# Ethnobotanical Knowledge, Chemistry, and Pharmacology of the Asteraceae Family in Iran: A Review

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## Research

## Abstract

*Background*: The Asteraceae family is one of the largest families of flowering plants, known for its diverse chemical compounds with significant biological activities. The majority of Asteraceae family members have therapeutic applications and have a long history in traditional medicine. The purpose of this study is to introduce the key medicinal species of this family and their chemical compounds that are used in traditional Iranian medicine.

*Methods*: Here, we reviewed scientific published studies in major scientific databases on the medicinal and chemical properties of Asteraceae family, emphasizing the ethnobotanical uses in Iran.

*Results*: This review selected 137 key Asteraceae family plants for their medicinal uses and chemical properties. The most frequently used parts were flower (26%) and leaves (21%). The most important preparations were decoction (44%) and infusion (33%). The genus *Artemisia* participates with the highest number of species (10 species) followed by *Centurea* (9 species). The most frequently cited medicinal species were used for digestive system treatment (18%) followed by the respiratory system (10%). Among the active substances that determine the biological activity of the plant material phenolic acid derivatives, flavonoids, sesquiterpene lactones and other terpenoids, and polyacetylenes are some of the most commonly reported compounds from Asteraceae family plants.

*Conclusions*: In this research, ethnobotany knowledge about the uses of Asteraceae family plants has been collected so that it will be available to the next generations. Local people are using the plants for various purposes i.e. digestive system treatment, respiratory system, and nervous system. The precious ethnobotanical knowledge about these plants must be transferred to the younger generations. The data may be valuable in the future for pharmacological studies.

*Keywords*: Ethnobotany; Medicinal plants, Asteraceae, Phytochemistry, Plant Ecology.

## Background

In traditional medicine, the plant kingdom has been the best source of remedies for a variety of diseases due to its ability to synthesize secondary metabolites with potentially significant biological activity. Plants are primary therapeutic agents used for treating illness, an integral element of health care systems, and the best testimony of cultural importance. There are numerous medicinal plants available in their surroundings and those herbs are being used by the tribal community as medicine for curing their diseases to add flavor and conserve food. Drugs based on plants used in traditional medicine are often cheaper than normal drugs, are easily accessible, and have fewer side effects than synthetic alternatives (Amini *et al.* 2024, Rolnik & Olas 2021).

The Asteraceae family, commonly known as the sunflower family, is one of the largest and most diverse families of flowering plants including more than 1600 plant genera and 32000 plant species (Https://Powo.Science.Kew.Org/ 2022) (Https://Powo.Science.Kew.Org/ 2022). Species of the Asteraceae family can be found at sea level to high mountains, and their main characteristic is the presence of capitula containing many florets (Willis 2017). The morphology of the Asteraceae plants is also diverse. Some species are trees reaching more than 30 m, however, many others are shrubs and most are perennial or less annual herbs. The form of the leaves varies widely while most are large, others are small and spiny, and in some species, there are no leaves, with their function being taken over by a green stem. Most leaves are covered with an indumentum and hairs of all lengths and colors. The majority of Asteraceae family members have therapeutic applications and have a long history in traditional medicine. Some members have been cultivated for more than 3000 years for edible and medicinal purposes (Rolnik & Olas 2021).

Many species of this family have been reported to contain bioactive compounds such as phenolic acids, flavonoids, terpenoids, volatile components, etc. (Devkota 2022). Based on certain reports presented in recent years, a wide range of pharmacological and therapeutic properties such as antioxidant, anti-inflammatory, anticancer, and antimicrobial properties have been attributed to the plants in the Asteraceae family (Nadri & Mahmoudvand 2021a)**.** Asteraceae family species have a long history of use for various purposes. Having beautiful flowers, many plant species of this family are cultivated for ornamental purposes. Plants such as *Tagetes erecta* L., *Ta. petula* L., *Helianthus annuus* L., *Calendula officinalis* L., and *Centaurea cyanus* L. are cultivated all over the world for their beautiful flowers. Many of these plants are also used in cultural and religious ceremonies and functions (Devkota 2022). This family with about 155 genera and almost 1234 species is the largest family after the Fabaceae in Iran. The most important species in Iran are: *Cousinia* with about 210 species, *Centaurea* with about 74 species, *Scorzonera* with about 50 species, *Artemisia* with about 34 species, *Tanacetum* with about 26 species, and *Tragopogon* with about 25 species. Most *Cousinia* species in Iran are exclusive plants and have the most distribution in Khorasan province. This genus is the second-largest genus of Iranian flora. Its different species grow from southern lowlands to mountainous heights. *Gundelia tournefortii* exists in most parts of Iran, especially in Fars and Central provinces. Sunflower oil seeds (*He. annuus*) and *Carthamus tinctorius* is used in the oil industry. Among the plants with nutritional value in this family are lettuce (*Lactuca sativa*), artichoke (*Cynara scolymus*), and endive (*Cichorium endivia*). Some plants such as *Ci. intybus*, *Echinops ritrodes*, *Achillea millifolium*, and *Ca. officinalis* have medicinal values. *Gu. tournefortii* is one of the most valuable pasture species that has edible use, especially in spring. Other genera like *Tagetes*, *chrysanthemum*, *Dahlia*, *Zinia*, and *Bellis*, *Chrysanthemums* have ornamental values (Qolipour & Moradi 2019).

Naderi and Mahmoudvand (2021) studied the role of Iranian medicinal plants of the family Asteraceae in pain therapy. They reported 16 plant species belonging to the Asteraceae family that were effective in pain treatment (Nadri & Mahmoudvand 2021a). They showed the most abundant parts of these plants were arial parts that are used for pain treatment. Gul *et al*. (2009) studied the medicinal value of the Asteraceae of Dir Kohistan Valley, Pakistan. This study introduces 25 species belonging to 21 genera of Asteracaeae family. These medicinal plants use as painkiller, diuretic, febrifuges, carminative, anthelmintic, anti flammatory and so one (Gul *et al.* 2009). Asteraceae family at Rajashahi Bangladesh is investigated by Rahman (2013). In this study 36 plant species belonging to 29 genera of the family Asteraceae have been recorded which are used in the ailment of human diseases and 18 species have been recorded which are used in the ailment of diseases of domestic animals.

Flora of Iran contains more than 8000 angiosperm species, out of which 1234 belongs to Asteraceae family (Ghahremaninejad & Nejad Falatoury 2016). The members of this numerous families are widely utilized in traditional medicine (Hassanpouraghdam *et al.* 2022). The medicinal properties of the plants of this family have been mentioned in several articles, in this paper, we tried to bring some of these scattered publications together and introduce the Asteraceae species that have the most prominent medicinal uses in Iran. We have also attempted to identify the botanical names of

some of these species to make them accessible to the scientific community. Since the medicinal properties of plants are related to their chemical compounds, some chemistry characteristics and ethnobotanical surveys have been included.

## Materials and Methods

We conducted an intensive literature search using major scientific databases of PubMed, Scopus, Google Scholar, and Web of Science. Search keywords were "Asteraceae", "medicinal plants", "Iran", and "ethnobotany". We selected peer-reviewed publications from 2010 to 2023 that focused on the medicinal applications and chemical properties of Asteraceae plants in Iran. The criteria for inclusion included studies focusing on Asteraceae family species native to Iran and their chemical, pharmacological, and ethnobotanical properties. Studies that pertained solely to unrelated fields or were not focused on the Asteraceae family were excluded. Data was systematically extracted concerning the ethnobotanical uses, chemical compounds, and health impacts associated with these plants. In addition, some Persian papers, botanical and folk medicine books were considered (Devkota 2022, Mozaffarian 2018). We tabulated the data and used descriptive statistics for data analysis, especially the frequency test. All statistical analyses were carried out using SPSS var. 26.

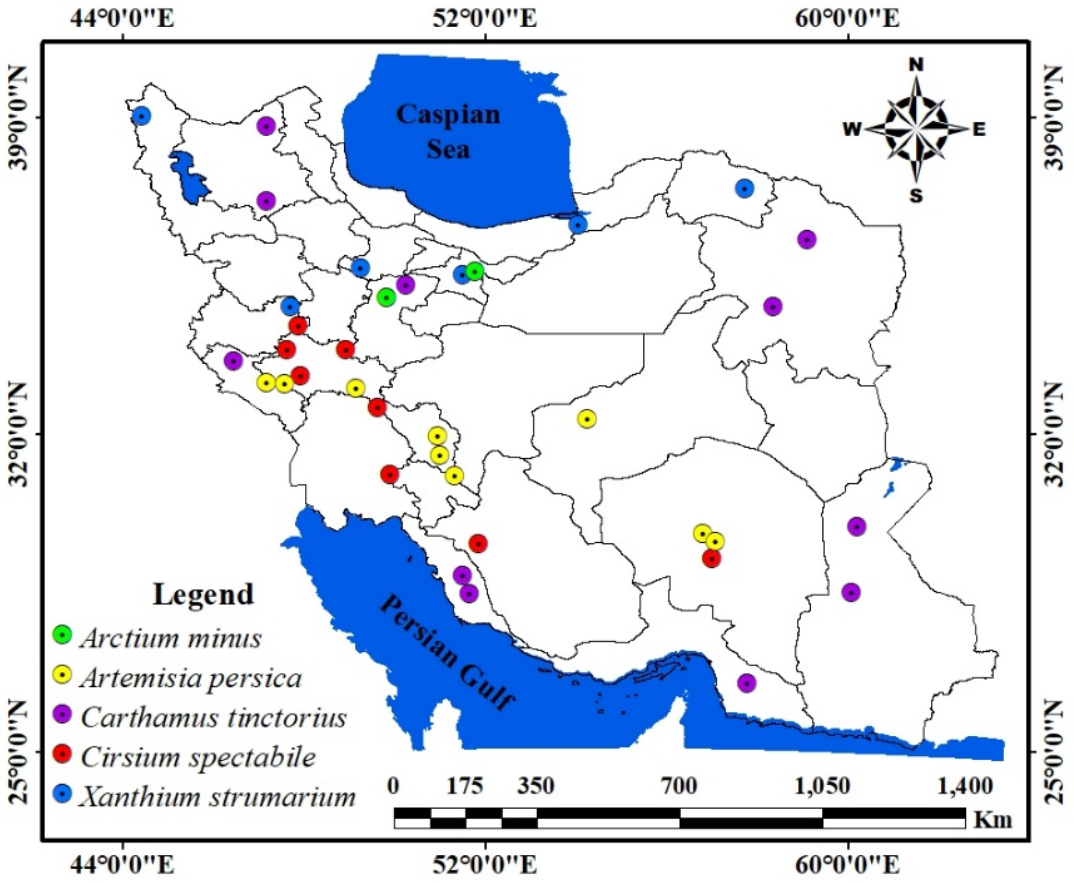


Figure 1. Geographical distribution map of key species of Asteraceae family in Iran.

## Results and Discussion

## The list of medicinal plant species of Asteracese family

In this review, ethnobotanical usage of 137 species has been determined. Table 1 illustrates the results of this survey. See Figure 1 for the geographical distributions of five major species.The plants used for various purposes in different parts of Iran were arranged in alphabetical order of their scientific names. The information comprises autochthonous names, the part(s) used, the method of preparation, and traditional applications along with literature sources. An ethnobotanical study on Asteraceae family at Rajshahi, Bangladesh was made. In which, Rhman (2013) reported 36 plant species in 29 genera of the family Asteraceae (Rahman 2013). The species *Calendula officinalis* L., *Cirsium arvense* (L.) Scop., *He. annuus* L., *Lactuca sativa* L., *Sonchus asper* (L.) Hill are common in Iran and Rajshahi, Bangladesh. Gul *et al.* (2009) introduced medicinal species of Asteraceae family of Dir Kohistan, Pkistan. This study, deals with the local uses of 25 species belonging to 21 genera of the

family Asteraceae. *Ac. millefolium* L., *Artemisia scoparia* Waldst. & Kitam., *Ar. absinthium* L., *Calendula officinalis* L., *Cichorium intybus* L., *Lactuca serriola* L., *Onopordum acanthium* L., *Sonchus asper* (L.) Hill and *Xanthium strumarium* L. are common in Iran and Dir Kohistan, Pkistan (Gul *et al.* 2009). The most commonly used plant parts were flowers (26%) and leaves (21%) with decoctions (44%) and infusions (33%) being the primary preparation methods (Figures 2).

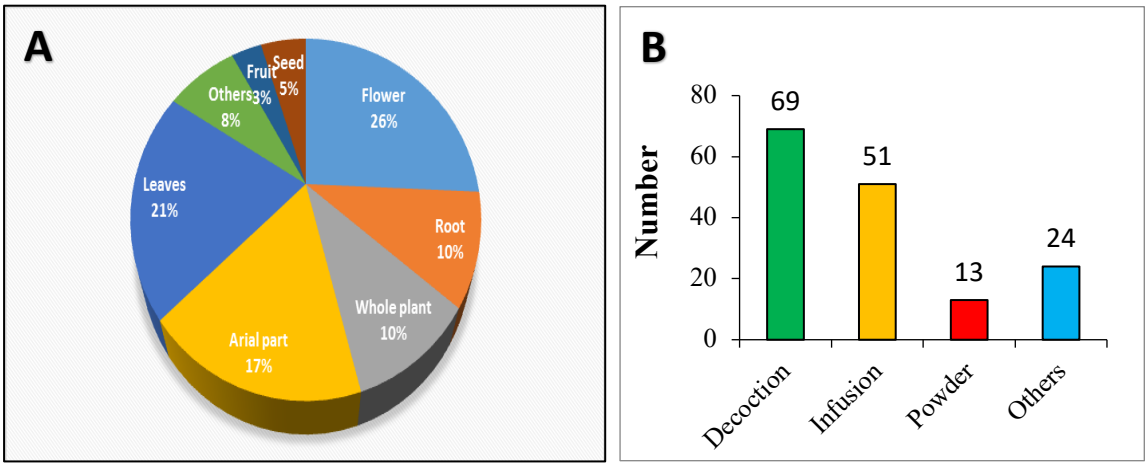


Fig. 2. Plant parts used for medicinal applications (a)and mode of preparation of plant parts and their percentages (b) based on data reported in the literature for Iranian Asteraceae species.

Among the genera, the most represented were *Artemisia* and *Centaurea* with 10 and nine species, respectively (Figure 3). The herb *Ar. annua* L. has been used for many centuries in Chinese traditional medicine as a treatment for fever and malaria (de Faveri Favero *et al.* 2014). However, in the articles examined in this research, this characteristic of those plant species is not mentioned, so it is suggested to conduct a study on the extraction of the artemisinin compound and its medicinal effects. In the ethnobotanical articles reported from Iran, species *A. aucheri* Boiss. *A. haussknechtii* Boiss. and *A. kopetdaghensis* Krasch., M.Pop. & Lincz. ex Poljak. are anti-fever and species *A. persica* Boiss is reported to be anti-malarial. According to ethnobotanical research, *Centaurea solstitialis* L. is mostly used for urinary diseases. This contains sesquiterpene lactones, flavonoids, and polyacetylenes are major groups of secondry metabolites (Branco *et al.* 2023). The review of *Echinops* species is used traditionally for respiratory diseases, digestive problems, pain relievers, febrifuge, treatment of skin diseases, and blood purifiers. Bitew and Hymete (2019) investigated the phytochemistry and biological activity of the *Echinops* genus (Bitew & Hymete 2019). Species *Echinops ritrodes* Bunge is the only species from Iran that is mentioned in this article to be used in traditional medicine. In addition, six *Achillea* species in this survey were used for nerve tonic, blood purifier, antidiabetic, treatment for blood fat, digestive system problems, menstrual disorders, febrifuge, and kidney pain. *Cousinia* species are utilized in removal of kidney stones, treatment of diabetic ulcers, digestive system problems, liver tonic and respiratoru system disorders. Among the four species of *Anthemis*, *Anthemis odontostephana* Boiss. has been reported by Arvin and firozeh (2022) to treat Corona. *Tanacetum* species are used for pain treatment, digestive problems, headache and menstrual pains. *Scorzonera phaeopappa* (Boiss.) Boiss. is used for healing wounds, insect bites, treating stomach upset, and healing pain. Turkish folk medicine uses this species for headaches (Lendzion *et al.* 2021). Three other introduced species of *Scorzonera* genus are used in Iranian traditional medicine for Laxative, Insects and animal bite. The introduced species of the *Taraxacum* genus in this article are used as liver tonic and treatment of diseases of blood, digestive system and respiratory system.

Table 1. List of plant species along with their use in traditional medicine

| Scientific Name | Vernacular name | Part Used | Preparation | Medicinal Uses (Human) | Reference Cited |
|---|---|---|---|---|---|
| *Achillea arabica* Kotschy | Boumadara, Golzard | Flower | Infusion | Heartache, Stomach bloating, Nerve pain | (Arvin & Firuzeh 2022) |
| *Achillea beibersteinii* Afan. | Bimadaroon zard | Whole plant | Decoction | Food poisoning, Carminative, Inflammation, Hypothermia, | (Delfan & Azizi 2020), (Naghibi *et al.* 2014) |
| *Achillea eriophora* DC. | Boumadaran | Aerial parts | Raw, Poultice, powder | Antipyretic, Insects bite, Bee bite, Snake bite, Scorpions bite, Wound healing, Bleeding, Relaxing, Gastric discomfort Parasite repellent, Anti-diarrhea, Menstrual disorders, Cramps, Febrifuge, Stomachache, Kidney Pain | (Amiri & Joharchi 2013), (Hoseini *et al.* 2021), (Mirshekar *et al.* 2019), (Mozaffarian 2018), (Safa *et al.* 2013), (Sharififar *et al.* 2010) |
| *Achillea millefolium* L. | Boumadaran | Aerial parts, Flower | Infusion, Steam, Delmulcent | Antidiabetic, Bleeding, menses, Abdominal pains, Anemia, Child fever, Bitter tonic, High blood pressure, Increase sweating, Antispasmodic, Astringent | (Bahmani *et al.* 2014), (Mirdeilami *et al.* 2011), (Mirdeilami *et al.* 2014), (Mehrnia *et al.* 2021), (Mozaffarian 2018), (Sadeghi & Mahmood 2014) |
| *Achillea santolinoides* subsp *wilhelmsii* (K.Koch) Greuter | Bumadaran | Aerial parts, Root | Infusion, Powder, Decoction, Aromatic water, poultice | Antihemorrhoids, Antidiarrhea, Hypoglycemic, Anthelmintic, Mastitis, Antacid, Dyspepsia, Nerve tonic, Treatment of osteoarthritis, Treatment of blood flooding, Appetizer, Stomachache, Disinfectant, Blood purifier, Carminative, Diuretic, Antispasmodic, Menses pain، Loose hair، Relaxing, Gastric discomfort Parasite repellent, Menstrual disorders, Cramps, Febrifuge, Stomachache | (Amiri & Joharchi 2013), (Delfan & Azizi 2020), (Hosseini *et al.* 2021), (Khajoei Nasab & Khosravi 2014), (Mardani-Nejhad & Vazirpour 2012), (Mehrnia *et al.* 2021), (Mosaddegh *et al.* 2012), (Nadaf *et al.* 2019), (Naghibi *et al.* 2014), (Safa *et al.* 2013) |
| *Achillea tenuifolia* Lam. | Bimadaroon | Fruit | Infusion | Blood fat, Flatulency, Abdominal pain | (Dolatkhahi & Ghorbani Nohooji 2013), (Ganjali & Khaksafidi 2016) |
| *Ajania fruticulosa* (Ledeb.) Poljakov (*Syn. Tanacetum fruticulosum* Ledeb.) | Dermene shah | Leaves | Fresh Organ | Stomachache, abdominal pain, flatulency | (Safa *et al.* 2013) |
| *Anacyclus pyrethrum* (L.) Lag. | Bimadaroon zard | Root | Decoction | Treatment of Sciatica, Treatment of Stuttering | (Amiri & Joharchi 2013) |

| Scientific Name | Vernacular name | Part Used | Preparation | Medicinal Uses (Human) | Reference Cited |
|---|---|---|---|---|---|
| *Anthemis austroiranica* Rech.f., Aellen & Esfand. | Barreh Chagh-kon | Aerial parts | Decoction is used to take bath, Edible | Measles, Stomachache, Blood fat | (Dolatkhahi & Ghorbani Nohooji 2013), (Mosaddegh *et al.* 2012) |
| *Anthemis cotula* L. | Babouneh bahari | Flowers, Leaves | Steam, Infusion | Antiepileptic, Headaches treatment, Diarrhea, Dysentery, Increased sleeping, Shortness of breath, Anti-infective, Wound healing, Eye and throats swelling, Stomach cramps in children | (Dolatkhahi & Ghorbani Nohooji 2013), (Farouji & Khodayari 2016), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Anthemis hyalina* DC. | Baboone | Aerial parts | Decoction is used to take bath, Edible | Relieves heartache, Relieves throat swelling | (Delfan & Azizi, 2020) |
| *Anthemis lorestanica* Iranshahr | Bawina | Flower, Leaves | Infusion | Antispasmodic, Emmenagogue, Uterotonic | (Mehrnia *et al.* 2021) |
| *Anthemis odontostephana* Boiss. | Baboone golsefid | Flower | Decoction | Eye pain, Liver cleansing, Women's infection, Burns, Colds, Corona, malaria, Heartache, Soothing headache | (Arvin & Firuzeh 2022) |
| *Arctium lappa* L. | Baba Adam | Leaves, Root, Seed | Steam, Poultice, Decoction, Infusion, | Diuretic Cholagogue, Antidiabetic, Depurative, Hypoglycemic, Vertigo, Blood purifier, Antispasmodic, Detoxification, Food digestion, Parasite repellent, Kidney diseases Anti-infective, Detoxifying agent, Diuretic, Tonic liver, Measles, Smallpox | (Amiri & Joharchi 2013), (Arvin & Firuzeh 2022), (Bahmani *et al.* 2014), (Delfan & Azizi, 2020), (Hosseini *et al.* 2021) (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Arctium minus* (Hill) Bernh. | Baba Adam | Root, Seed, Leaves | Infusion, Decoction | Metabolite, Bald head, Diaphoretic, Skin burns and allergies (external use), Blood purification, Rheumatism, Kidney stones, Skin disease, Snake and scorpion bites | (Mardani-Nejhad & Vazirpour 2012), (Mehrnia *et al.* 2021), (Mosaddegh *et al.* 2012), (Mozaffarian 2018) |
| *Artemisia absinthium* L. | Afsantin | Aerial parts | Decoction, Demulcent | Anthelmintic, Appetizer, Indigestion, Stomach ache, Laxative in children, Skin, Intestinal parasites | (Amiri & Joharchi 2013), (Arvin & Firuzeh 2022), (Mirdeilami *et al.* 2011), (Mirdeilami *et al.* 2014), (Hosseini *et al.* 2021), (Mozaffarian 2018) |
| *Artemisia annua* L. | Dermane | Whole plant | Decoction | Antihemorrhage, Diarrhea, Appetizer, Diuretic, Anti-flatulence, Anthelmintics, Astringent, Bruises | (Delfan *et al.*, 2015), (Mehrnia *et al.* 2021), (Mirdeilami *et al.* 2011), (Mirdeilami *et al.* 2014), (Mozaffarian *et al.* 2018) |

| Scientific Name | Vernacular name | Part Used | Preparation | Medicinal Uses (Human) | Reference Cited |
|---|---|---|---|---|---|
| *Artemisia aucheri* Boiss. | Dermane koohi | Leaves, Flowering branches | Fresh organ, powder | Stomachache, Abdominal pain, Fever, Relaxing, Abdominal pains, Respiratory diseases, Body tonic, Febrifuge | (Dolatkhahi & Ghorbani Nohooji 2013), (Ganjali & Khaksafidi 2016), (Hosseini *et al.* 2021), (Khajoei Nasab & Khosravi 2014), (Safa *et al.* 2013), (Sharififar *et al.* 2010) |
| *Artemisia dracunculus* L. | Tarkhun | Aerial parts, Root | Decoction, Food | Appetizer, Dyspepsia Spice, Anthelmintic, Antacid, Carminative, Decrease blood pressure, Spice, Anti-microbial, Anti-flatulence, Carminative, Febrifuge, Appetizer, Hiccups, Stomach tonic, Spasmolytic, Nerve tonic | (Amiri & Joharchi 2013), (Dolatkhahi & Ghorbani Nohooji 2013), (Mehrnia *et al.* 2021), (Mosaddegh *et al.* 2012), (Mozaffarian 2018), (Nadaf *et al.* 2019) |
| *Artemisia haussknechtii* Boiss. | Dermane zagrosi | Aerial parts | Decoction | Disinfectant, anti-cough, wind breaker, appetite suppressant, anti-parasitic, fever reducer | (Delfan & Azizi, 2020) |
| *Artemisia kopetdaghensis* Krasch., M.Pop. & Lincz. ex Poljak. | Dermane | Aerial parts | Decoction, powder | Fever, wound in children Flavoring, Cleansing the liver, increasing bile, reducing blood sugar, heartache, stomach inflammation | (Arvin & Firuzeh 2022), (Mirdeilami *et al.* 2011), (Mirdeilami *et al.* 2014) |
| *Artemisia persica* Boiss. | Dermene torki | Flowering branches | Decoction, powder | Febrifuge, Gastric infection, Stomachache, Spice, Anti-infective, Cough, Anti-flatulence, Carminative, Anti-malaria, Headache, Tonic, Anthelmintics | (Hosseini *et al.* 2021), (Hosseini *et al.* 2021), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Artemisia scoparia* Waldst. & Kitam. | Dermaneh | Aerial parts | Decoction, fresh organ | Flatulency in children, joint pain and rheumatism, Hydrocele. Stomachache | (Dolatkhahi & Ghorbani Nohooji 2013), (Hosseini *et al.* 2021), (Mozaffarian 2018), (Safa *et al.* 2013) |
| *Artemisia sieberi* Besser | Dermaneh | Whole plant | Decoction,Infusion, powder | Treatment of burns, Earache, Vomiting, worms and parasitic diseases, Headache, Heartache, Stomach Bloating, Viral disease like corona, Shortness of breath, Digestive problems, Sedative, Antipyretic, Nauseous, Diabetes, Hypertension, Abdominal pains diarrhea | (Arvin & Firuzeh 2022), (Eslami Farouji & Khodayari 2016), (Khajoei Nasab & Khosravi 2014), (Hosseini *et al.* 2021), (Mozaffarian *et al.* 2018), (Mirshekar *et al.* 2019), (Sadeghi & Mahmood 2014) |
| *Artemisia vulgaris* L. | Berenjasf | Leaves, Flower | Infusion, decoction | Nerve Tonic, Sexual Impotency, Menstrual Regulator, Digestive problems, Sedative, | (Amiri & Joharchi 2013), (Mozaffarian 2018), (Sadeghi & Mahmood, 2014) |

| Scientific Name | Vernacular name | Part Used | Preparation | Medicinal Uses (Human) | Reference Cited |
|---|---|---|---|---|---|
| | | | | Addiction treatment, Diabetes, Sterility, Hyperlipidemia | |
| *Atractylis cancellata* L. | Karcharkha | gum, Leaf | Row, Powder | Vegetable | (Hosseini *et al.* 2021) |
| *Bellis perennis* L. | Mina chamani | Leaves, Flower | Decoction | Diuretic, Expectorant, Febrifuge, Laxative, Tonic, Sedative, Rheumatism, Bronchitis | (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Bidens tripartita* L. | Du Dand an | Aerial parts | Infusion | Astringent, Diuretic, Bladder and kidney problems, Hematuria, Digestive disorders | (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Calendula arvensis* L. | Hamisha behar | Flower, Leaves | Infusion, Decoction, Cataplasm | Kidney stones, Skin, urinary tract infections, Psoriasis, Anti-fungal, Anti-inflammatory, Diaphoretic, Increase bile production Diuretic | (Dolatkhahi & Ghorbani Nohooji 2013), (Mardani-Nejhad & Vazirpour 2012), (Mehrnia *et al.* 2021), (Mirdeilami *et al.* 2011), (Mirdeilami *et al.* 2014), (Mosaddegh *et al.* 2012) |
| *Calendula arvensis* L. *(Syn. Calendula persica* var. *persica)* | *Hamishe Baha* | Flower | Decoction | Canker sores, bedsores | (Arvin & Firuzeh 2022), (Mozaffarian 2018) |
| *Calendula officinalis* L. | Hamishe Baha | Aerial parts | Infusion, Decoction, oil | Blood purification, Anticancer, Wound treatment, Analgesic, Vermifuge, Anti-bacterial, Anti-retroviral, Heart tonic, Carminative, Pancreatic cancer, Acne, Pterygium, Anti-fungal, Anti-inflammatory, Diaphoretic, Diuretic, Increase bile production, Hyperlipidemia, Hypertension, Analgesic, Peptic ulcer, Intestinal ulcer, Asthma, Cough, Anemia, Wound healing (external use), Skin moisturizing, Rash and pustule, Nipple dryness of breastfeeding mothers, Sedative | (Amiri & Joharchi 2013), (Eslami Farouji & Khodayari 2016), (Hosseini *et al.* 2021), (Mehrnia *et al.* 2021), (Mozaffarian 2018), (Nadaf *et al.* 2019) |
| *Cardinia orientalis* (L.) O.Kuntze | Gargo | Aerial parts | Decoction | Wound healing, Removal of kidney stones | (Delfan & Azizi, 2020) |
| *Carduus arabicus* Jacq. | Tatari | Aerial parts | Decoction | Relieving eye swelling, healing wounds and lowering blood pressure | (Delfan & Azizi, 2020) |
| *Carthamus lanatus* L. | Kharzard, Golrang | Flower, Seed | Poultice, Food, Cataplasm | Bruise, Diaphoretic, Diuretic, Febrifuge, Anthelmintics, Wound healing | (Hosseini *et al.* 2021), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |

| Scientific Name | Vernacular name | Part Used | Preparation | Medicinal Uses (Human) | Reference Cited |
|---|---|---|---|---|---|
| *Carthamus oxyacantha* M.Bieb. | *Golrang zard* | Leaf, Flower, Seed | Decoction, Powder | Purgative, Menstrual disorders, Blood purifierrrrr, Wound healing (external use of the oil), Itching | (Arvin & Firuzeh 2022), (Delfan & Azizi, 2020), (Hosseini *et al.* 2021), (Hosseini *et al.* 2021), (Mehrnia *et al.* 2021), (Mozaffarian *et al.* 2018) |
| *Carthamus tinctorius* L. | Golrang | Leaves, Flower, Seed | In baking, Food, Cataplasm | Emmenagogue, Flavoring laxative, Treatment of rheumatism, The plant has a cooling nature, Antipyretic, Anti-tumor, Heart tonic, Eye problems, Dyeing and staining, Food color, Cholesterolemia, Atherosclerosis, Diaphoretic, Analgesic, Febrifuge, Expectorant, Tonic, Cough, Wound healing | (Amiri & Joharchi 2013), (Eslami Farouji & Khodayari 2016), (Khajoei Nasab & Khosravi 2014), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Centaurea behen* L. | Bahman sefid | Root | Decoction | Strengthening, Jaundice treatment, Heart diseases, Antidote, Relief impotence, Palpitations, increase sperm volume, Heart strengthen, Refreshing, Jaundice, improve memory loss, Anti-lithiasis, Aphrodisiac | (Amiri & Joharchi 2013), (Eslami Farouji & Khodayari 2016), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Centaurea benedicta* (L.) L. | Khar moghadas | Flowering branches, Seed | Decoction | Memory tonic, Stomach tonic, Diaphoretic, Febrifuge, Appetizer, Digestive tonic, Hyperuricemia, Spasmolytic, Herpes zoster (external use) | (Hosseini *et al.* 2021), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Centaurea bruguierana* (DC.) Hand.-Mazz. | Gol gandom | Aerial parts | Infusion, Decoction | Blood sugar, Diabetes, decrease Pain headache, antipyretic, anti- scorpions bite, Anti- inflammatory, Remedy for the eyes (eyewash), Bitter tonic, Hepatoprotective, Improving resistance to infection, Digestion tonic | (Dolatkhahi & Ghorbani Nohooji 2013), (Hosseini *et al.* 2021), (Mehrnia *et al.* 2021), (Safa *et al.* 2013), |
| *Centaurea hyalolepis* Bioss. | Gole Gandom | Flower | Infusion | Relieves liver discomfort, Eye conjunctivitis, Stomach tonic | (Delfan & Azizi, 2020) |
| *Centaurea iberica* Trevir. ex Spreng. | Gole Gandom, Chamanzar | Flower | Infusion | Relieves liver discomfort, Eye conjunctivitis, stomach tonic | (Delfan & Azizi, 2020), (Zolfaghari *et al.* 2012) |
| *Centaurea luristanica* Rech.f. | Gol-e-ganem | Flower, Leaves | Infusion | Febrifuge, Diuretic, Laxative, Decrease bile production, Kidney and liver problems, Digestive tonic, Conjunctivitis, Stye | (Mehrnia *et al.* 2021) |

| Scientific Name | Vernacular name | Part Used | Preparation | Medicinal Uses (Human) | Reference Cited |
|---|---|---|---|---|---|
| *Centaurea reflexa* subsp. *sosnovskyi* (Grossh.) Mikheev (*Syn. Centaurea sosnovskyi* Grossh.) | Gole Gandom | Flower | Infusion | Treating eye pain, healing cuts, treating acne, a strong diuretic | (Delfan & Azizi, 2020) |
| *Centaurea solstitialis* L. | Gole gandome zard | Flower, Root | Decoction, Infusion | Refrigerant, Stomach tonic, Kidney stones, Treatment of eye pain Healing cuts, acne treatment, Febrifuge, Bitter tonic | (Delfan & Azizi 2020), (Eslami Farouji & Khodayari 2016), (Mehrnia *et al.* 2021), (Mozaffarian 2018), (Naghibi *et al.* 2014) |
| *Centaurea virgata* subsp. *squarrosa* (Willd.) Gugler | Gole gandome tarkee | Flower, Leaves | Infusion | Treatment of eye conjunctivitis, Treatment of pimples and acne, Anti-cough, anti-urinary, Rheumatism, Bitter tonic, Mild laxative for children | (Delfan & Azizi 2020), (Mehrnia *et al.* 2021) |
| *Chamaemelum nobile* (L.) All. (Syn. *Anthemis nobilis* L.) | Gol-e-babooneh | Flower | Decoction, Infusion (with tea) | Kidney stones, Women, Carminative, Analgesic | (Amiri & Joharchi 2013), (Mirdeilami *et al.* 2011) |
| *Cichorium intybus* L. | Kasni | Whole plant | Decoction, Edible, Orally, cooked and taken with yogurt, powdered flower, Arrack, Hydrodistilation, Aromatic water, Mceration | Treatment of Palpitation, Appetizer, Depurative, Treatment of Furuncles, Antiallergic, Liver tonic, Anti-bacterial, Carminative, Heart tonic, Nerves reinforcing, Lowering blood sugar, Anti-anemia, Skin disorders, Digestive, Jaundice treatment, Diuretic, Febrifuge, Antihypertensive, Laxative Blood cleanser, Icterus, Antipyretic, Dermal allergies, Cough, destruction of warts | (Amiri & Joharchi 2013), (Delfan & Azizi, 2020), (Dolatkhahi & Ghorbani Nohooji 2013), (Dolatkhahi & Nabipour 2014), (Eslami Farouji & Khodayari 2016), (Hosseini *et al.* 2021), (Mardani-Nejhad & Vazirpour 2012), (Mehrnia *et al.* 2021), (Mirdeilami *et al.* 2014), (Mozaffarian 2018) |
| *Cichorium pumilum* Jacq. | Kasni | Root, Leaf, Flower | Aromatic water, Mceration | Sunstroke،For Liver pain، Icterus, Jaundice, Febrifuge, Blood purifier, Antihypertensive, Laxative, Appetizing | (Mercier *et al.* 2009), (Sharififar *et al.* 2010) |
| *Cirsium arvense* (L.) Scop. | Kangar | Root, pith parenchyma | Decoction | Gastric discomfort, Appetizing, Disinfectant, Febrifuge | (Hosseini *et al.* 2021), (Mozaffarian 2018), (Sharififar *et al.* 2010) |
| *Cirsium sorocephalum* Fisch. & C.A.Mey. (*Syn. Cirsium congestum* Fisch. & C.A.Mey. ex DC.) | Kangar | Whole plant | Food | Cholesterol Mia, Diuretic, Liver detoxifying agent, Anti-inflammatory, Hypertension, Weight loss, Digestion tonic, Liver tonic | (Mehrnia *et al.* 2021) |
| *Cirsium spectabile* DC. | Kangar tamashaei | Aerial parts | Decoction | Removal of kidney stones, Treatment of diabetic ulcers | (Delfan & Azizi, 2020) |

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|---|---|---|---|---|---|
| *Cota altissima* (L.) J.Gay (*Syn. Anthemis altissima* L.) | Baboone | Fruit | Infusion | Heart tonic, Menstruate pain | (Dolatkhahi & Ghorbani Nohooji 2013) |
| *Cota tinctoria* (L.) J.Gay | Babouneh | Flowering, branching | Decoction | Throat pains, Nervous problems, Common cold, Anti-diarrhea, Prostate | (Hosseini *et al.* 2021) |
| *Cota wiedemanniana* (Fisch. & C.A.Mey.) Holub (*Syn. Anthemis wiedemanniana* Fisch. & C.A.Mey.) | Gol-e-babooneh | Flower | Infusion | Colds and sinusitis | (Joharchi & Amiri 2012) |
| *Cousinia belangeri* DC. | Hezar khar | Flower | Infusion | Removal of kidney stones, treatment of diabetic ulcers | (Delfan & Azizi, 2020) |
| *Cousinia congesta* Bunge | Polosh | Gum | Decoction | Asthma | (Hosseini *et al.* 2021) |
| *Cousinia cylindracea* Boiss. | Hezar khar ostovanee | Flower | Infusion | Removal of kidney stones, treatment of diabetic ulcers | (Delfan & Azizi, 2020) |
| *Cousinia khorramabadensis* Bornm. | Hezar khar ostovanee | Flower | Infusion | Detox, Liver tonic | (Delfan & Azizi, 2020) |
| *Cousinia stocksii* C. Winkl. | Polosh | Gum, Root | Powder, juice | Dropsy, Diarrhea, Diuretic, Antiseptic | (Mirshekar *et al.* 2019), (Sadeghi & Mahmood 2014) |
| *Cyanus depressus* (M.Bieb.) Soják (*Syn. Centaurea depressa* M.Bieb.) | Gole Gandom | Aerial parts | Decoction, Infusion | Digestive, Febrifuge, Cholagogue, Blood cleanser, Antigout fever to relieve liver discomfort, Eye conjunctivitis, Laxative, Cough, Neurasthenia | (Amiri & Joharchi 2013), (Delfan & Azizi, 2020), (Eslami Farouji & Khodayari 2016), (Hosseini *et al.* 2021), (Mozaffarian 2018) |
| *Cynara scolymus* L. | Kangar Farangi | Aerial parts | Decoction, food | Liver Tonic, Digestive, Jaundice, Hepatitis | (Amiri & Joharchi 2013), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Doronicum pardalianches* L. | Daroanj Aghrabi | Root | | Diuretic, Treatment of Snake and Scorpion bites, Nerve Tonic | (Amiri & Joharchi 2013), (Mozaffarian 2018) |
| *Echinops aucheri* Boiss. | Shekar kooh | Resin | Decoction | Emollient in cold and pectoralgia, Laxative | (Safa *et al.* 2013) |
| *Echinops cephalotes* DC. | Shekar Tighal | Manna, Resin | Decoction | Antitussive, Anti-asthmatic, Pharyngitis, Febrifuge, Digestive problems, Hoarsening, Expectorant, pain reliever, Cough, Memory enhancement, Wound treatment | (Amiri & Joharchi 2013), (Delfan & Azizi, 2020), (Dolatkhahi & Ghorbani Nohooji 2013), (Mehrnia *et al.* 2021) |

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|---|---|---|---|---|---|
| *Echinops elymaiticus* Bornm. | Shekar tighal | Flower | Infusion | Expectorant, Pain reliever, Cough, Memory enhancement, Wound treatment | (Delfan & Azizi, 2020) |
| *Echinops endotrichus* Rech.f. | Qan shakarook | Sap (Manna) | Decoction | Anti-tussive, Anti-asthmatic, Antipyretic | (Mehrnia *et al.* 2021) |
| *Echinops haussknechtii* Boiss. | Shekar tighal | Fruit | Decoction | Chest pain, Cough, Weight loss, Depression, Hypertension, Digestive and respiratory systems tonic | (Mehrnia *et al.* 2021) |
| *Echinops kotschyi* Boiss. | Shekar tighal | Root, Sap (Manna) | Decoction | Immunostimulant, Anti-inflammatory, Antibiotic, Detoxifying, Anti-allergenic, Diaphoretic, Expectorant, Pain reliever, Cough, Memory enhancement, Wound treatment | (Delfan & Azizi, 2020), (Mehrnia *et al.* 2021) |
| *Echinops mosulensis* Rech.f. | Shekar tighal | Fruit | Decoction | Expectorant, Pain reliever, Cough, memory enhancement, Wound treatment, Constipation, Hypertension, Frequent urination, Laxative, Febrifuge | (Delfan & Azizi, 2020), (Mehrnia *et al.* 2021) |
| *Echinops ritrodes* Bunge | Shekar tighal | Whole plant, fruit | Decoction | Treatment of skin diseases, Prevention of cough, Gastric discomfort | (Eslami Farouji & Khodayari 2016), (Hosseini *et al.* 2021), (Mozaffarian 2018) |
| *Eclipta prostrata* (L.) L. | Masture khabideh | Aerial parts | Decoction fresh organ | Blood purifier | (Mozaffarian 2018), (Safa *et al.* 2013) |
| *Erigeron canadensis* L. (Syn. *Conyza canadensis* (L.) Cronquist) | Pirbaharakebagh | Whole plant | Brew | Wound healing, Kidney stones, Bleeding during menstruation, Elimination of female secretions | (Mozaffarian 2018), (Safa *et al.* 2013), (Zolfaghari *et al.* 2012), |
| *Glebionis coronaria* (L.) Cass. ex Spach (*Syn. Chrysanthemum coronarium* L.) | Babooneye | Aerial parts | Decoction, Infusion | Headache, migraine, Blood purifier, Eyesight enhancement | (Hosseini *et al.* 2021), (Mosaddegh *et al.* 2012), (Sharififar *et al.* 2010) |
| *Grantia aucheri* Boiss. | Golmorak | Aerial parts | Decoction, cataplasm | Scorpion and snake bite, Stomach ulcers | (Sadeghi & Mahmood, 2014), (Safa *et al.* 2013) |
| *Gundelia tournefortii* L. | Kangar | Aerial parts, Pith paranchyma, Rhizome | Edible,Food, salad | Liver Tonic Treatment of Hepatitis, Anti-parasite for digestive system, Gastric discomfort, Constipation, Reduce blood fat, Blood purifier, Food, Anthelmintics, | (Amiri & Joharchi 2013), (Delfan & Azizi, 2020), (Eslami Farouji & Khodayari 2016), (Hosseini *et al.* 2021), (Mardani-Nejhad & Vazirpour 2012), (Mehrnia *et* |

| Scientific Name | Vernacular name | Part Used | Preparation | Medicinal Uses (Human) | Reference Cited |
|---|---|---|---|---|---|
| | | | | Hyperlipidemia, Kidney stone, Digestive, Infected burns, Febrifuge | *al.* 2021), (Mosaddegh *et al.* 2012), (Mozaffarian 2018) |
| *Helianthus annuus* L. | Aftabgardan | Flower, Seeds, Leaves, Roots | Boiled, Powder, Decoction, Food | Refrigerant, Disposal of lung diseases, Diuretic and mucosa creative, Hypoglycemia, Stomach pain, Nourishing, Febrifuge, Malaria, Bronchitis and cough, Diuretic, Expectorant, Diabetes | (Eslami Farouji & Khodayari 2016), (Mehrnia *et al.* 2021), (Mozaffarian *et al.* 2018) |
| *Helianthus tuberosus* L. | Sibzamini torshi | Glands, seed | Oil, Raw | Lowering blood sugar and blood urea | (Eslami Farouji & Khodayari 2016), (Mozaffarian 2018) |
| *Helichrysum graveolens* (M.Bieb.) Sweet | Afsantin | Aerial parts | Infusion | Anodyne, Anthelmintic, Appetizer, Nerve Tonic | (Amiri & Joharchi 2013) |
| *Helichrysum kotschyi* Boiss. | Gol-e-bi marg | Flower | Infusion | Elimination of intestinal parasites | (Delfan & Azizi, 2020) |
| *Helichrysum oligocephalum* DC. | Derameh Karimkhani | Aerial parts | Infusion mixed with other plants | Cold, Astringent, Expectorant, Anthelmintics, Increase bile production, Stomach tonic, Skin conditioner, Anti-inflammatory, Detoxifying agent | (Mosaddegh *et al.* 2012), (Mehrnia *et al.* 2021) |
| *Hertia angustifolia* (DC.) Kuntze | Karkich biabani | Leaf, Flower | Decoction | Pain relief | (Hosseini *et al.* 2021) |
| *Hertia intermedia* (Boiss.) Kuntze | Karkich | Flowering | Poultice | Insect bite, Purgative, Parasite repellent | (Hosseini *et al.* 2021), (Mozaffarian 2018) |
| *Inula britannica* L. | Mosofa | branches, Aerial parts, Flowers | Decoction, Syrup,Infusion | Reducing thirst, Mild expectorant, decrease phlegm production, Bronchitis, Wheeziness, Chronic coughing, Stop vomiting | (Hosseini *et al.* 2021), (Mehrnia *et al.* 2021) |
| *Inula helenium* L. | Mosaffa | Root | Infusion | Expectorant, Cough, Diaphoresis, Mild bitter tonic, Antiseptic | (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Inula salicina* L. | Mosaffa | Root | Infusion | Intestine and stomach tonic | (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Klasea cerinthifolia* (Sm.) Greuter & Wagenitz *(Syn. Serratula cerinthifolia* (Sm.) Boiss.) | Gol-e-gandomi | Flowering tops | Decoction, Cataplasm | pain healing, Wound healing, Astringent | (Delfan & Azizi, 2020), (Mehrnia *et al.* 2021) |

| Scientific Name | Vernacular name | Part Used | Preparation | Medicinal Uses (Human) | Reference Cited |
|---|---|---|---|---|---|
| *Lactuca orientalis* (Boiss.) Boiss. | Jaroo | Latex, Flower | Decoction | Insomnia | (Hosseini *et al.* 2021) |
| *Lactuca sativa* L. | Kahu | Stems, Leaves, Seeds | Food | Anti-thirst, Cool agent, Blood purifier, Analgesic, Appetizer, Hypnotic, Anti-cough, Hypoglycemic, Liver cleaning, Treatment of neuritis, Mental weakness, Iron deficiency, Treatment of whooping cough, Nervous cough treatment, Asthma, Diabetes, Hyperemia, Gout, Constipation, Diuretic, Decrease bile production, Hyperlipidemia, Cholesterol Mia, Tonic, Laxative, Insomnia, High heart beating, Urinary incontinence, Anxiety | (Amiri & Joharchi 2013), (Eslami Farouji & Khodayari 2016), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Lactuca serriola* L. | Bikh bonje | Leaves | Edible | Appetizing, Cholagogue | (Dolatkhahi & Ghorbani Nohooji 2013), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Lactuca serriola* L. (*Syn. Lactuca scariola* L.) | Kahokhardar | Aerial parts, Latex, Resin, Seed, Oil | Poultice, Decoction, Food | Bone and joint pain, Purgative, Hepatoprotective, Laxative, Diuretic, Diaphoretic, Spasmolytic, Febrifuge, Coughing (caused by Tuberculosis, Analgesic, Sedative, Bronchitis | (Delfan & Azizi, 2020), (Mehrnia *et al.* 2021) |
| *Launaea acanthodes* (Boiss.) Kuntze | Goojar | Aerial parts | Maceration | Animal parasite repellent, Pain relief | (Hosseini *et al.* 2021) |
| *Launaea nudicaulis* (L.) Hook.f. | Kahusa | Leaves | Fresh Organ | Fever in children | (Safa *et al.* 2013) |
| *Launaea procumbens* (Roxb.) Ramayya & Rajagopal | Bonmoghi, Nonak | Leaves | Fresh Organ | Urination difficulty in children | (Safa *et al.* 2013) |
| *Matricaria aurea* (Loefl.) Sch.Bip. | Babooneh | Leaves, Flower | Infusion | Insomnia and nervous disorders (sedatives), Menstrual pain, Kidney ache | (Khajoei Nasab & Khosravi 2014) |
| *Matricaria chamomilla* L. (*Syn. Chamomilla recutita* (L.) Rauschert) | Baboone | Flower, Seed | Infusion | Antimicrobial, Hair tonic, Dysentery, Anti-allergy, Anti-inflammatory, Spasmolytic, Digestive, Wound healing, Skin and hair tonic, Stomachache (As infusion), Febrifuge | (Amiri & Joharchi 2013), (Dolatkhahi & Ghorbani Nohooji 2013), (Hosseini *et al.* 2021), (Mardani-Nejhad & Vazirpour 2012), (Mehrnia *et al.* 2021), |

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|---|---|---|---|---|---|
| | | | | | (Mosaddegh *et al.* 2012), (Mozaffarian *et al.* 2018) |
| *Microcephala lamellata* (Bunge) Pobed. | Gol-e-babooneh | Flower | Infusion | Treatment of earache, antispasmodic, menstrual stimulant, appetite stimulant, wound healer and laxative | (Amiri & Joharchi 2013) |
| *Onopordum acanthium* L. | Khar panbeh | Flower, Stem, Seed, Root | Food | Cancer treatment, Skin wounds, Stomach tonic, Appetizer, treat baldness, Febrifuge, Diuretic, Astringent, Liver and stomach tonic | (Eslami Farouji & Khodayari 2016), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Onopordum carmanicum* (Bornm.) Bornm. | Kngar | Young branches | Decoction | Gastric discomfort | (Hosseini *et al.* 2021) |
| *Onopordum heteracanthum* C.A.Mey. | Kar zanbaba | Flower | Decoction | Reduces blood sugar and fat of skin and coin mushrooms | (Arvin & Firuzeh 2022) |
| *Onopordum leptolepis* DC. | Kangar | Aerial parts | Decoction | Urinary stone, Abdominal pains, Anti-diarrhea | (Hosseini *et al.* 2021) |
| *Phagnalon persicum* Boiss. | Sang sey | Whole plant | Infusion | Kidney stones, Analgesic | (Mehrnia *et al.* 2021) |
| *Phagnalon rupestre* (L.) DC. | Sang sey | Whole plant | Infusion | Kidney stones, Analgesic, Rectal prolapse | (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Picnomon acarna* (L.) Cass. | Zard Khar | Leaves | Decoction | Indigestion, Gastric disorders, Appetizer, Stomachache | (Mehrnia *et al.* 2021) |
| *Pulicaria arabica* (L.) Cass. | Kak kosh | Root, Flower | Infusion | Febrifuge, Hypnotic, Dysentery | (Mehrnia *et al.* 2021) |
| *Pulicaria glaucescens* (Boiss.) Jaub. & Spach (*Syn. Platychaete glaucescens* (Boiss.) Boiss.) | mangoru | Leaves | Powder, decoction | Wound healing, stomachache | (Safa *et al.* 2013) |
| *Pulicaria undulata* (L.) C.A.Mey. | Bomadarane balochi | Flower, Leaves, Capillary stem | Fresh organ, Decoction | Children complaints, Child poisoning, vertigo, nausea, skin problems, foot pain, menstruation additive | (Sadeghi & Mahmood 2014), (Safa *et al.* 2013) |
| *Rhaponticum repens* (L.) Hidalgo | Talkhe sadi | Aerial parts | Poultice, Decoction | Baby fever, Cancer | (Hosseini *et al.* 2021) |
| *Scorzonera mucida* "Rech.f., Aellen & sfand." | Kalaghoo | Fresh leaf | Poultice | Infection wound | (Hosseini *et al.* 2021) |

| Scientific Name | Vernacular name | Part Used | Preparation | Medicinal Uses (Human) | Reference Cited |
|---|---|---|---|---|---|
| *Scorzonera paradoxa* Fisch. & C.A.Mey. | komboluh | Bulb | Fresh Organ | Laxative | (Safa *et al.* 2013) |
| *Scorzonera phaeopappa* (Boiss.) Boiss. | Hapeluk | Root | Decoction | Healing wounds, Insect bites, Treating stomach upset, Healing pain | (Delfan & Azizi, 2020) |
| *Scorzonera psychrophila* Boiss. & Hausskn. ex Boiss. & Hausskn. (*Syn. Scorzonera pseudolanata* Grossh.) | Hapeluk | Tuber | Cataplasm | Insects and animals bite | (Mehrnia *et al.* 2021) |
| *Senecio glaucus* L. | Bangdaneh | Aerial parts | Poultice | Chronic wound | (Hosseini *et al.* 2021) |
| *Senecio vulgaris* L. | Pir giah | Whole plant | Decoction, Infusion | Drug dependency, Emmenagogue, Uterus pain, Stop bleeding, Gout, Pustule | (Mehrnia *et al.* 2021), (Mozaffarian 2018), (Naghibi et al, 2014) |
| *Silybum marianum* (L.) Gaertn. | Khar maryam | Whole plant | Decoction, Edible, Infusion, powder, sweat | Hypoallergenic, Anti-cancer, Antidepressant, Anti-oxidants, Resistant prostate diseases, Anti-virus, Laxative, Expellant, Digesting food, Fat blockers, Treatment of chronic hepatitis, Sedative, Stomach reflux, Galactogenic, increase blood pressure, Fever, reduce blood sugar, Liver tonic, Increase secretion of bile, Antidepressant, Antioxidant, Hepatoprotective, Galactagogue, Hypertension, Hyperlipidemia, Detoxifying agent | (Amiri & Joharchi 2013), (Delfan & Azizi, 2020), (Dolatkhahi & Ghorbani Nohooji 2013), (Eslami Farouji & Khodayari 2016), (Hosseini *et al.* 2021), (Mosaddegh *et al.* 2012), (Mirdeilami *et al.* 2014), (Mosaddegh *et al.* 2012), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Sonchus asper* (L.) Hill | Shirtighak | Whole plant | Fresh organ, Decoction, Cataplasm | Earache, Asthma, Chest, Discomforts, Organ inflammation, Skin rash, Wound healing, Laxative, Abscess, Lowering blood pressure, Blood lipids, Sedative | (Delfan & Azizi 2020), (Hosseini *et al.* 2021), (Mehrnia *et al.* 2021), (Mozaffarian 2018), (Safa *et al.* 2013) |
| *Sonchus maritimus* L. | Shirtighak | Whole plant | Decoction | Induce cough, Bronchitis, Asthma, Pertussis | (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Sonchus oleraceus* (L.) L. | Shirtighak | Whole plant | Poultice, Decoction, Cataplasm | Skin rash, Tonic, Febrifuge, Analgesic, Laxative, Diuretic, Anti-infective, Wound healing | (Hosseini *et al.* 2021), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Tagetes erecta* L. | Gol Jafari | Flower | | Febrifuge, Treatment of Cut | (Amiri & Joharchi 2013) |

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|---|---|---|---|---|---|
| *Tanacetum balsamita* L | Mina | Leaves,Flower | Infusion | Stomach tonic, Carminative and antiflatulence, Epilepsy, Anthelmintics, Cough, Decrease bile production | (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Tanacetum kotschyi* (Boiss.) Grierson | Mokhallesa | Aerial parts | Infusion | Anti-inflammatory, Bitter tonic, Headache, Migraine | (Arvin & Firuzeh 2022), (Mehrnia *et al.* 2021) |
| *Tanacetum parthenium* (L.) Schultz-Bip. | Gole babooneh | Aerial parts | Decoction | Antitussive, Anti-catarrhal, Hair Tonic, Treatment of Colic, Menstrual Pains | (Amiri & Joharchi 2013), (Hosseini *et al.* 2021), (Mozaffarian 2018), (Zolfaghari *et al.* 2012) |
| *Tanacetum persicum* (Boiss.) Mozaff. | Gol-e-babooneh | Flower | Infusion | Antitussive, Anti-catarrhal, Hair Tonic, Treatment of Colic, Menstrual Pains | (Joharchi & Amiri 2012), (Mozaffarian 2018) |
| *Tanacetum polycephalum* Sch.Bip. | Shamshireh | Leaves, Latex, Flowering top | Orally, Infusion | Constipation, Warts, Anthelmintics, Diuretic, Decrease bile production | (Delfan & Azizi, 2020), (Mehrnia *et al.* 2021), (Naghibi *et al.* 2014) |
| *Taraxacum assemanii* Boiss. | Shir Dandan | Leaves, lower | Decoction | Liver tonic, Diuretic | (Hosseini *et al.* 2021) |
| *Taraxacum assemanii* Boiss. (*Syn. Taraxacum primigenium* Hand.-Maaz.) | Shir Dandan | Leaves, lower | Decoction | Emiction, Good for Liver | (Sharififar *et al.* 2014) |
| *Taraxacum pseudocalocephalum* Soest | Gasedak | Seed | Decoction | Blood fat | (Hosseini *et al.* 2021) |
| *Taraxacum syriacum* Boiss. | Gole Ghased Souri | Leaves, Root, Resin | Decoction | Diuretic, Laxative, Galactagogue, Kidney stone, Hepatitis, Cholesterol Mia, Diabetes, Eczema, Rheumatism, Anemia, Weight loss, Gout, Analgesic, anti-inflammatory, Treatment of jaundice | (Delfan & Azizi, 2020), (Mehrnia *et al.* 2021), (Zolfaghari *et al.* 2012) |
| *Taraxacum campylodes* G.E. Haglund (*Syn. Taraxacum officinale* (L.) Weber ex F.H.Wigg.) | Kalkhizo | Flower, Leaves, Root | Infusion, cataplasm | Stomach tonic, Diuretic, Liver cleansing, Snack and scorpion bites | (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Tragopogon caricifolius* Boiss. | Sheng | Leaves, Flower, Fruit | Food, Cataplasm | Food, Hyperlipidemia, Hypertension, Kidney stone, Astringent, Blood coagulation, Improve bowel movements, Wart | (Delfan & Azizi, 2020), (Mehrnia *et al.* 2021) |

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|---|---|---|---|---|---|
| *Tragopogon graminifolius* DC. | Sheng | Leaves, Root, Seed | Decoction, Food | Emiction, Diuretic, Gastrointestinal disorders, Food (97, Burns, Stomach tonic, Appetizer, Remove infections and extra, mucosa of the ears | (Sharifi far *et al.* 2014), (Hosseini *et al.* 2021), (Mardani-Nejhad & Vazirpour 2012), (Mehrnia *et al.* 2021), (Mozaffarian 2018), |
| *Tragopogon porrifolius* subsp. *longirostris* (Sch.Bip.) Greuter | Sheng | Aerial parts | Decoction | Reducing blood lipids, blood pressure, kidney stone removal | (Delfan & Azizi, 2020) |
| *Tragopogon rechingeri* Ownbey | Sheng | Leaves | Powdered | Anemia | (Naghibi *et al.*, 2014) |
| *Tripleurospermum disciforme* (C.A.Mey.) Sch.Bip. | Gole baboone | Flower | Decoction | Treatment of Cough, Febrifuge, Kidney stone, Women's discomforts, fever and chills, Wound healing, Nerve tonic, Antimigraine, Antistress, Sedative, Hypnotic | (Amiri & Joharchi 2013), (Delfan & Azizi 2020), (Mozaffarian 2018), (Nadaf *et al.* 2019), (Naghibi *et al.*, 2014) |
| *Tussilago farfara* L. | Pa khari | Aerial parts | Infusion | Expectorant, Antitussive, Mouth, Wounds, Treatment of Furuncles, Cough, Sedative, Expectorant | (Amiri & Joharchi 2013), (Mehrnia *et al.* 2021), (Mozaffarian 2018) |
| *Varthemia persica* DC. | Atr-e-sang | young Leaves | Infusion | Fragrant, Digestive tonic | (Mehrnia *et al.* 2021) |
| *Xanthium spinosum* L. | Zardina | Leaves, Fruits | Infusion | Dermal discords, Diuretic | (Mehrnia *et al.* 2021), (Mozaffarian 2018), (Nadaf *et al.* 2023) |
| *Xanthium strumarium* L. | Zardina | Root, Fruit | Infusion | Diaphoretic, Analgesic, Increase saliva secretion, Sedative, Astringent, Anti-herpes | (Mehrnia *et al.* 2021), (Mozaffarian 2018) |

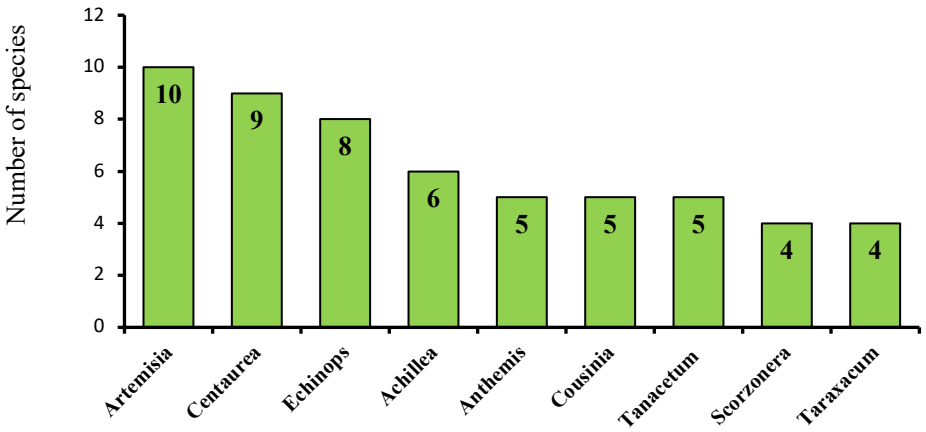


Figure 3. Plant genera with the highest number of species of Iranian Asteraceae species

The most frequently cited therapeutic species were used for digestive system treatment (18%) followed by the respiratory system (10%). Among the reported Asteraceae species 7% have been reported in the treatment of the circulatory system, urinary system 6% nerve system, pain treatment, fever and skin 5%, and other diseases 35% (Figure 4). A similar result has been obtained for the Lamiaceae family (Naghibi *et al.* 2010).

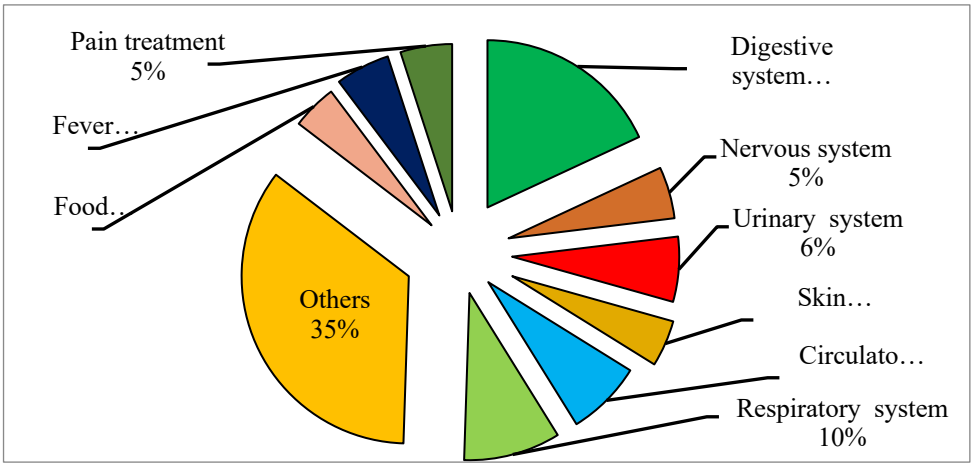


Figure 4. The most frequently cited health problems treated by the Iranian Asteraceae species

Medicinal species of Asteraceae family with the largest number of uses in Iran were *Calendula officinalis* L. (30 number of use), *Lactuca sativa* L. (29 number of use), *Ac. santolinoides* and *Ci. intybus* L. (25 number of use) and *Silybum marianum* (23 number of use) (Figure 5). *Ca. officinalis* L. is known for its medicinal importance containing various phyto-chemicals including carbohydrates, amino acids, lipids, fatty acids, carotenoids, terpenoids, flavonoids, quinones, coumarins, and other constituents, showing some important biological activities (John & Jan 2017).

The treatment with *A. santolinoides* hydroalcoholic extracts significantly reduced triglycerides, total cholesterol, and low-density lipoproteins, and reduced diastolic and systolic blood pressure. *A. santolinoides* leaf and stem extracts induced antiproliferative and apoptotic effects on prostate cancer cell lines. This species has potential applications for cosmetics, pharmaceuticals, and nutraceutical products (Raudone *et al.* 2022).

*Ci. intybus* has a long tradition of use globally and contains high amounts of proteins, carbohydrates, and mineral elements. Inulin from *chicory* roots is considered a functional food ingredient as it affects physiological and biochemical processes, resulting in better health and a reduction of the risk of many diseases (Street *et al.* 2013).

*La. sativa* is used as both a palatable vegetable and an important folk medicine. It is low in carbohydrate and fat contents, with high water contents. *La. sativa* is rich in minerals and vitamins such as vitamins A, C, E, iron, potassium, calcium, and

phosphorus. It also contains selenium which has medicinal properties for the prevention of colon, prostate, and lung cancers. Sesquiterpene lactones are considered the most active compounds of this plant. Due to their strong therapeutic potential against heart disease and cancer, these compounds provide health benefits by providing a balanced diet and by acting as therapeutic agents. *La. sativa* is also a rich source of phytochemicals and plant secondary metabolites such as phenolic compounds (Noumedem *et al.* 2017).

*Si. marianum* is a medicinal plant and also is available for use as a dietary supplement. This plant has been widely used to treat various diseases, especially hepatic diseases. The seeds and fruits of *Si. marianum* contain a flavonolignan complex called silymarin, the active compounds of which include silybin, isosilybin, silychristin, dihydrosilybin, silydianin, and so on (Marmouzi *et al.* 2021, Wang *et al.* 2020).

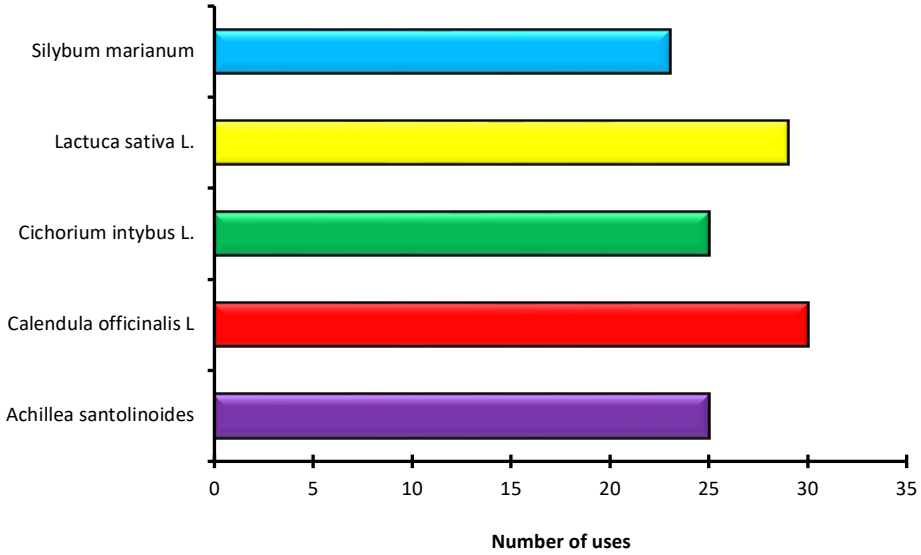


Figure 5. Iranian Asteraceae species with the largest number of uses in Iran

## Chemistry of Asteraceae

The attention paid to the chemical substances contained in plants is mainly from their use in medicine and pharmacy (Piątkowska *et al.* 2022). Medicinal plants of the Asteraceae family are widely studied for their chemical constituents and biological/pharmacological activities (Devkota & Aftab 2023). Among the active substances that determine the biological activity of the plant material phenolic acid derivatives, flavonoids, sesquiterpene lactones and other terpenoids, and polyacetylenes are some of the most commonly reported compounds from Asteraceae plants. Phenolic acids are widely reported as active antioxidant, enzyme inhibitory, antibacterial, anti-inflammatory, and cytotoxic components. Similar to phenolic acid derivatives, flavonoids are also reported as potent antioxidant, anti-inflammatory, and anticancer compounds. Sesquiterpene lactones and furanosesquiterpenes are another class of characteristic compounds in Asteraceae that are mainly involved in plant protection. They are also reported to possess various biological activities such as anti-inflammatory and anti-tumor/anticancer activities. However, many such compounds, especially those with an activated exocyclic methylene group, are reported as potent allergens responsible for allergic dermatitis (Devkota 2022). The proximate composition of herbs depends, among others, on the season, agrotechnical conditions and the development phase of the plant or its morphological part (inflorescence, leaf, stem, root, fruit, and seed) etc. (Piątkowska *et al.* 2022).

*He. annuus* L. grain and oil quality are defined by grain weight and oil percentage, oil fatty acid composition, and the number of antioxidants. Oxidative stability, which delays the loss of nutritional value and the development of unpleasant flavors, depends on the proportion of oleic acid (18:1) and the number of antioxidants, mainly α-tocopherol. On the other hand, when oil methyl esther is used for fuel (biodiesel), a low degree of unsaturation is preferred. From the point of view of human health, polyunsaturated acids, such as linoleic acid (18:2), are essential to mammals and have a potent hypocholesterolemic effect (Pereyra-Irujo & Aguirrezábal 2007).

*Ci. intybus* is one of the biggest natural sources of inulin. In the 1970s, it was discovered that the root of *Ci. intybus* contained up to 40% inulin, which has a negligible impact on blood sugar and thus is suitable for diabetics (Street *et al.* 2013). Also, *chicory* root is a source of many acids such as caffeic acid, chlorogenic acid, and isovanillic acid (Devkota & Aftab 2023). The

main bioactive compaounds in *Ci. pumilum*, similar to other Asteraceae species, are sesquiterpene lactones. Yet, in general not much research has been conducted on the active ingredient composition of the aerial parts of this short-leaved plant (Hosseini *et al.* 2024).

*He. tuberosus*, Jerusalem artichoke, is also a versatile choice in cuisine. Its edible parts are the tubers, which contain vitamins and minerals such as potassium and phosphorous. It is also a source of inulin, a complex carbohydrate that can promote good health in humans (Rolnik & Olas 2021). Phenolic acids such as gallic acid, caffeic acid, rosmarinic acid, and mono or di-caffeoyl quinic acids are widely reported as active antioxidant, enzyme inhibitory, antibacterial, anti-inflammatory, and cytotoxic components (Devkota & Aftab 2023).

Phytochemicals present in *Taraxacum* spp. include sesquiterpene lactones, taraxinic acid derivatives; triterpenoids, phenolic derivatives, coumarins, lignans and taraxacosides (Sharifi-Rad *et al.* 2018). A study of various members of the *Asteraceae* family, *Cirsium arvense*, *Onopordum acanthium* and *Centaurea solstitailis*, found phenolic content and flavonoid content. In addition, several triterpenes, such as taraxacin, taraxacin acid, fardiol, arnidiol, taraxasterol, α-amiryn and β-amiryn, have been identified in *Taraxacum* spp. Many plants are also sources of malic acid, fumaric acid, citric acid and ascorbic acid (Rolnik & Olas 2021). Hundreds of flavonoids have been reported from plants of the Asteraceae family commonly reported flavonoids include apigenin, luteolin, kaempferol, quercetin, and 6-hydroxylated flavonoids such as scutellarein, hispidulin eupatorine, sinesetin, and their methylated, acylated, and glycosylated derivatives. Flavonoids are abundant in plants of the Asteraceae family and have potent analgesic effects (Nadri & Mahmoudvand 2021b). Sesquiterpene lactones and furanosesquiterpenes are another class of characteristic compounds in Asteraceae that are mainly involved in plant protection. One of the most important sesquiterpene lactone derivative is artemisinin, isolated from *Ar. annua* L. (Devkota & Aftab 2023). According to Mefort (2011), sesquiterpene lactones are the most prevalent and biologically significant secondary metabolites since they have numerous biological and pharmacological activities such as anticancer, anti-inflammatory, anti-tumor, anti-malarial, antiviral, antibacterial, antifungal etc. Because have prompted interest among chemists towards drug discovery research (Merfort 2011, Nadri & Mahmoudvand 2021a). Reports indicate that the essential oil of *Ar. sieberi* has a strong antimicrobial effect and prevents the growth of various pathogenic microorganisms. In some cases, its activity has been reported to be stronger than the commercial antibiotics such as nalidixic acid and gentamicin. Sesquiterpene lactones are the bioactive compounds of this plant, and this plant can contain as much artemisinin as *A. annua*. In addition, *Ar. aucheri* is distinguished by containing hydroxydavanone, artemin, artemisinin and ethyl caffeate. The spice and appetite stimulant *Ar. absinthium* is considered an important medicinal plant in some pharmacopoeias, and its leaves and vegetative organs are used as a laxative, anthelmintic, disinfectant, anti-flatulent, and digestive. In addition to the prominent presence of monoterpenes and sesquiterpene lactones, this plant also contains phenolic and flavonoid compounds, carboxylic acids, and glycosides (Hosseini *et al.* 2024). Arctiin is a lignan, a glucoside of artigenin, found in many species of *Asteraceae* and was first isolated from *Arctium lappa*. Arctiin possesses several pharmacological effects including cytotoxicity, antiproliferative, and desmutagenic activity; it also acts as a platelet-activating factor antagonist and calcium antagonist (Rolnik & Olas 2021). Asteraceae family plants are also rich in essential oils having strong antimicrobial and antioxidant activities (Devkota & Aftab 2023). Plants within the genus *Scorzonera* are reported to contain flavonoids, phenolic acid derivatives, triterpenoids, sesquiterpenoids, dihydroisocoumarins, and other bioactive compounds (Lendzion *et al.* 2021).

The investigation of antioxidant and antidiabetic properties of the *Achillea arabica* flower extract was carried out by Hanalp *et al.* (2023). The results show that *Ac. arabica* flower extract has possible therapeutic effects to prevent high blood glucose levels and oxidative stress caused by DM in the liver and kidney via its high phenolic content (Hanalp *et al.* 2023). In the extensive studies that have been done about the *Ac. biebersteinii*, the main compound in the essential oil of this plant is 1-8-cineole and the major compound in the extract of this plant is caffeic acid (Yılmaz 2022). Gallic acid and keampferol-O-glucoside, axillarin, luteolin-7-glucoside and patulitrin compounds found in the extract of *Ac. biebersteinii* are used as dyeing agents in fabric dyeing (Karadag & Yildiz 2022). Triterpene glycosides are abundantly present in *Calendula arvenis*, many of these compounds are physiologically active and possess a broad range of medico-biological action (Arora *et al.* 2013). The most important compounds of this plant include terpenoids (such as faradiol-3-O-palmitate, faradiol-3-O-myristate and calendulosides) (Muley *et al.* 2009), flavonoids (such as Quercetin, isorhamnetin, isoquercetin, narcissin, calendoflavoside and rutin) (Givol *et al.* 2019), coumarins (such as scopoletin, umbelliferone and esculetin) (Belal *et al.* 2022), quinones (such as plastoquinone, phylloquinone and tocopherol) (Neukirch *et al.* 2005), lipids (such as Lauric, myristic, palmitic, stearic, oleic, linoleic and linolenic acid) (Dulf *et al.* 2013), amino acids (such as alanine, arginine, aspartic acid, asparagines, valine and histidine) (Abasova *et al.* 1994), essential oils (such as Thujene, pienene, sabinene, pienene, limonene, 1,8-cineol, p-cymene, trans-ocimene, terpenene, 3-carene, nonanal, terpene-4-ol, 3-cylo, cadinene, cadinol, t-muurolol and limonene)

(Raal *et al.* 2016), carotenoids (such as Neoxanthin, auroxanthin, flavoxanthin, mutatoxanthin, cryptoxanthin and carotene) (Raal *et al.* 2016) and carbohydrates (such as (1_3)-D-galactam, araban (1_3)-araban and alpha-L-rhamnan-(1_3) (Nina & Vennos 2017).

*Centaurea virgata* (slender knapweed) is native to parts of Europe and Asia and is known for its medicinal properties and potential use in traditional medicine. In Iran, *Ce. virgata* has garnered interest due to its phytochemical constituents and their biological activities. According to studies, sesquiterpenes (8α-hydroxysonchucarpolide, 8α-(3, 4-dihydroxy-2-methylenebutanoyloxy)-dehydromelitensine, and cnicin), flavones (apigenin, hispidulin, salvigenin, eupatorin, 3′-methyleupatorin), and the flavonol (isokaempferideterpene) (Tuzun *et al.* 2017), lipids (palmitic acid, oleic acid, and linoleic acid) (Tüzün *et al.* 2024), essential oils (β-sesquiphellandrene, β-caryophyllene, germacrene d, bicyclogermacrene, spathulenol, caryophyllene oxide, eudesmol) (Kilic 2013) have been reported in the *Ce. virgata*. Milk thistle has been used since ancient times as a liver protectant and in the treatment of biliary diseases, and there is medical evidence for its anti-cancer and hepatoprotective activities. *Silybum marianum* has been used since ancient times as a liver protectant and in the treatment of biliary diseases, and there is medical evidence for its anti-cancer and hepatoprotective activities. Phallonolignan compounds such as Silybin and Silymarin are considered its dominant compounds (Hosseini *et al*. 2024).

*Carthamus tinctorius* L. is a versatile cash crop known for its multifunctional applications. The flowers and seeds of this plant are widely used in traditional herbal medicine across China, Korea, Japan, and Iran to address various health issues, including gynecological, cardiovascular, and cerebrovascular diseases, as well as conditions like blood stasis and osteoporosis. Many bioactive compounds have been isolated and identified from *C. tinctorius*, with notable classes including flavonoids (such as quinochalcones, C-glycosides, O-glycosides, and kaempferol derivatives) (Zhang *et al*. 2016), alkaloids (such as N-feruloylserotonin, N-feruloyltryptamine, and serotonin derivatives) (Fristiohady *et al.* 2023), lipids (linoleic acid, oleic acid, palmitic acid, and stearic acid) (Asgarpanah & Kazemivash 2013), amino acids (Adenine, Adenosine, Thymine and Uracil) (Zhou *et al.* 2014), polyacetylenes ((2Z,8Z,10Z)-tridecatriene-4,6-diyne-1,12,13-triol-1-O-β-d-glucopyranoside, (2E,8E)− 11S-teteradeca-diene-4,6-diyne-1,11,14-triol and 4, 6-decadiyne-1-O-β-d-glucopyranoside) (Xian *et al.* 2022), essential oils (Caryophyllene, p-allyltoluene, 1-acetoxytetralin and heneicosane) (Asgarpanah & Kazemivash 2013). From a phytochemical perspective, *Ca. oxyacantha* active ingredient consists of fatty acids, alkaloids, sterols, flavonoids, lignans, quinones, and tocopherols, and the main source of these compounds is safflower seeds (Hosseini *et al*. 2024). The genus *Anthemis* mainly contain flavonoids, sesquiterpene lactones. The methanolic extract from *Anthemis cotula* flowers has antimicrobial activity against gram-positive and gram-negative microorganisms such as *E. coli*, *Ps. aeruginosa* and *Salmonella* species. However, the activity revealed against *E. coli* is the most significant when correlated with the folkloric use of the plant in the treatment of dysentery (Boukhary *et al.* 2019). The species *Anthemis hyalina* has important compounds: flavonoids, polyphenolic acids and terpenes (Rezaei *et al.* 2010). *An. lorestanica* Major compounds in this species are methyl decanoate, α-cadinol, and n-tricosan, neryl acetate, α-cadinol, and dihydro eudesmol (Kamkar *et al*. 2023). *Lactuca sativa* is a well-known plant worldwide due to its use in the preparation of salad, soup, and vegetable curries. This plant also has excellent medicinal properties. The chemical composition of the plant revealed the presence of different classes of secondary metabolites, such as terpenoids, flavonoids, and phenols which should be responsible for its biological activities. The plant also contains essential elements, such as vitamins as well as minerals and organic substances (Noumedem *et al.* 2017).

All parts of *Echinops ritrodes*, except its fruit, are poisonous and have traditionally been used as a diuretic and aphrodisiac, but due to its high similarity to non-medicinal species, it is difficult for non-experts to distinguish it and its use has gradually decreased. In terms of active ingredient compounds, *Ec. ritrodes* is distinct from other species of the Asteracae family, and its dominant and characteristic active ingredients are thiophenes, and strong antimicrobial, antifungal, antibacterial and cytotoxic activity has been reported from this plant under the influence of these same compounds, and its toxic activity is consistent with the traditional uses of this plant (Hosseini *et al*. 2024, Mozaffarian 2018). *Gundelia tournefortii* is a well-known medicinal plant and its active ingredient contains phenolic and flavonoid compounds, sterols, monoterpenes, sesquiterpenes, coumarins, fatty acids and tocopherols. According to reports, the use of more than 300 mg/kg of artichoke may cause liver damage and its use during the vegetative growth stage can be toxic and fatal to livestock (cattle and sheep) due to the presence of hydrocyanic acid (Hosseini *et al*. 2024).

## Other the importance of the Asteraceae family

The species of the Asteraceae family mentioned in table 1 are used as food and ornamental in addition to medicinal uses. *Bellis perennis* in addition to being planted as an ornamental plant, is used in lead absorption and phytoremediation (Sadeghi *et al.* 2021). *Calendula arvensis* L. is a famous ornamental and medicinal plant. In the reviewed articles, only two therapeutic properties of this plant are mentioned, but the following uses are mentioned for this type of plant. anti-inflammatory,

antiviral, insecticidal, antitrypanosomial, anticholinesterase, antimutagenic, immunomodulator, hemolytic, and wound healing agent (Khouchlaa *et al.* 2023). *Carthamus tinctorius L.*, widely accepted as Safflower or false saffron. It has been shown that the scavenging activities of Safflower petals can produce a range of colors from orange to white with various intensities. Therefore, this plant is used for numerous culinary and textile purposes. With the advent of synthetic aniline dyes, it has been mainly grown as an oil seed and bird seed that has some applications in medicinal fields (Delshad *et al.* 2018). *Ca. tinctorius* is rich in quinochalcone C-glucosides. Carthamin in petals is responsible for its red color and hydroxysafflower yellow A, safflower yellow A and B, safflomin A and C, and tinctormine are responsible for yellow coloration (Devkota 2022). *Cichorium intybus* L. in addition to medicinal uses also used in gastronomy as a coffee substitute, food or drink additive (Janda *et al.* 2021). *Helianthus annuus* L. In addition to being planted as an ornamental plant, the plant is also used in phytoremediation (Hoseini *et al.* 2021). Other ornamental species in this family include *Tagetes erecta* L., *Ca. officinalis* L. many species of Asteraceae family are also used as vegetables such as *He. tuberosus* L., *Arctium lappa* L., *Inula helenium* L., *Ci. intybus* L., *Lactuca orientalis* (Boiss.) Boiss. and *La. sativa* L. Many of these vegetables are rich in vitamins, minerals, polyphenols, fibers, and other bioactive compounds (Devkota & Aftab 2023, Stojakowska *et al.* 2018).

## Conclusion

The present study provides information on the traditional uses of 137 species belonging to the Asteraceae family and the importance of this family. Local people use plants for various purposes i.e. digestive system treatment, respiratory system, nervous system, urinary system, skin, circulatory system, to name just a few.

The precious ethnobotanical knowledge about these plants must be transferred to the younger generations. The data may be valuable in the future for pharmacological studies. This review highlights the critical role of ethnobotanical knowledge in preserving the therapeutic heritage of the Asteraceae family in Iran. However, many plant species have not been studied in detail for their chemical constituents' pharmaceutical compounds and activities extensive chemical and pharmacological analysis of less explored species can lead to the discovery and development of new drug molecules, functional foods and cosmetic products. It also contains some allergenic and toxic plant species, so great care should be taken when storing and using these species. A careful analysis of safety and possible toxicity is necessary in the future.

## Declarations

**Ethics statement:** Not applicable - review article.
**Consent for publication:** Not applicable
**Availability of data and materials:** Supporting data available in article and if generated data required available upon request.
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**Author contributions:** M.N. and M.H., carried out the field survey and collected specimens, prepared the manuscript, and revised the manuscript. R.O., analyzed data and revised the manuscript. H.S., A.R. M. and E.S.G. revised the manuscript. All the authors read and approved the final manuscript.

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