, scopolamine, hyoscine [20].

***Salvia spp.* (Lamiaceae):**

Plant organs aerial parts in the area Abadeh Fars are used to treat seizures. The main active ingredient of this plant are α-thujone, 1,8-cineole, viridiflorol, β-thujone and β-caryophyllene [21].

Grammosciadium platycarpum Boiss. & Hausskn. (Apiaceae):

Plant organs aerial organs in the area Behbahan are used to treat seizures. The main active ingredient of this plant is Linalool and (*E,E*)-*α*-farnesene [22].

***Nigella sativa* L. (Caryophyllaceae):**

Plant organs seed in the area Behbahan are used to treat seizures. The main active ingredient of this plant are thymoquinone, dithymoquinone, thymohydroquinone and thymol [22].

***Leonurus cardiaca* L. (Lamiaceae):**

Plant organs aerial organsin the area Behbahan are used to treat seizures. The main active ingredient of this plant are epi-cedrol, α-humulene, dehydro-1,8-cineole, germacrene D, spathulenol [22].

***Anethum graveolens* L. (Apiaceae):**

Plant organs leaves and seed in the area Mariwan are used to treat seizures. The main active ingredient of this plant are a-Phellandrene, p-Cymene, g-Terpinene, a-Pinene, Limonene, Germacrene D, Dill ether, β-Myrcene, a-Thujene [23].

***Papaver fugax* Poir. (Papaveraceae):**

Plant organs aerial organs in the area Mariwan are used to treat seizures. The main active ingredient of this plant are thebaine, isothebaine, (-)-nuciferine [23].

***Lotus corniculatus* L. (Fabaceae):**

Plant organs aerial organs in the area Sajasrood are used to treat seizures. The main active ingredient of this plant are benzoic acid, transilin, isosalicin, soyasaponin I, dehydrosoyasaponin I, medicarpin-3-O-β-D-glucopyranoside, pharbitoside A and p-coumaric acid [24].

***Verbascum thapsus* L. (Scorphalariaceae):**

Plant organs aerial organs in the area Sajasrood are used to treat seizures. The main active ingredient of this plant are luteolin and 3-O-fucopyranosylsaikogenin F [24].

***Ferula assa-foetida* L. (Apiaceae):**

Plant organs resin and roots in the area East Khuzestan are used to treat seizures. The main active ingredient of this plant are α-eudesmol, α-pinene, β-pinene, β-dihydroagarofuran, γ-eudesmol, guaiol, limonene, α-phellandrene, (E)-β-ocimene, 5-epi-7-epi-α-eudesmol, β-eudesmol [25].

***Ferula gumosa* Boiss. (Apiaceae):**

Plant organs resin and roots in the area East Khuzestan are used to treat seizures. The main active ingredient of this plant are γ-elemene, germacrene B, (E)-γ-bisabolene, viridiflorene and epizonaren [25].

***Heracleum persicum* Desf.ex Fischer. (Apiaceae):**

Plant organs resin and roots in the area East Khuzestan are used to treat seizures. The main active ingredient of this plant is trans-Anethole [25].

***Angelica archangelica* L. (Apiaceae):**

Plant organs flower in the area East Khuzestan are used to treat seizures. The main active ingredient of this plant is α-bisabolol [25].

***Vicia faba* L. (Papilionacea):**

Plant organs leaves and seeds in the area East Khuzestan are used to treat seizures. The main active ingredient of this plant are α-pinene, δ-3-carene, limonene, sabinene, δ-phel-landrene, δ-3-carene, α-phellandrene [25].

***Verbascum pseudonobile* Stoj & Stef. (Scrophulariaceae):**

Plant organs flower in the area East Khuzestan are used to treat seizures. The main active ingredient of this plant is Anthocyanins [25].

***Anethum graveolens* L. (Apiaceae):**

Plant organs flower in the area Kazerun are used to treat seizures. The main active ingredient of this plant are a-Phellandrene, p-Cymene, g-Terpinene, a-Pinene, Limonene, Germacrene D, Dill ether, β-Myrcene, a-Thujene [26].

***Melissa officinalis* L. (Lamiaceae):**

Plant organs flower in the area Kazerun are used to treat seizures. The main active ingredient of this plant are Geraniol, citronellal, neral [26].

***Teucrium polium* L. (Lamiaceae):**

Plant organs aerial organs in the area Kazerun are used to treat seizures. The main active ingredient of this plant are α-pinene, β-pinene and p-cymene [26].

***Datura stramonium* L. (Solanaceae):**

Plant organs aerial organs in the area Kazerun are used to treat seizures. The main active ingredient of this plant are Scopolamine, Daturanolone, daturadiol and Hyoscine [26].

***Hymenocrater* spp. (Lamiaceae):**

Plant organs aerial organs in the area Mashhad are used to treat seizures. The main active ingredient of this plant are Geraniol, citronellal, neral [27].

Data obtained from the study of plants with anticonvulsant effect in ethno-botanical knowledge were analyzed. According to the results, the plants of this study belong to 11 plant families. Accordingly, the aerial part with 32% is the most plant part used for seizures.

Also, most of the medicinal plants used to treat seizures were related to the northern region of Khuzestan. People of Mashhad region have the most knowledge about the effect of medicinal plants and traditional medicine in the treatment of seizures.

Discussion

Seizure, which is a limited event of cerebral palsy, can be caused by abnormal depletion of brain neurons [28] and important causes of seizures include brain infection, cerebral ischemia, and concussion [28]. In the present study, it was found that traditionally (in ethnobotanical knowledge) of Chamomile, Common motherwort, *Hyoscyamus niger*, Common sage, Dill, Fennel flower, Jimsonweed, Poppy, Mullein, Asafoetida, Ferula gummosa, Heracleum persicum, Broad bean, Dracocephal have been used to treat seizures. Experimental studies on animal models of Iranian medicinal plants such as *Peganum harmala* [29], *Lavandula officinalis* [30], *Matricaria chamomilla* [31], *Tanacetum sonbolii* [32], *Acanthode Launaea* [33], *Ocimum basilicum* [34], *Salvia sahendica* [35], *Ruta graveolens* [36], *Elaeagnus angustifolia* [37], *Zizphora tenuior* [38], *Heracleum persicum* [39] and *Scrophularia striata* [40] have anticonvulsant effects. Traditional medicine and ethnobotanical knowledge have evolved over thousands of years and have played an important role in influencing people's health. Ethnobotanical knowledge studies how people of a certain ethnicity or culture use the native plants of that region. In fact, ethnobotany has been an important tool for gathering ideas as well as a way to extract indigenous knowledge of the use of plants, especially as medicine, with the aim of producing new commercial products. Ethnobotanical knowledge is part of the national capital of every ethnic group and culture of every region, which includes their local therapeutic beliefs about plants and their properties, which are the result of centuries of trial and error in the natural environment and are degenerating due to orality.

Chamomile and *H. persicum* are medicinal plants that have been proven to have anticonvulsant effects in both traditional and ethnobotanical science and modern pharmacology, and show that traditional knowledge and local therapeutic beliefs can pave the way for drug production in modern medicine.

Causes of seizures include various tumors, concussions, neurological diseases, infections, congenital diseases, fever, toxic agents and metabolic factors [41]. In experimental and clinical studies, seizures act as inhibitory transmitters by various mechanisms such as glycine receptors [42]. Treatment for seizures such as phenobarbital, phenytoin, valproic acid, carbamazepine and diazepam [43]. Medicinal plants have anticonvulsant properties on seizures by similar mechanisms as chemical drugs. Medicinal plants with mechanisms such as reducing the time of tonic and clonic of seizures, increasing latency to the onset of frontal lobe clonus, recent increase in myoclonic contractions, increasing the onset threshold of seizures, latency at the time of generalized tonic-clonic seizures, decrease in incidence Imbalance and jump have anti- seizures effects [44-48]. The use of plant antioxidants and medicinal plants is a useful solution for the treatment of various disorders and diseases [49-58].

Conclusion

Medicinal plants contain effective medicinal substances that improve and treat seizures by known mechanisms.

Authors' contributions

All of the authors reviewed and contributed to data collection and preparation of the manuscript. The first draft was prepared by all of authors. All authors read the final version and confirmed for the publication.

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