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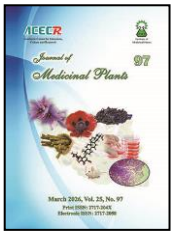

Research Article

Ethnobotanical research on medicinal plants of Sabzevar County, West of Razavi Khorasan Province Iran

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ABSTRACT

Background: Ethnobotanical knowledge, an essential component of a nation's cultural heritage, encompasses the traditional use of medicinal plants and the wisdom gained by local communities through generations of experience. This knowledge, accumulated over centuries through trial and error in natural environments, is at risk of being lost due to its predominantly oral transmission. **Objective:** The main goal of this research is to investigate and document the traditional use of medicinal plants among the people of Sabzevar County in the west of Razavi Khorasan province. **Methods:** In this study, traditional knowledge of medicinal plants among local people was collected through interviews and observation. Interviews were conducted based on topics such as Persian names, components used, properties and uses of plants. Then the collected plants were identified using authentic plant sources. **Results:** The results of this study showed that 78 medicinal plants species belonging to 69 genera and 30 different families were identified in the study area. Among these families, Lamiaceae, Asteraceae and Apiaceae had the highest number of medicinal plants. The results showed that the most common use of these plants is in the treatment of digestive disorders and colds. The most frequently used plant parts are leaves, stems and aerial parts of plants. **Conclusion:** This study also showed that some of the uses of plants in the study area are similar in other parts of Iran. This confirms that people's knowledge in using medicinal plants is largely based on similar experiences across the country.

1. Introduction

People across all cultures have long relied on plants for essential needs such as food, shelter, warmth, medicine, and other necessities. This deep-rooted dependence led to the discovery of various plant uses, which were gradually shared and disseminated through migration, interactions with neighboring tribes, and even among both friends and foes.

Ethnobotany is a science that studies the traditional and local use of plants in different regions by local people and different cultures.

Abbreviations: HSUS, Herbarium of Hakim Sabzevari University

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The term "ethnobotany" was coined by the American botanist John William Harshberger in 1895 [1]. This term is derived from the combination of two words: "ethno," meaning people or culture, and "botany," meaning the study of plants [2]. Ethnobotany is considered a branch of ethnobiology and is an interdisciplinary science that is defined as the interaction between plants and people. In an ethnobotanical study, the researcher, after visiting the target area and conducting preliminary investigations about the knowledge of that area, refers to local people, and persons have experience and traditional knowledge related to plants of that area. He talks with them about the various uses of plants, including medicinal, food, dyeing, handicrafts, etc., and documents the non-written and verbal information he obtains from them [3].

According to the World Health Organization's estimation, approximately 80% of the world's population relies on traditional medicine systems for primary healthcare, where plants constitute a predominant source among other natural resources [4]. Traditional medicine based on herbal medicines has always played a key role in the healthcare system of many countries. The emphasis of the WHO on gradually replacing chemical substances with natural materials has led various countries worldwide to invest in, plan for, and industrially produce medicinal plants. However, it's important not to forget that many medicinal plants are still not well understood. Investigating their full properties and effects on the body, as well as examining their interactions with other drugs and plants, requires more time. Medicinal plants have been helpful in providing relief and soothing human suffering and pain. They are extensively used by traditional healers and in the pharmaceutical trade.

Ethnobotany is a branch of indigenous knowledge that is recognized throughout the world. Many researches have been done about this material and its stabilization methods and various applications have been investigated. Studies have been conducted in Argentina [5], northeastern part of Ethiopia [6], Guangzhou China [7], northern parts of Pakistan [8], northern Morocco [9], Osun State of Nigeria [10], Golmi region of Nepal [11], and high areas of northwestern Himalayas [12], confirm that people around the world have realized the importance of medicinal plants.

Iran is one of the countries with rich flora and wide climatic diversity. Iranians are among the nations that have been fond of traditional use of medicinal plants and have attached great importance to this issue since ancient times.

To collect and use medicinal plants, it is very important to know the growing place, growing time and ecological conditions of these plants. This information helps us to determine the best time and place to collect medicinal plants and to make optimal use of natural resources. Also, correct identification of medicinal plants is very important for their use. Ethnobotanical studies in different regions and provinces of Iran have a considerable history. Some of the studies conducted in this field are: Mashhad [13], Nehbandan [14], Gilan [15], Abhar [2], Behbahan [16], Kazeroon [17], Abadeh [18], Zaram rud Neka [19], Mobarake Isfahan [20], Zarivar region in Marivan [21], Kachik region in Golestan [22], Fasa [23], East Khuzestan [24], Jiroft [25], Nemarstaq Amol [26], Zagheh and Biranshahr in Lorestan province [27], Ajabshir [28], Alamut and Qazvin [29], south of Kerman [30], Shazand [31], Hamedan [32], northeast of the Persian Gulf [33], Khash [34], Raz and Jargalan of North Khorasan province [35], Sirjan [36], Sardasht West Azerbaijan [37], and Zebarkhan Nishabur [38].

Sabzevar County, located in the west of Razavi Khorasan province, with an area of 17718 square kilometers, is one of the areas with almost high plant species diversity in the province. This County is bounded by Jovein and Joghtai cities from the north, Neishabur city from the east, Kashmer and Khalilabad cities from the south, and Davarzen city from the west. Geographically, this city is located between 33-56 to 58-16 degrees longitude and 35-27 to 36-52 degrees latitude and at an altitude of 978 meters above sea level [42]. From ancient times, the inhabitants of this county and the surrounding villages have used herbaceous, bulbous plants, shrubs and trees, as well as local and wild plants due to the pristine nature of the region and the rich plant diversity. They have been familiar with the medicinal properties of these plants in traditional treatment of diseases, strengthening appetite and physical strength, and relieving pain [29], with firm belief. Studies have been conducted on the Flora and herbs of Sabzevar, focusing on introducing the flora of this county as well as presenting its medicinal plants. However, primarily, these studies did not have an ethnobotanical approach. Plant collection in Sabzevar County has been conducted to identify and register various plant species surrounding the county. In this project, medicinal plants present in the region were collected, identified, and after completing the identification process, they were preserved and registered in the herbarium of Hakim Sabzevari University. Until today, a wide variety of plant species have been collected from the vicinity of the county. These species have been recognized due to their scientific and indigenous importance, and they have been registered in the herbarium for long-term preservation and for future information regarding the plant diversity of the region. This research investigates the most important medicinal plant species used by the local people of Sabzevar County.

2. Materials and methods

For field collection and studies, we first examined access routes to the desired areas using topographic maps to ensure necessary actions are taken during appropriate seasons for plant collection (Fig. 1). The collection was carried out during the years 1401 and 1402 SH (2022 and 2023 AD) from various areas surrounding Sabzevar County. In the plant collection, both wild and cultivated plants were present. The collected specimens were transferred to the herbarium of Hakim Sabzevari University for registration and identification purposes. Then, they were examined for medicinal use through interviews with 86 local's people. Plants were identified by flora Iranica and Persian flora [39]. Furthermore, to obtain ethnobotanical information and traditional, medicinal, and local uses, these specimens were consulted with knowledgeable individuals such as herbalists in the city, elders, and individuals known for herbal medicine in the villages. During these interviews, information was obtained about the local names of the plants, their medicinal properties, the organs used and how to consume them. The information obtained about the Persian names of plants and their medicinal properties were compared with reliable sources [40-42] in the field of Iranian medicinal plants [39].

In table 1, the characteristics of the questioned people and their level of education in the field of study have been questioned. In total, 86 knowledgeable and indigenous individuals participated in these interviews.

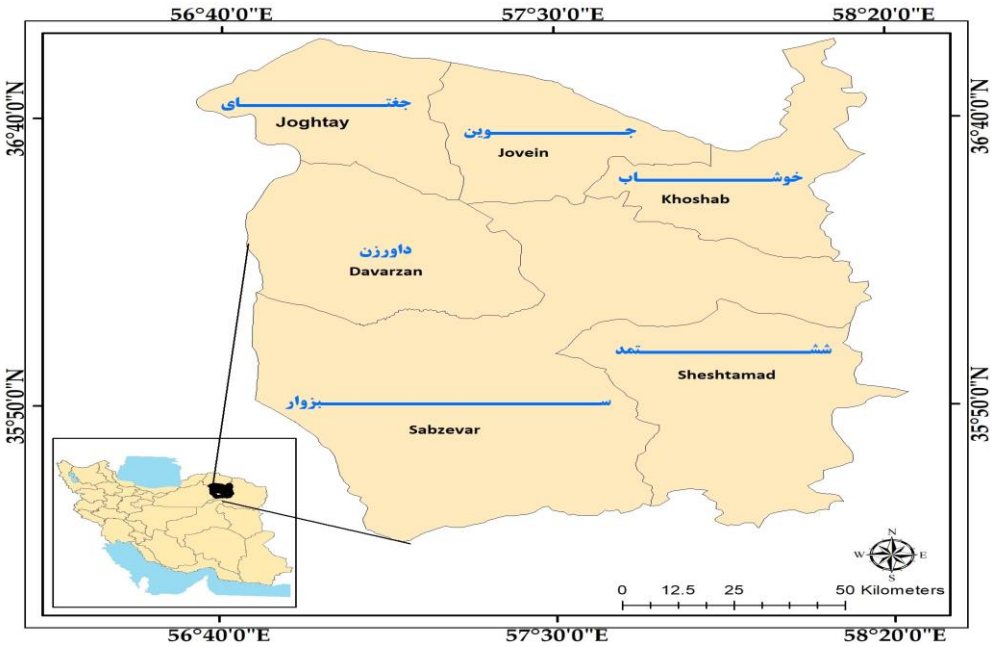

Fig. 1. Location of Sabzevar city in Khorasan Razavi province and aerial photo of the study area

Table 1. Profiles of people questioned in the field of study

		Education level			
		Uneducated	**Elementary**	**Diploma**	**Academic**
Gender	**Woman**	10	15	5	20
	Man	4	13	3	16
Total		14	28	8	36

3. Results

According to the results of this research, a total of 78 medicinal plant species belonging to 69 genera and 30 families were identified in Sabzevar County, which are used by the people (Table 2). The Lamiaceae family with 13 species (17.33 %), the Asteraceae family with 10 species (13.33 %), and the Apiaceae family with 9 species (12 %) are considered the most important plant families in terms of medicinal use, respectively (Fig. 2).

The list of medicinal plants of the study area along with other details including scientific name, family name, herbarium number, Persian name, organ used, medicinal properties and method of administration are presented in the table 2.

The most important medicinal plant species used in this research are: *Ferula foetida, Ferula gummosa, Cuminum cyminum, Crocus sativus, Achillea millefolium, Rosa damascena, Mentha piperata, Mentha longifolia, Ziziphora clinopodioides, Salvia macrosiphon, Foeniculum vulgare, Glycyrrhiza glabra, Artemisia sieberi, Fumaria asepala, Plantago major, Tribulus Terrestris, Peganum harmala* and *Descurainia Sophia.*

The majority of the medicinal plants examined in this study are used in the treatment of gastrointestinal diseases (50 species, 43 %), respiratory disorders and colds (16 species, 14 %), and women's health conditions (9 species, 8 %) (Fig. 3).

The most important parts of plants used include leafs (20 species, 22 %), aerial parts of plants (17 species, 19 %), stems (14 species, 16 %), fruits (12 species, 13 %) and seeds (10 species, 11 %) (Fig. 4).

The most common methods of consuming medicinal plants in the studied area are as

follows: decoction (36 species, 31), infusion (18 species, 15 %), raw and fresh consumption (21 species, 18 %), powder (10 species, 8 %), extract (2 species, 2 %), and cooked (9 species, 7 %) (Fig. 5).

Table 3 lists the most commonly used medicinal plants and their traditional therapeutic properties in Sabzevar County.

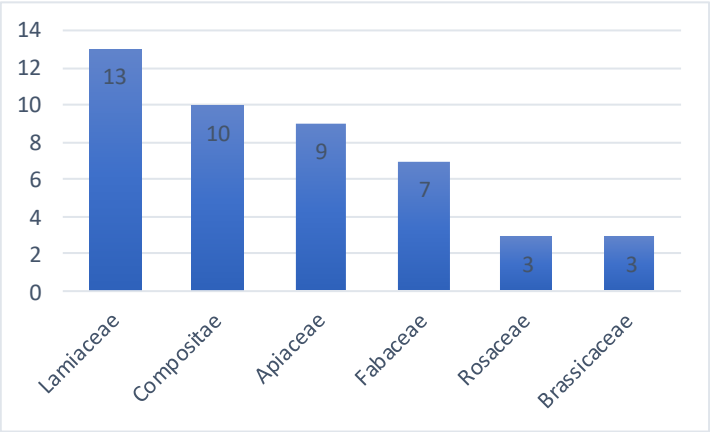

Fig. 2. The most important medicinal plant families utilized in traditional therapy in Sabzevar County.

Table 2. List of species of medicinal plants and their therapeutic properties in Sabzevar County

Num.	Scientific name	Local name	Wild or cultivated plant	Organ used	Medicinal properties	Method of used	Herbarium number
			Amaranthaceae				
1	*Amaranthus cruentus* L.	Taj khorus	Cultivated	Seed	Hemorrhoid, Blood Cleanser	Decoction	HSUH 4010
2	*Spinacia oleracea*L.	Esfenaj	Cultivated	Leaf-stem	Anemia	Cooked, raw	HSUH 4023
			Anacardiaceae				
3	*Pistacia vera* L.	Pesteh	Cultivated	Fruit	Anemia ،Iron deficiency treatment	Edible	HSUH 4065
			Apiaceae				
4	*Anethum graveolens* L.	Shevid	Cultivated	Leaf, fruit	Blood lipid treatment, Relief of coldness	Raw, decoction	HSUH 4055
5	*Carum carvi* L.	Zireh siaah	Cultivated	Fruit (seed)	Carminative, anastaltic, antidiarrheal	Infusion, powder	HSUH 4050
6	*Cuminum cyminum* L.	Zireh Sabz	Cultivated	Fruit (seed)	Nourishing, carminative, menstrual disorders	Infusion, powder	HSUH 4068
7	*Dorema ammoniacum* D. Don.	Komai Kandal	Wild	Resin	Wound disinfection	Powder, Poultice	HSUH 4084
8	*Ducrosia anethifolia* (DC.) Boiss.	Moshgak	Wild	Inflorescence	Treatment of gastric bloating, Menstrual disorders	Decoction, edible	HSUH 4031
9	*Eryngium bungei* Boiss.	Zol Khorasani, Boghnagh	Wild	Flowering stem, root	Body strengthening (Flowering stem), Constipation treatment (root)	Raw, decoction	HSUH 4064
10	*Ferula gummosa* Boiss.	Barijeh	Wild	Root and stem resin, leaf	Anticonvulsant, eliminate uterine disease, eliminate digestive toxicity and reduce stomach acid	Edible, powder (root)	HSUH 4047

Table 2. List of species of medicinal plants and their therapeutic properties in Sabzevar County (Continued)

Num.	Scientific name	Local name	Wild or cultivated plant	Organ used	Medicinal properties	Method of used	Herbarium number
11	*Ferula foetida* (Bonge) Regel.	Anghouzeh	Wild	Stem, leaf	Eliminates intestinal parasites, Anti-flatulent, Expectorant, anticonvulsant, Blood pressure reducer	Cooked	HSUH 4033
12	*Foeniculum vulgare* Miller.	Razianeh	Cultivated	Fruit	Increasing breast milk, regulating menstruation, reducing women's weight	Infusion	HSUH 4067
				Brassicaceae			
13	*Alyssum lanceolatum* Baumg.	Ghodomeh	Wild	Seed	Laxative, Skin inflammations	Poultice	HSUH 4091
14	*Brassica rapa* L.	Shalgham	Cultivated	Root	Cold treatment, Respiratory disorders	Cooked	HSUH 3985
15	*Descurainia sophia* (L.) Schur.	Khakshir Irani	Wild	Seed	Constipation, Treatment of chest congestion and throat infection	Infusion, syrup	HSUH 4090
				Caryophyllaceae			
16	*Acanthophyllum borsczowii* Litv.	Choubak	wild	Root	Laxative, constipation, Gastrointestinal cleanser	decoction	HSUH 4089
				Asteraceae			
17	*Achillea millefolium* L.	Bomadaran	Wild	Flower, leaf	Blood sugar and lipid regulator, Treatment of acidity, Treatment of menstrual disorders, hemorrhoid, diuretic, kidney stone	Infusion, decoction	HSUH 4060
18	*Anthemis rhodocentra* Boiss.	Babouneh kope Ghermez	Wild	Flower	Anti-inflammatory, Relieving intestinal disorders	Infusion	HSUH 4100
19	*Artemisia scoparia* Waldst.	DermanehSharghi, Jaro Mashhadi	Wild	Leaf, stem	Cold treatment, sore throat, carminative	Decoction	HSUH 4098
20	*Artemisia sieberi* Bunge.	Dermaneh	Wild	aerial parts	Carminative, diarrhea, carminative nausea,	Infusion, decoction	HSUH 4053
21	*Artemisia turanica* Krasch.	Dermaneh Ghermez	Wild	Aerial parts	Digestive problems	Infusion, decoction	HSUH 4069
22	*Cichorium intybus* L.	Kaasni	Wild	Root, flower	Kidney stone, Jaundice, Diuretic	Herbal sweat	HSUH 4071
23	*Echinops chorassanicus* Bunge	Shekar Tighal Khorasani	Wild	Flower	Fever-reducing, Cold treatment and Cough	Decoction, powder	HSUH 4078

Table 2. List of species of medicinal plants and their therapeutic properties in Sabzevar County (Continued)

Num.	Scientific name	Local name	Wild or cultivated plant	Organ used	Medicinal properties	Method of used	Herbarium number
24	*Gundelia tournefortii* L.	Kangar	Wild	Stem	Fever-reducing, Jaundice, Liver detoxification, Appetizing	Raw, cooked	HSUH 4092
25	*Onopordon leptolepis* DC.	Khaar Panbeh	Wild	Receptacle	Gastric lavage	Raw	HSUH 4076
26	*Scorzonera pusilla* Pall.	Sheng	Wild	Whole plant	Treatment of gastric ulcer, wart, Expectorant, aperient	Raw, decoction	HSUH 4088
27	*Tanacetum parthenium* L.	Babouneh Gaavi	Wild	Aerial parts	Nourishing, carminative	Infusion, decoction	HSUH 4059
			Elaeagnaceae				
28	*Elaeagnus angustifolia* L.	Senjed	Cultivated	Fruit	Joint pain, diarrhea	Powder	HSUH 4042
			Ephedraceae				
29	*Ephedra intermedia* Schrank.	Ermak	Wild	Aerial parts	Relieve stomach pain, Treatment of infertility and ovarian diseases	Vapor	HSUH 4101
			Fabaceae				
30	*Alhagi pseudalhagi* (8M.B) Desf.	Khaar Shotor	Wild	Resine	Kidney stone, Baby jaundice, Eliminates bile	Herbal sweat, decoction	HSUH 4093
31	*Cicer chorassanicum* Bunge.	Nokhod Khorasani	Cultivated	Seed	Nourishing	Cooked	HSUH 4077
32	*Glycyrrhiza **g**labra* L.	Shirin Bayan	Wild	Root	Carminative, reduce stomach acid, Stomach strengthening, Relief of stomach pain	Powder, decoction	HSUH 4071
33	*Trifolium fragiferum* L.	Shabdar	Cultivated	Leaf	Digestion of food	Powder	HSUH 4070
34	*Trigonella arcuate* C.A.Mey.	Shanbalileh	Cultivated	Leaf, Young stems	Hypertension, diabetes	Raw, decoction	HSUH 4079
35	*Trigonella subenervis* Rech. F.	Shanbalileh Sabzevari	Cultivated	Leaf, Young stems	Hypertension, diabetes	Raw, decoction	HSUH 4074
36	*Medicago sativa* L.	Younjeh	Cultivated	Leaf, Young stems	Anemia, Appetizing	Raw, cooked	HSUH 4072
			Geraniaceae				
37	*Erodium oxyrrhynchum* M.B.	Nok laklaki	Wild	Leaf	Laxative	Raw, decoction	HSUH 4019
			Iridaceae				
38	*Crocus sativus* L.	Zaferan	Cultivated	Stigma	Menstruation, relief from body chill, invigorating	Infusion	HSUH 3990

Table 2. List of species of medicinal plants and their therapeutic properties in Sabzevar County (Continued)

Num.	Scientific name	Local name	Wild or cultivated plant	Organ used	Medicinal properties	Method of used	Herbarium number
39	*Iris kopetdagensis* Vved.	Zanbagh khorasani	Wild	Aerial parts	Antifungal ، Rheumatism	Decoction	HSUH 3994
				Juglandaceae			
40	*Juglans regia* L.	Gerdoo	Cultivated	Root bark	Teeth whitening	Toothbrush	HSUH 4061
				Lamiaceae			
41	*Marrubium anisodon* C. Koch.	Farasion	Wild	Leaf, stem	Increasing sexual desire, antimicrobial, abdominal pain, Blood lipid and sugar treatment	Decoction	HSUH 4026
42	*Mentha longifolia* (L.) Huds.	Pooneh	Wild	Leaf	Reduction of stomach acid secretion, reducing stomach bloating, strengthening the stomach	Raw (edible)	HSUH 4015
43	*Mentha piperata* L.	Nanae	Cultivated	Leaf, Young stems	Carminative, Relieving cold and heartache	Raw, infusion	HSUH 4013
44	*Nepeta bracteata* Benth.	Pooneh Sa	Wild	Leaf, stem	Mouth and stomach deodorizer	Raw	HSUH 4017
45	*Nepeta cataria* L.	Nanae Gorbeee	Wild	Aerial parts	Carminative diarrhea,	Herbal infusion	HSUH 4007
46	*Nepeta glomerulosa* Boiss.	Pooneh Sa	Wild	Aerial parts	Eliminate digestive pains, carminative	Herbal sweat, infusion	HSUH 4004
47	*Perovskia artemisioides* Boiss.	Brazambil	Wild	Aerial parts	Fever-reducing, relief from asthma, chronic coughs, allergy	Herbal sweat, infusion	HSUH 4018
48	*Salvia leriifolia* Benth.	Maryam Goli Mashhadi	Cultivated	Whole plant	Calming, Analgesic, Disinfectant	Decoction, herbal sweat	HSUH 4035
49	*Salvia macrosiphon* Boiss.	Maryam Goli	Cultivated	Seed	Menstruation breaking addiction, diarrhea	Decoction	HSUH 4034
50	*Scutellaria litwinowii* Bornm. & Sint.	Boshghabi Khorasani	Wild	Whole plant	Analgesic, Insomnia treatment, Strengthen the liver	Decoction, herbal sweat	HSUH 4032
51	*Stachys trinervis* Aitch. & Hemsl.	Chai Kohi	Wild	Aerial parts	NourishingEliminate, female infections,bronchitis	Infusion	HSUH 4070
52	*Vitex agnus-castus* L.	Panj Angosht	Wild	Whole plant	Hormone regulator for menopausal women, enhancer of sexual potency, sedative, anastaltic	Infusion	HSUH 4036

Table 2. List of species of medicinal plants and their therapeutic properties in Sabzevar County (Continued)

Num.	Scientific name	Local name	Wild or cultivated plant	Organ used	Medicinal properties	Method of used	Herbarium number
53	*Ziziphora clinopodioides* Lam.	Kaakoti	Wild	Aerial parts	Cough suppressant and expectorant, relief from heartburn and nausea	Infusion, decoction, powder	HSUH 4073
				Liliaceae			
54	*Eremurus luteus* Baker.	Serish	Wild	Leaf, seed, root	Jaundice, Liver discomfort, Skin acne	Decoction, Poultice, powder	HSUH 4105
55	*Allium ampeloprasum* L.	Tareh Koohi, Ajaar	Wild	Leaf, bulb	Expelling stomach worms, constipation	Raw, cooked	HSUH 4103
				Malvaceae			
56	*Alcea tiliacea* (Bornm.) Zohary	Khatmi	Cultivated	Leaf, flower	Relief of respiratory and gastrointestinal issues, Relief of mouth and throat inflammation, Cough suppressant and fever reducer	Infusion, decoction	HSUH 3969
57	*Malva sylvestris* L.	Panirak Ghermez	Wild	Aerial parts	Treatment of kidney and bladder infections, constipation, Lung ointment	Infusion	HSUH 3971
				Moraceae			
58	*Ficus criaca* L.	Anjir	Cultivated	Fruit	Constipation, Relief of cough and Lung dryness	Raw (infusion fruit)	HSUH 3983
59	*Morus alba* L.	Toot	Cultivated	Leaf and stem sap	Treatment of Cutaneous leishmaniasis	Poultice	HSUH 3980
				Papaveraceae			
60	*Fumaria asepala* Boiss.	Shah Tareh	Wild	Aerial parts	Disinfectant, Tranquilizer, nourishing, cool nature	Herbal sweat, decoction	HSUH 3876
61	*Hypecoum pendulum* L.	Zardeh Shah Tareh	Wild	Aerial parts	Cooling, Heart rate regulator, Diuretic, Narcotic	Extract	HSUH 4112
				Pedaliaceae			
62	*Sesamum indicum* L.	Konjed	Cultivated	Seed	Stomach emollient	Raw, oil	HSUH 4104
				Plantaginaceae			
63	*Plantago major* L.	Baarhang	Wild	Seed	Constipation, aperient, Lung softener	Infusion	HSUH 3993
				Poaceae			
64	*Triticum aestivum* L.	Gandom	Cultivated	Starch extracted from seed	Sore throat	Mix with warm water in the form of a spool	HSUH 4008

Table 2. List of species of medicinal plants and their therapeutic properties in Sabzevar County (Continued)

Num.	Scientific name	Local name	Wild or cultivated plant	Organ used	Medicinal properties	Method of used	Herbarium number
			Polygonaceae				
65	*Polygonum afghanicum* Meisn.	Alaf Haft Band	Wild	Whole plant	Anastaltic, Antifungal, Diuretic, Anti-hemorrhagic, Wound healing, Antidiarrheal, Hemorrhoids and jaundice	Decoction, Poultice	HSUH 4012
			Punicaceae				
66	*Punica granatum* L.	Anaar	Cultivated	Fruit	Stomach ulcer, Detoxification	Edible, Decoction	HSUH 4117
			Rhamnaceae				
67	*Ziziphus jujuba* Mill.	Annaab	Cultivated	Fruit	Children's jaundice, Diuretic, Aperient, Treatment of constipation and pain relief	Raw, Decoction	HSUH 4011
			Rosaceae				
68	*Amygdalus communis* L.	Baadaam	Cultivated	Seed	Kidney stone, Dyspnea Cough, Strengthen hair and eyelashes	Raw, oil	HSUH 3098
69	*Prunus* spp.	Aloocheh	Cultivated	Fruit	Constipation	Raw, infusion, cooked	HSUH 4021
70	*Rosa damascena* L.	Gol Mohammadi	Cultivated	Flower	Relief of cold-induced heartache, Disinfectant, Body warmer	Rose water edible, dried	HSUH 4027
			Rutaceae				
71	*Haplophyllum pedicellatum* Bge. Ex Boiss.	Sedaabi Sabzevari	Wild	Aerial parts	Fever-reducing	Decoction, Poultice	HSUH 3897
			Salicaceae				
72	*Salix alba* L.	Bid Sefid	Cultivated	Bark	Fever-reducing, Headache, Muscle cramps	Herbal sweat, Decoction	HSUH 4039
			Scrophulariaceae				
73	*Scrophularia leucoclada*	Mokhleseh	Wild	Aerial parts	Bee and scorpion antidote	Poultice, decoction	HSUH 3900
74	*Scrophularia scoparia* Pennell.	Gol Meymoni Khorasani	Wild	Fruit, Young stems	Analgesic, Lumbar disc, Pulmonary disorders	Poultice	HSUH 3994

Table 2. List of species of medicinal plants and their therapeutic properties in Sabzevar County (Continued)

Num.	Scientific name	Local name	Wild or cultivated plant	Organ used	Medicinal properties	Method of used	Herbarium number
				Tamaricaceae			
75	*Tamarix ramosissima* Ledeb.	Gaz	Wild	Leaf	Diarrhea	Decoction	HSUH 4107
				Verbenaceae			
76	*Verbena officinalis* L.	Shaah Pasand	Cultivated	Flowering branch	Blood Cleanser, Fever-reducing	Decoction	HSUH 4079
				Zygophyllaceae			
77	*Tribulus terrestris* L.	Khaar khasak	Wild	Aerial parts	Kidney stone, Sexual enhancer	Fresh, Decoction	HSUH 4083
78	*Peganum harmala* L.	Espand	Wild	Fruit, Seed	Disinfectant, Toothache, Vermicide, Diarrhea	Vapor, Decoction seed	HSUH 4041

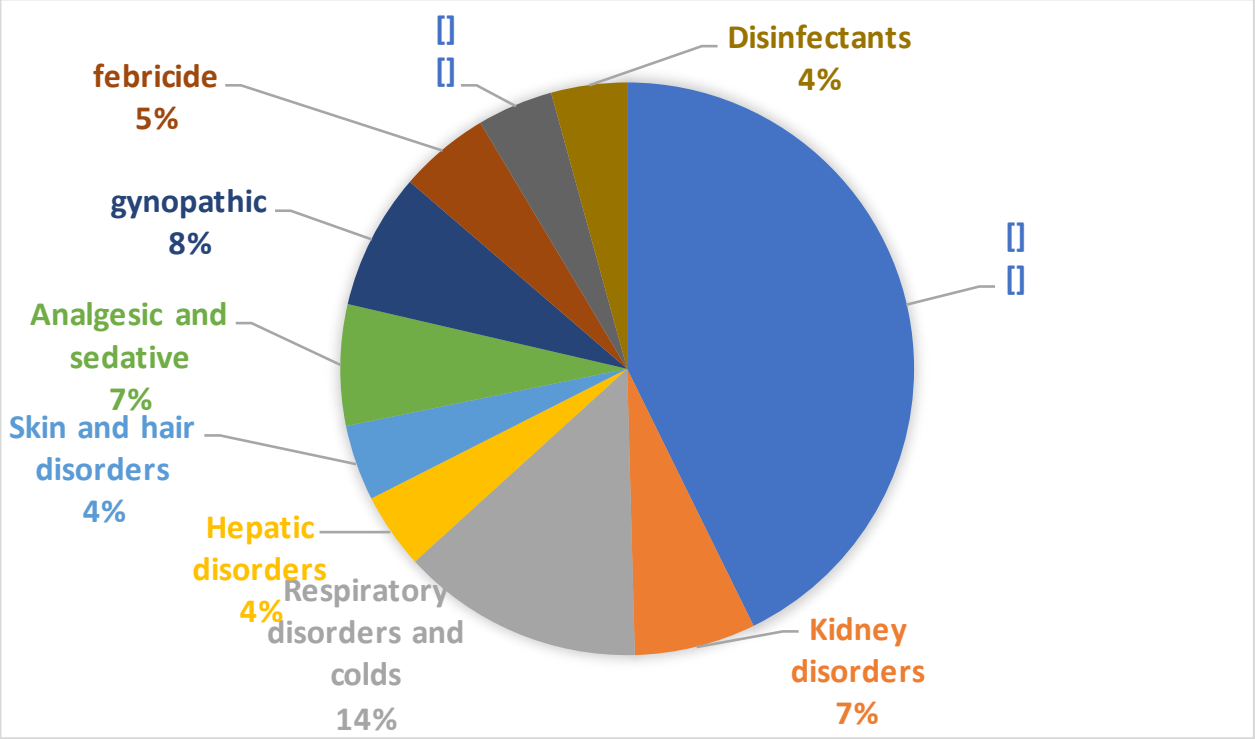

Fig. 3. The most important medicinal properties of medicinal plants used in Sabzevar County

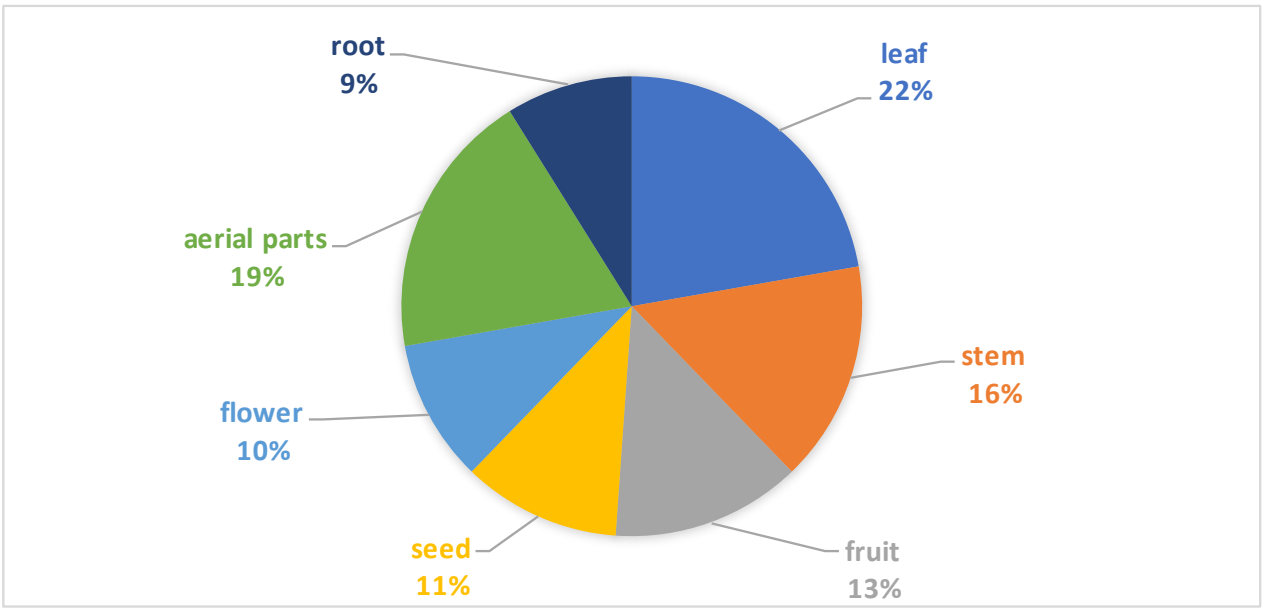

Fig. 4. Frequency distribution of plant parts used in the treatment of diseases in Sabzevar County

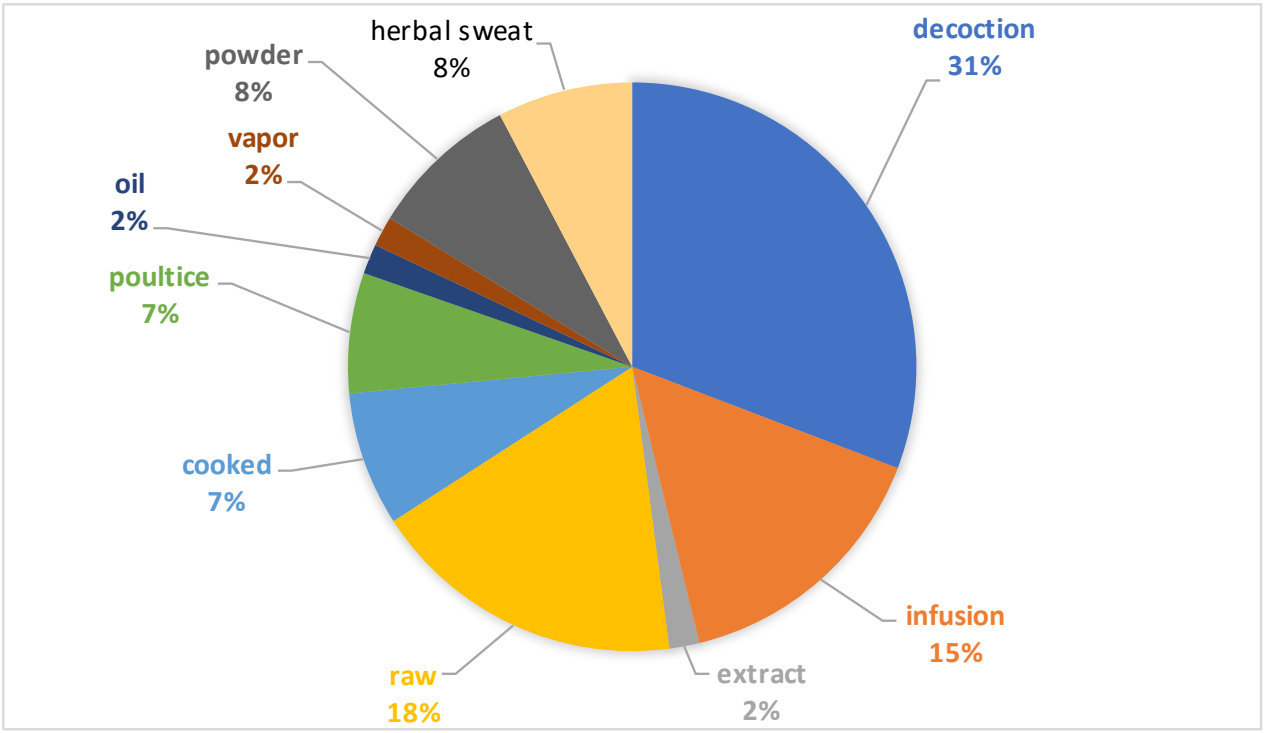

Fig. 5. Frequency distribution of medicinal plants consumption in Sabzevar city

Table 3. The most widely used medicinal plants and their traditional healing properties in Sabzevar County

	Medicinal use	Species used	Number
1	Digestive disorders	*Ferula gummosa, Artemisia turanica, Nepeta glomerulosa, Alcea tiliacea, Alyssum lanceolatum, Erodium oxyrrhynchum, Plantago major, Sesamum indicum, Bunium wolffii, Cuminum cyminum, Ducrosia anethifolia, Artemisia scoparia, Artemisia sieberi, Tanacetum parthenium., Glycyrrhiza glabra, Mentha longifolia, Mentha piperata, Nepeta cataria, Nepeta glomerulosa, Mentha piperata, Ziziphora clinopodioides, Rosa damascene, Artemisia sieberi, Artemisia sieberi, Ziziphora clinopodioides, Eryngium bungei, Descurainia Sophia, Allium ampeloprasum, Malva sylvestris, Ficus criaca, Plantago major, Prunus* spp., *Carum carvi, Artemisia sieberi, Elaeagnus angustifolia, Nepeta cataria, Salvia macrosiphon, Polygonum afghanicum, Tamarix ramosissima, Ferula gummosa, Punica granatum, Ferula gummosa, Glycyrrhiza glabra, Amaranthus cruentus, Achillea millefolium, Fumaria asepala, Peganum harmala, Glycyrrhiza glabra, Acanthophyllum borsczowii.*	48
2	Respiratory and cold disorders	*Brassica rapa, Alcea tiliacea, Scorzonera pusilla, Plantago major, Brassica rapa, Artemisia scoparia, Echinops chorassanicus, Echinops chorassanicus, Perovskia abrotanoides, Ziziphora clinopodioides, Alcea tiliacea, Ficus criaca, Amygdalus communis*	12
3	Female Genital	*Stachys trinervis, Vitex agnus-castus, Cuminum cyminum, Ducrosia anethifolia, Foeniculum vulgare, Achillea millefolium, Crocus sativus, Salvia macrosiphon, Ephedra intermedia*	8
4	sedative	*Salvia leriifolia, Scutellaria litwinowii, Scrophularia scoparia, Salix alba, Salvia leriifolia, Vitex agnus-castus, Fumaria asepala, Elaeagnus angustifolia*	8
5	Kidney disorders	*Achillea millefolium, Alhagi pseudalhagi, Malva sylvestris, Amygdalus communis, Tribulus terrestris, Polygonum afghanicum, Ziziphus jujube, Cichorium intybus*	7
6	Fever-reducing	*Echinops chorassanicus, Gundelia tournefortii, Perovskia abrotanoides, Haplophyllum pedicellatum, Salix alba, Verbena officinalis*	6
7	Reducing blood sugar and fat	*Achillea millefolium, Marrubium anisodon, Anethum graveolens,*	5
8	Skin and hair disorders	*Alyssum lanceolatum, Eremurus luteus, Amygdalus communis, Iris kopetdagensis, Polygonum afghanicum*	5
9	Disinfectants	*Dorema ammoniacum, Salvia leriifolia, Fumaria asepala Rosa damascena, Peganum harmala*	5
10	Liver disorders	*Gundelia tournefortii, Eremurus luteus, Alhagi pseudalhagi, Scutellaria litwinowii, Cichorium intybus*	4

4. Discussion

The ethnobotanical study of as a valuable and useful method plays a very important role in preserving the ancient history and different cultures around the world. In Iran, a country known for its diverse regions and cultures, the use of medicinal plants for treating illnesses and traditional purposes has always been prevalent among the population. The experiences and local indigenous knowledge of people in different regions of Iran regarding the different properties of plants have created a very valuable treasure. Preserving this national and cultural asset should be among the top priorities of society, and serious efforts should be made to prevent the loss of this indigenous knowledge.

The Khorasan Razavi Province, especially the County of Sabzevar, is among the regions in Iran with a long and valuable history of using medicinal plants for treating illnesses, enhancing physical strength, and alleviating bodily pains and discomforts [43]. The presence of numerous herbalist shops and traditional medicinal plant stores in these areas reflects the

diversity and significance of these beliefs in the community. With advancements in technology and changes in daily life, individuals are increasingly facing various stresses and challenges that can adversely affect their mental and physical well-being. In such circumstances, the consumption of medicinal plants has gained significant importance as a natural and effective solution. Due to the fact that the consumption of medicinal plants has fewer side effects compared to chemical drugs, more people are inclined towards using these natural therapeutic resources [44]. The increased interest in using medicinal plants as a natural and healthy approach to maintaining both physical and mental well-being amidst the changes brought about by modern and mechanized lifestyles reflects the need for the development and promotion of knowledge in this field and the enhancement of public awareness regarding the benefits of medicinal plants.

The present research focuses on ethnobotany, examining some of the most important medicinal plants of Sabzevar County. The results obtained from this study indicate that there is a diverse range of medicinal plant species in this area, with people utilizing various parts of these plants for therapeutic purposes.

This research contributes to a better understanding and utilization of medicinal plant resources in Sabzevar County, which can aid in the development of herbal medicine consumption in traditional medicine as well as in the health and cosmetic industries of the region. Moreover, the information obtained from this research can assist in the conservation of medicinal plant diversity in this area and prevent environmental damage. The most important plant families studied in this research are the Lamiaceae (mint family), Compositae, Apiaceae (carrot family), and Fabaceae (pea family).The results of ethnobotanical studies conducted by some researchers in the cities of Raz and Jargalan, Neyshabur, Kashmar, Saryen, and Abhar have also reported the prominence of these plant families, which supports the present study's findings regarding the dominant medicinal plant families in Sabzevar County[2, 38, 45].This study has shown that the most common traditional use of medicinal plants in Sabzevar County is for treating gastrointestinal diseases. Furthermore, the least utilization of medicinal plants in this area is related to the treatment of gastrointestinal disorders, infectious, skin, and hair conditions (Fig. 2).These findings are consistent with the results of studies conducted by Dolatkhaahi and Nabipour [33], Abtahi [31], Keyasi and Forouzeh [18], Mardani Nezhad, and Vazirpour [20] .On the other hand, the results of the present study indicate that the most commonly utilized parts of medicinal plants are leaves, aerial parts, and stems (Fig. 3). These findings are consistent with the results of other researchers' studies [23, 24, 28] .Examination of other studies [46, 47] in various regions of Iran demonstrates that the use of medicinal plants by the people follows a similar pattern. This indicates that different ethnic groups and traditions in Iran consider the use of these plants for treating physical and mental illnesses as significant. Further research in different regions of Iran could lead to the identification of a greater number of medicinal plants and their therapeutic properties. This information can aid in the development of local consumption of medicinal plants, promotion of traditional medicine, and the expansion of herbal-related commerce in these areas. Furthermore, attention is drawn towards the conservation of plant resources and prevention of their improper

proliferation, thus preserving the environment. These research findings may serve as inspiration for similar studies in the future and contribute to the improvement of public health and the environment in Iran. Similar results to our research on the traditional and medicinal uses of plants have been obtained in various regions including southern Kerman [48], Kazeroon [17], Fasa [23], Zarmrud Neka district [19], Zariwar region in Marivan [21], northeastern Khuzestan[23], Namarestagh Amol [26], Ajabshir [28], Almut, and Qazvin [29], Hamedan [32], Gilan [15], northwest Tarem Zanjan, Zanjan province [2], and Dashtestan county in Bushehr [49].

5. Conclusion

The results of this study identified 78 medicinal plant species from 30 families in Sabzevar County, with Lamiaceae, Compositae, and Apiaceae as the most important families in terms of medicinal use. The most commonly used plants include *Ferula foetida*, *Cuminum cyminum*, and *Rosa damascena*, among others. The plants are primarily used for treating gastrointestinal disorders (43 %), respiratory issues (14 %), and women's health conditions (8 %). Leaves, aerial parts, and stems are the most frequently used plant components, and decoction and infusion are the most common methods of preparation. These findings highlight the rich ethnobotanical knowledge present in the region and underscore the importance of preserving and documenting traditional medicinal practices, which can serve as a valuable resource for future pharmacological research and sustainable healthcare approaches**.**

Author Contributions

M.M.N. designed and supervised the study. M.R.V.K. contributed to data analysis and manuscript revision. M.A.F. participated in sample collection and contributed to writing the initial draft.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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