

## An ethnobotanical survey of medicinal plants in Ballakayati (Erbil, North Iraq)

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**Abstract:** This study aims to identify wild plants used for medical purposes by local people of the Ballakayati district of Erbil in North Iraq, and to determine the local names and uses of those plants. The study was carried out for approximately 3 years between 2016 and 2018. During this period of time, 85 plant specimens were collected. Demographic characteristics of the participants, names of the local plants, used parts of these plants and their preparation methods were investigated and recorded. In the literature analysis of the plants used in this study, 85 plants were found to be used for medicinal purposes while 3 plants were not found in the literature records. Local plant names differ due to local dialects in North Iraq. Locals benefit from the wild plants growing in their districts. In this area, it was found that locals use 85 plants from 38 families for curative purposes. The medicinal plants were used for the treatment of many diseases, mostly for the treatment of a cold, shortness of breath, and heart and gastrointestinal diseases. It was determined that the plants we identified in this study were used directly or as infusion or decoction. The most considerable medicinal plants were *Mentha longifolia* (L.) L. subsp. *noeana* (Briq.) Briq. (UV:0.38), *Urtica dioica* L. (UV:0.38). Furthermore, plants used for medicinal purposes are dried and stored for using them in winter. The medicinal use of *Rhaponticum repens* (L.) Hidalgo and *Tanacetum polycephalum* Sch.Bip. subsp. *argyrophyllum* (K.Koch) Podlech. that we found in this area were recorded for the first time. Different use of those plants were observed in this study.

**Keywords:** Ballakayati, ethnobotany, medicinal plants, North Iraq, use value

### 1. Introduction

Ethnobotany can be defined as plant-human relations throughout human history (Muthu, 2006). In history, the first "Ethnobotany" was coined in 1896 by the American botanist John Harshberger as the study of plants used by primitives and indigenous people. Since then it has been defined as the traditional familiarity of aboriginal communities of the surrounding plant diversity and the study of how people of a particular culture and region make use of indigenous plants. Ethnobotany has its roots in botany (Harshberger, 1896).

Today, traditions around herbal medicine and the use of plants become widespread in towns, villages and rural areas in Northern Iraq. Apart from a recent study by Mati and de Boer (Mati and de Boer, 2010) on natural dye use and knowledge transfer among nomadic tribes in Erbil, there are a few ethnobotanical research studies on North Iraq.

In particular, it is possible to see some of plants which belong to the flora of Iraq which is neighboring country of Turkey in the plant studies carried out in Eastern Anatolia Region of Turkey (Ereçevit and Kırbag, 2017; Polat et al., 2017; Yüce Babacan et al., 2017; Yapar and Behçet, 2018;

Karaköse et al., 2018, 2019; Nadiroğlu and Behçet, 2018; Selvi et al., 2019). Turkey is rich in plant diversity and the number of plants is as much as the number of plants growing in all over Europe (Davis, 1965–1985; Davis et al., 1988; Güner et al., 2000).

Flora and ethnobotany studies have not been conducted in Ballakayati before. In this study, plants used for medicinal purposes by people living in Ballakayati Region (Erbil-Iraq) were investigated. But there are some studies that were conducted in nearby regions (Alrawi and Chaakravarty, 1964; Mati and de Boer, 2010; 2011; Saman and Ali, 2015). Forms of using and local names of those plants which grow naturally in that region were given in detail. With this study, we believe that by determining the diversity of medicinal plants in a region that has not yet been studied, we will raise awareness of our valuable plant resources and contribute to the protection of these areas.

### 2. Materials and methods

#### 2.1. Study area

The studied area is settled in the Upper Zagros Section of the Irano-Turanian Region and on the northwestern

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boundary of the Erbil Province, between the Halgord and Sakran Mountains (Figure 1). Erbil (Hawler) is the capital of the autonomous region. This province consists of nine districts (Central Erbil, DashtyHawler, Makhmur, Koya, Shaqlawa, Merqasur, Rawanduz, Soran, and Choman). Erbil is between the latitudes of 35° 30' and 37° 15' north and longitudes of 43° 22' and 45° 05'. The total area of Erbil is 15.074 km<sup>2</sup> and the total population is 1,530,722. Northern Iraq (an autonomous region in federal Iraq) is bordered on the north by Turkey, on the east by Iran, and on the west by Syria (UTC +3time zone). It consists of the provinces of Erbil, Sulaymaniyah, Dahuk, and Halabja, as well as the province of Kirkuk, a disputed region of central Iraq. These lands are fertile plains that join the Zagros Mountains and are crossed by the Tigris, Great Zab, and Little Zab rivers (Boesch, 1939).

Ballakayati is located in Irano–Anatolian subregion. Some plants in Ballakayati can be listed as *Aegilops kotschy* Boiss., *Eremopyrum bonaepartis* (Spreng.) Nevski, *Artemisia herba–alba* Asso, *Ephedra foliata* Boiss. ex C.A.Mey, *Haloxylon salicornicum* (Moq.) Bunge ex Boiss., *Salsola vermiculata* L., *Neotorularia torulosa* (Desf.) Hedge & J. Léonard. The vegetation has also a lot of species of plants; *Acantholimon*, *Anthemis*, *Astragalus*, *Cousinia*, *Onobrychis*, and *Salvia*. Our research areas in Ballakayati have the phytogeographical characteristics of Irano–Anatolian subregion. It consists of mountains, steppe, aquatic area. The subregion is rich in physiognomic

types: forests, various herbaceous and herbaceous alpine and subalpine communities, lush steppes, tragacanth formations, and halophytic and psammophyte vegetation all are present. Although northeastern Iraq is the only part of the subregion within our borders, it is an area extremely rich in endemic species (Guest and Al-Rawi, 1966). The number of Irano–Anatolian species in Iraq is 550, representing 57% of the Irano-Turanian species known in the country (Guest and Al-Rawi, 1966).

## 2.2. Plant materials

The study was carried out between 2016 and 2018. The plants used by the locals and especially naturally growing plants form our material. During this period of time, 85 taxa were collected.

Flora of Iraq (Towsend and Guest, 1966–1985) and the other floras such as flora of Turkey (Davis, 1965–1985; Davis et al., 1988), flora of Iranica (Rechinger, 1965–1977), and flora of Palestine (Zohary, 1966–1986) were used during the identification process of the plants.

The plants collected in the study were examined and described by the authors mentioned above. These plants were rendered herbarium materials and they were kept in the Bingöl University Science and Literature Faculty Herbarium (BIN) in Turkey. The taxonomic order of the plants was in alphabetical order.

## 2.3. Demographic characteristics of study participants

During this research study, 120 people who live in Ballakayati and in its 20 villages were interviewed to get

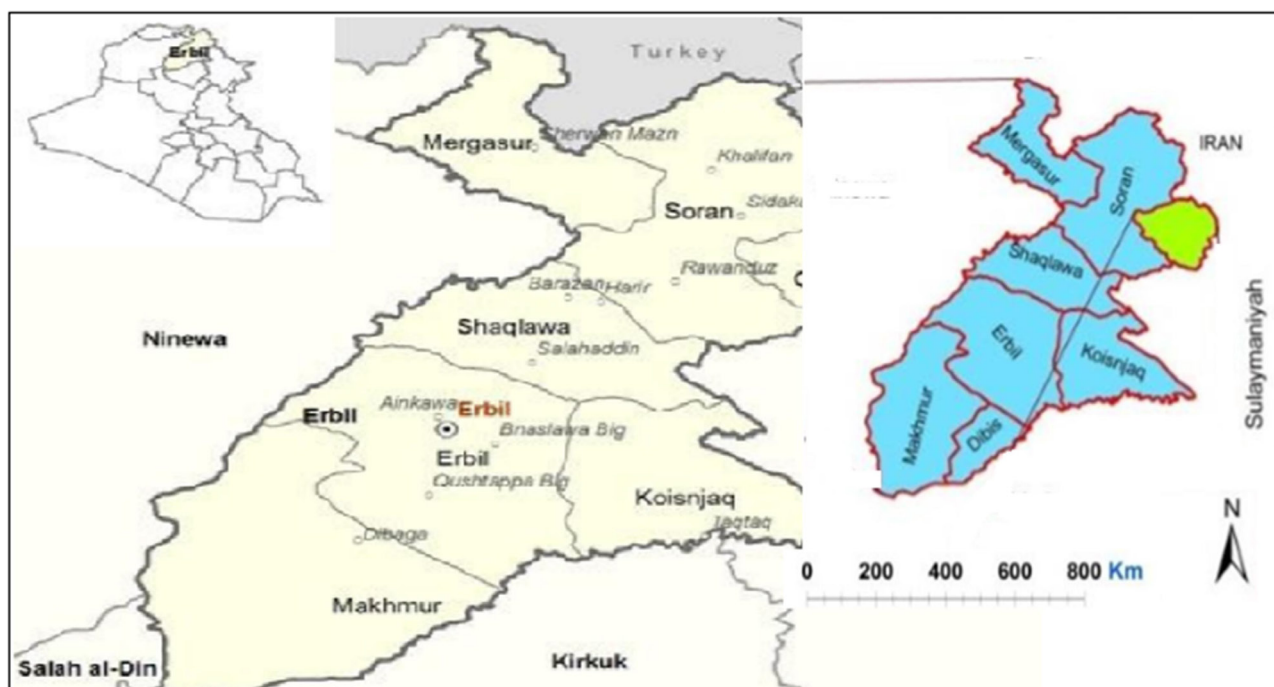


Figure 1. Geographical location of the study area.

information. The study population consisted of 84 men and 36 women. The education status of the participants was literate, 44 (36.7%); primary and secondary school, 38 (31.7%); high school, 29 (24.2%); and university, 9 (7.4%). Occupational distribution of the participants was as follows: employee, 36 (31%); housewife, 29 (24%); farmer, 22 (18%); teacher, 10 (8%); retired, 1 (1%); and other, 22 (18%).

#### 2.4. Interviews with local people

In this study, face-to-face questionnaires were conducted (Appendix A). Interviews were carried out during busy hours in public areas (school, gardens, houses, etc.) (Figure 2). During the interviews, the demographic information of the participants and the local names of the plants, how they were used, and how they were stored were obtained.

The schools distributed in Ballakayati were Gardeen Basic School for Boys, Darband Coeducational Preparatory School, Ashibraguiz Coeducational Preparatory School, Rashdur Coeducational Preparatory School, Galala Coeducational Preparatory School, Federally High School for Girls, Ballak High School for Girls, and Qasre High School for Boys.

The information about the plants was provided from the answers given by students, their parents, and relatives to the questions in the questionnaires, which were distributed directly to the students living in the region or by face to face survey technique.

#### 2.5. Calculations

A. Use value, which is a quantitative method that indicates the relative importance of locally and known species, is calculated according to the following formula:  $UV = U / N$  where U is the number of citations and N is informative (Trotter and Logan, 1986).

B. Informant consensus factor is calculated by using the following formula:  $FIC = Nur - Nt / Nur - 1$ , where

Nur is the number of citations and Nt is the number of species used in each category (Trotter and Logan, 1986).

### 3. Results and discussion

#### 3.1. Interviews with locals and literature review

It was observed that participants of the study were Kurdish ethnic descendants. All people living in Ballakayati district and surrounding villages involved in our study area speak the Kurdish language. Also, some people could speak in the languages of neighboring countries, such as Arabic and Persian.

Medicinal plants were used for the treatment of many diseases mostly for the treatment of a cold, shortness of breath, and heart and gastrointestinal diseases. It was determined that these plants, which we identified in this study were used fresh or as infusion or decoction. The following is a comparison of predetermined taxonomic uses for some species and uses in other research studies.

*Acanthus dioscoridis* L.; the decoction of dried leaves of this plant is used for the treatment of diarrhea. No similar use has been found in the literature.

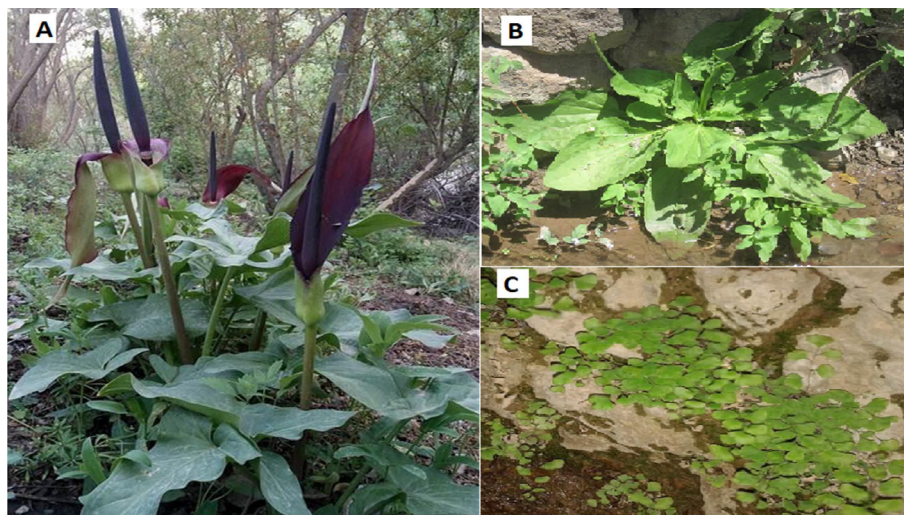
*Adiantum capillus-veneris* L. (Figure 3); it is used as a treatment for kidney pain by boiling the leaves in the water (decoction). Also, the plant powder is mixed with sugar to be used as a treatment for cold, spleen pain and diarrhea. It also cures snake bites, rabies, and other insect bites. In the literature, it was found that this plant is used for different purposes such as leaves are used as a treatment for seborrheic dermatitis (Leto et al., 2013).

*Rhaponticum repens* (L.) Hidalgo; this plant is used as a treatment for the infertility of married couples. During the treatment period, they are required to inhale it in the bathroom, then perform the intercourse process. This process is continued twice in 2 days. In their study, Pawera et al. (2016) indicated that the aerial part of the plant is



Figure 2. Interviews with local people.





**Figure 3.** Some plant photographs in the research area (a. *Arum dioscoridis* b. *Plantago media* c. *Adiantum capillus-veneris*)

used for the treatment of stomachache, diarrhea, and digestive disorders by oral infusion.

*Centaurea behen* L.; the plant is used for the treatment of colic. After the leaves are infused, it is drunk before breakfast. Similar use was not found in the literature.

*Silybum marianum* (L.) Gaertn.; the seed powder mixed with sugar is used for the treatment of stomachache. In the literature, similar uses were found in the studies of Mosaddegh et al. (2012).

*Euphorbia esula* L. subsp. *tommasiniana* (Bertol.) Kuzmanov; the stem of this plant, latex, is used as a treatment for allergy. It is recommended to apply this liquid to sensitive areas for 2 or 3 times per day. Similar use is also available in the study of Tetik et al (2013) which indicates that the latex is used as a treatment for scorpion bite by covering the affected part directly.

The aerial parts of the *Muscari neglectum* Guss. are used in the treatment of rheumatism. Although other uses were identified in the literature, it was found that there was no similar use. Koçyiğit and Özhatay (2006) indicated that the flowers are rubbed on warts and used as a treatment for rheumatism. Also, Ugurlu and Secmen (2008) showed that the decoction of fruits is used for the treatment of rheumatism.

*Epilobium parviflorum* Schreb.; the extract of the leaves of this plant is used as a treatment for digestive system diseases. For that purpose, the upper leaves of the plant are boiled, the water is filtered, and it is drunk 2–3 times in the mornings. Also, flowers of this plant are used as herbal tea. There is no similar use in the literature.

*Avena sterilis* L. subsp. *ludoviciana* (Durieu) Gillet & Magne; the seed is used as a treatment for diabetes (type II) and stomachache. In the literature, similar uses were found

in the studies of Abu-Rabia (2015). *Pistacia eurycarpa* Yalt.; its fruit is eaten as raw, roast the fruit of *P. eurycarpa* and consumed to make a coffee and added into ayran to change the taste. In addition, the body of the tree is used as a fuel and charcoal. The resin obtained from the stem is used to treat stomachache and abdominal pain, and it is consumed to make gum. Also, the oil extracted from the seed is used for the treatment of skin burns. In the literature, similar uses were also found in the studies of Kaval et al. (2014).

*Scirpoides holoschoenus* (L.) Sojak; the filtered water of the boiled roots is used as a treatment for incontinence; it is drunk twice in a day. Likewise, it causes sterility in men and women. Its usage is not mentioned in the literature.

*Hesperis persica* Boiss.; the flower is a sedative for the brain because of its fragrance. Its usage is not mentioned in the literature.

*Datura stramonium* L.; seeds of this plant are used to prevent the formation of the embryo since it causes infertility. Other uses have been identified in the literature, but no similar use has been found.

*Tribulus terrestris* L.; the seeds are used for the treatment of stomach pain and the removal of kidney stones. In the literature, Polat and Satıl (2012) and Ahmed (2016) also stated that the seeds and aerial parts have been used as a treatment for the removal of kidney stones and to relieve stomach and back pain.

*Rheum ribes* L.; the plant is used as a vegetable, consumed to make a jam and sold for economic purposes. Also, the root of this plant is used as a treatment for diabetes. It is recommended to drink after the root is dried, crushed, boiled in water, and filtered. In the literature, similar use was found in the studies of Behçet and Arik (2013) and Kaval et al. (2015).

*Ziziphus jujuba* Mill.; the fruit is eaten raw, consumed to make jams. Also, the decoction of the fruit is used as a treatment for tonsillitis. Similar use was found in the study of Ahmed (2016).

Karim Rasul (49 years old), who lives in Ballakayati, said that he uses *Eryngium bourgatii* Gouan for bronchitis and stomachache. *Eryngium* species was reported to have antioxidant and antiinflammatory activities (Yeşilada et al., 1989; Paşayeva et al., 2017).

70-year-old Galawezh Qadir, who lives in Ballakayati, said that he uses *Arum dioscoridis* Sm. plant leaves for the treatment of cancer (Figure 3). *Arum* species are abundant and poisonous plants containing calcium oxalate crystals, oxalic acid, soluble oxalates, and volatile substances, with strong local activity (Kandemir, 2008).

*Rosa x dumalis* Bechst.; the petals of the flower are used to make a jam. Also, the fruit is used for the treatment of cold and cough. It is recommended to drink 3 times per day after it is dried and added to boiled water. *Rosa gallica* L.; the petals of the flower are used to make a jam. Similarly, the fruit is used for the treatment of cold and cough by drinking after it is dried and added to boiled water. In literature, similar uses were found in the studies of Nadiroğlu and Behçet (2018). *Rosa* species was reported to have antiinflammatory and antinociceptive activity (Deliorman et al., 2007).

*Urtica dioica* L.; the leaf and root are used as a treatment for antiinflammatory and rheumatism, after that it is filtered from the water, added to the affected area and wrapped by a piece of cloth. In literature, similar uses of plants have been identified in many studies of Cakilcioglu et al. (2011), Akbulut and Bayramoglu, (2013), Mükemre et al. (2015), and Korkmaz et al., 2016. *Urtica dioica* was reported to have antioxidant, antimicrobial, antidermatophytic, antifungal, antiulcer and analgesic activities (Gülçin et al., 2004; Hadizadeh et al., 2009; Mikaeili et al., 2013).

*Thymus kotschyanus* Boiss. & Hohen. is being traditionally and commonly used for cold and headache in Ballakayati. The preparation, including thyme extract, alleviates cough following the common cold and decreases the severity and duration of bronchitis symptoms (Büechi et al., 2005; Gruenwald et al., 2005). *T. kotschyanus* was reported to have antimicrobial activities (Kırbağ and Zengin, 2006).

### 3.2. Taxonomic identification

Family name, the scientific name of plant, sample of plug (MK: Awara Mohammed Amin Mohammed Amin Kawarty), vernacular name, preparation and utilization methods, and usage categories of the medical plant used in Ballakayati are shown in the table.

As a result of interviews with the local people living in the Ballakayati district and its villages, it was found that 85 taxa are used for medicinal purposes in the study area.

The most common families are, Asteraceae (15 taxa), Apiaceae (10 taxa), Rosaceae (10 taxa), Fabaceae (5 taxa), Lamiaceae (5 taxa), and Brassicaceae (4 taxa) (Figure 4).

It was seen that plants belonging to the families of Asteraceae and ApiaceaeLamiaceae in Yüksekova (Bulut et al., 2016); and Asteraceae, Rosaceae, and Apiaceae in Hawraman (Iraq) (Saman and Ali, 2015) are commonly used by the local people of those regions.

In the reference survey of the plants used in this study, it was observed that the 85 taxa were found being already used for medical purposes while 3 plants were not. The medicinal use of *Rhaponticum repens* and *Tanacetum polycephalum* subsp. *argyrophyllum* that were found being used in our study area were recorded for the first time.

### 3.3. Mode of preparation–utilization method

The most common preparations are obtained by decoction. Preparation methods include decoction, infusion, drying, removing the latex, powdering, and crushing.

Local people use medicinal plants most frequently for the treatments of cardiac disorders, cold and flu, diabetes (types II), rheumatism, respiratory tract problems, digestive troubles, wound healings, hemorrhoids, etc. (Table).

### 3.4. Category of ailments

The reported ailments were grouped into 9 categories according to the information obtained from the interviewees: rheumatic diseases, diabetes, urogenital problems (infertility, prostate, incontinence, contraceptive), kidney problems (diuretic, kidney pain, kidney stones), cardiovascular diseases (antihypertensive, high cholesterol, hyperlipidemia), dermatological diseases (allergy, skin pain and burning, wound healing, burn, bleeding, skin irritations, skin infections, skin inflammation), gastrointestinal diseases (stomach ache, gastric pain, colic, hemorrhoids, diarrhea, bowel disease, abdominal pain, reduce appetite, constipation, dysentery, refluxing), respiratory diseases (bronchitis, cough, shortness of breath, throat ache, pharyngitis, lung pain, cold and flu), and other diseases (oral health, infections and sores in the mouth, eye pain, snake bite, anemia, toothache, headache, sedative, anorexia, immunostimulant, redness of the eye, inflammation).

### 3.5. Data analysis

According to the calculation made based on the use value (UV) by Trotter and Logan (1986), *Urtica dioica* (0.38), *Mentha longifolia* subsp. *noeana* (Briq.) Briq. (0.38), *Juglans regia* (0.34), *Ocimum basilicum* (0.30), *Allium macrochaetum* (0.32), *Thymus kotschyanus* (0.31), *Gundelia tournefortii* (0.29), *Portulaca oleracea* (0.27), *Origanum vulgare* subsp. *gracile* (0.24), *Anchusa azurea*

**Table.** List of medicinal plants used by the local people of district Ballakayati (Iraq)

Family, plant species, voucher specimen	Vernacular name of Ballakayati	Plant parts used <sup>a</sup>	Preparations <sup>b</sup>	Utilization method c	Use	UV
<b>Acanthaceae</b>						
<i>Acanthus dioscoridis</i> L. MK115	Gulapamba	L	Dr, Frh	Raw	Diarrhea	0.01
<b>Amaryllidaceae</b>						
<i>Allium ampeloprasum</i> L. MK37	Kurada, Tareg	B	-	Eat	Antihypertensive	0.32
<i>Allium macrochaetum</i> Boiss. & Hausskn. MK36	Sira Kewilka	Ap	In	Eat	Refluxing	0.13
<b>Anacardiaceae</b>						
<i>Pistacia eurycarpa</i> Yalt. MK28	Darbnawsh, Bnawshila	Lx -Fr	Lr	Lex -Eat	Skin pain and burning -Stomachache	0.03
<i>Pistacia khinjuk</i> Stockss MK11	Daraban, Qaskwan	Fr	-	Eat	Stomachache	0.06
<i>Rhus coriaria</i> L. MK57	Dar trsh, Smaq	Lx	Lr	Lei	Stomachache	0.16
<b>Apiaceae</b>						
<i>Anethum graveolens</i> L. MK38	Doragh, Shwit	L		Eat	High cholesterol	0.04
<i>Apium graveolens</i> L. MK39	Karawz, Karafs	Ap, L	In -	Doa -Eat	Kidney stones -Kidney pain	0.03
<i>Chaerophyllum macropodum</i> Boiss. MK114	Mandoke, Zremendok, Bendoka	L	Dec	Des	Diuretic	0.01
<i>Eryngium bourgatii</i> Gouan MK50	Tesu	Br -R	- -In	Raw -Dtt	Bronchitis -Stomachache	0.02
<i>Falcaria vulgaris</i> Bernh. MK122	Kazyza, Razyanay Kewi	L	Dec	Doa	Stomachache	0.04
<i>Foeniculum vulgare</i> Mill. MK102	Razyana	L, S	- -Scr	Raw	Milk (women) -Stomachache, headache	0.03
<i>Heracleum lasiopetalum</i> Boiss. MK15	Kashma, Kashm	Ap	In	Doa	Cough	0.05
<i>Pimpinella anthriscoides</i> Boiss. var. <i>anthriscoides</i> MK34	Alo	L	Dr	Chw	Infections and wounds in the mouth	0.19
<i>Pimpinella eriocarpa</i> Banks & Sol. MK64	Zira	R -Br	In -	Doa -Raw	Bronchitis -Stomachache	0.02
<i>Smyrniium cordifolium</i> Boiss. MK17	Qalandor	St	In	Ihn	Headache	0.02
<b>Araceae</b>						
<i>Arum dioscoridis</i> Sm. MK7	Kahri, Kardu	L	In	Eat	Cancer	0.03
<b>Asparagaceae</b>						
<i>Muscari neglectum</i> Guss. ex Ten. MK54	Susin	Ap	In	Com (on the knee and legs)	Rheumatism	0.01
<b>Asteraceae</b>						
<i>Achillea kotschyi</i> Boiss. MK118	Bezhan	Ca, L	In	Com	Hemorrhoids	0.07
<i>Rhaponticum repens</i> (L.) Hidalgo MK68	Ziba	Ap	In	Vap	Infertility	0.02
<i>Cota coelopoda</i> (Boiss.) Boiss. MK1	Baybun, Saqit, Nacih	Ca	In	Doc	Diarrhea	0.11

Table. (Continued).

<i>Arctium lappa</i> L. MK101	Zragana, Musaka	Ca -S	Dec -Dec	Des -Doc	Kidney stones -Shortness of breath, diabetes	0.06
<i>Artemisia absinthium</i> L. MK93	Gyaband	Ca	Dec	Doc	Shortness of breath, diabetes	0.08
<i>Centaurea behen</i> L. MK77	Tali, Talka	L	In	Doc	Colic	0.02
<i>Cichorium intybus</i> L. MK118	Chaqchaqa	Ap	In	Doc	Antihypertensive, prostate	0.23
<i>Gundelia tournefortii</i> L. MK47	Kangr, Qngir	S	-	Raw	Diarrhea	0.22
<i>Cynara cardunculus</i> L. MK113	Qalaghan, Artishu	Ap	Dec	Des	Kidney stones	0.08
<i>Helichrysum plicatum</i> DC. MK87	Gularun	Ca	In	Dct	Diarrhea, intestinal disease, kidney stones	0.06
<i>Lactuca serriola</i> L. MK43	Talishk, Gyakaw	Ap	In -Dec	Ext -Doc	Wound healing -Milk enhancer	0.16
<i>Silybum marianum</i> (L.) Gaertn. MK45	Drka	S	Scr	Pw+Eat+Sugar	Stomachache	0.03
<i>Tanacetum polycephalum</i> Sch. Bip. subsp. <i>argyrophyllum</i> (K.Koch) PodlechMK51	Borzhan	Ca	In	Doc	Cold and flu	0.02
<i>Tanacetum balsamita</i> L. MK118	Chawspilka	Ca	In	Com	Eye pain	0.02
<i>Tragopogon pratensis</i> L. MK21	Azpung, Azpun	L	-	Raw	Gastric pain	0.07
<b>Boraginaceae</b>						
<i>Anchusa azurea</i> Mill. MK8	Gormza, Gormza	L	Dec	Com	Snake bite	0.24
<b>Brassicaceae</b>						
<i>Capsella bursa-pastoris</i> (L.) Medik. MK2	Peqal, Kundashwana	Ap	Dec	Doc	Abdominal ache	0.10
<i>Hesperis persica</i> Boiss. MK98	Shawbo, Shabo	Fl	-	Snf	Sedative	0.06
<i>Lepidium sativum</i> L. MK41	Taratula, Taratiza	L	-	Raw	Anorexia	0.04
<i>Nasturtium officinale</i> R. Br. MK29	Kuzala, Peez, Kozala, Tuzik	L	-	Raw	Reduce appetite, constipation	0.09
<b>Cannabaceae</b>						
<i>Celtis tournefortii</i> Lam. MK97	Tawk, Tawe	Fr	-	Raw	Diarrhea	0.12
<b>Cyperaceae</b>						
<i>Scirpoides holoschoenus</i> (L.) Sojak MK27	Pizok	R	Dec	Des	Sterility, incontinence	0.01
<b>Dipsacaceae</b>						
<i>Cephalaria syriaca</i> (L.) Schrad. ex Roem. & Schult. MK42	Ziwan, Zivane	S	In	Doc	Diabetes	0.01
<b>Euphorbiaceae</b>						
<i>Euphorbia esula</i> L. subsp. <i>tommasiniana</i> (Bertol.) Kuzmanov MK32	Shirshiroka	Lx	Ext	Lex	Allergy	0.03
<b>Fabaceae</b>						

Table. (Continued).

<i>Glycyrrhiza glabra</i> L. MK74	Memuk	R	In	Doc	Anemia	0.11
<b>Fagaceae</b>						
<i>Quercus brantii</i> Lindl. MK22	Barw, Dara sur	Fr	-	Raw	Diabetes, diarrhea, stomachache	0.04
<b>Geraniaceae</b>						
<i>Erodium cicutarium</i> (L.) L'Hér MK76	Gya Darzila	Ap	In	Doc	Dysentery, abdominal pain	0.02
<b>Juglandaceae</b>						
<i>Juglans regia</i> L. MK105	Guiz, Gwez, Jeviz	S	-	Raw	Immunostimulant	0.34
<b>Lamiaceae</b>						
<i>Mentha longifolia</i> (L.) L. subsp. <i>noeana</i> (Briq.) Briq. MK85	Pung, Ping	Fl, L	In	Dct	Headache	0.38
<i>Ocimum basilicum</i> L. MK-112	Rehan	L	Dec	Dct	Diarrhea	0.30
<i>Origanum vulgare</i> L. subsp. <i>gracile</i> (K.Koch) Ietsw. MK81	Jatrakewilka	Ap	In	Doc	Toothache	0.24
<i>Phlomis lanceolata</i> Boiss. & Hohen. MK116	Bnazarda	Ap	Dec	Doc	Diabetes	0.02
<i>Thymus kotschyanus</i> Boiss. & Hohen. MK82	Jatra	Ap, L	In	Doa	Cold, headache	0.31
<b>Lythraceae</b>						
<i>Punica granatum</i> L. MK88	Hanar	Fp	Crs -	Com -Raw	Burn -Diarrhea	0.11
<b>Malvaceae</b>						
<i>Alcea pallida</i> Waldst. & Kit. MK58	Hero, Harmale	Fl, S, R	Dec	Doc	Cold, cough	0.05
<i>Malva sylvestris</i> L. MK91	Tolka, Paniroka	L -Ap	Lc -In	Com -Doa	Wound healing -Stomachache	0.18
<b>Onagraceae</b>						
<i>Epilobium parviflorum</i> Schreb. MK23	Pungakewilka	L	In	Des	Digestive	0.03
<i>Epilobium hirsutum</i> L. MK84	Bora pung, Zra Pung	Ap	Lc	Com	Bleeding stopper	0.01
<b>Orchidaceae</b>						
<i>Dactylorhiza umbrosa</i> (Kar. & Kir.) Nevski MK53	Salma, Salmka	Ap	In	Com	Rheumatism	0.02
<b>Papaveraceae</b>						
<i>Papaver rhoeas</i> L. MK5	Klukasura	Ap	Dr+Pw	Doa+Water	Cold and flu	0.09
<b>Plantaginaceae</b>						
<i>Plantago media</i> L. MK95	Rukesh, Gwebarkha	L	-	Com	Bleeding stopper	0.12
<b>Poaceae</b>						
<i>Avena sterilis</i> L. subsp. <i>ludoviciana</i> (Durieu) Gillet & Magne MK2	Dulka	S	Dec	Doc	Diabetes, stomachache	0.08
<b>Polygonaceae</b>						
<i>Rheum ribes</i> L. MK35	Rewas, Mam rewas.	R	In	Doc	Diabetes	0.14
<i>Rumex tuberosus</i> L. MK18	Trshoka	S	Dec	Doc	Diabetes	0.22



Table. (Continued).

<b>Portulacaceae</b>						
<i>Portulaca oleracea</i> L. MK86	Parpena, Pirpar	L	Lc	Raw	Immunostimulant	0.27
<b>Pteridaceae</b>						
<i>Adiantum capillus-veneris</i> L. MK78	Khalarasha, Qetrana	L -Ap	Dec -Pw	Doc -Com	Kidney pain -Cold, spleen pain, diarrhea, snake bites, rabies and insect bites	0.15
<b>Ranunculaceae</b>						
<i>Ranunculus sericeus</i> Banks Sol. MK71	Chapchapi	L	Dec	Com	Skin irritations, skin infections, allergies	0.08
<i>Thalictrum minus</i> L. MK94	Gyamamilan	L	In	Doc	Bowel treatment	0.01
<b>Rhamnaceae</b>						
<i>Paliurus spina-christi</i> Mill. MK25	Astri, Stri	Fr	Dec	Dtt	Abdominal pain, stomachache, kidney stones	0.06
<i>Ziziphus jujuba</i> Mill. MK48	Snci, Sncu	Fr	In	Doa	Tonsillitis	0.04
<b>Rosaceae</b>						
<i>Crataegus meyeri</i> Pojark. MK30	Gewzh, Goizh	Fl	Dec	Doc	Kidney stones	0.21
<i>Cydonia oblonga</i> Mill. MK110	Be, Bay, Bahe	S	In	Doa	Cough, lung pain, pharyngitis	0.12
<i>Potentilla kurdica</i> Boiss. & Hohen. MK33	Nabil	Fl	In	Com	Eye redness	0.02
<i>Prunus arabica</i> (Olivier) Meikle MK6	Kalashin	S	-	Raw	Reflux	0.04
<i>Prunus dulcis</i> (Mill.) D.A.Webb MK83	Badam, Chala	S	-	Raw	Hyperlipidemia	0.03
<i>Prunus microcarpa</i> C.A. Mey MK59	Blaluk, Halhaluk	Fr	-	Raw	Diarrhea	0.02
<i>Rosa x dumalis</i> Bechst. MK61	Shilan, Gulazarda	Fr	In	Doc	Cold, cough	0.12
<i>Rosa heckeliana</i> Tratt. subsp. <i>orientalis</i> (A. Dupont ex Ser.) Meikle MK16b	Gularaz	Fr, Fl	In	Doa	Cold, cough	0.04
<i>Rosa gallica</i> L. MK16a	Gula Bakh	Fr, Fl	In	Doa	Cold, cough	0.02
<i>Rubus sanctus</i> Schreb. MK60	Drila, Tutrk, Dudrk	Fr	-	Raw	Immunostimulant	0.20
<b>Salicaceae</b>						
<i>Salix pentandra</i> L. MK89	Bi, Dar bi	L	Lc	Com	Toothache	0.03
<b>Solanaceae</b>						
<i>Datura stramonium</i> L. MK109	Musaka, Zragana	S	Dec	Doa	Contraceptive	0.02
<b>Tamaricaceae</b>						
<i>Tamarix smyrnensis</i> Bunge MK92	Dara gaz	S	-	Ext	Toothache	0.02
<b>Thymelaeaceae</b>						
<i>Daphne mucronata</i> Royle MK52	Teru	S	-	Ext	Toothache	0.05
<b>Urticaceae</b>						

Table. (Continued).

<i>Urtica dioica</i> L. MK90	Gazgazka, Gazna	L, R	In	Com	Rheumatism, anti-inflammatory	0.38
<b>Xanthorrhoeaceae</b>						
<i>Asphodelus albus</i> Mill. MK26	Srelk, Astrelk	Wp	In	Dtt	Abdominal pain	0.01
<b>Zygophyllceae</b>						
<i>Tribulus terrestris</i> L. MK108	Qunjraaka, Kunjraaka	S	Dec	Doc	Kidney stones, stomach pain	0.04

**MK:**Awara Mohammed Amin Mohammed Amin Kawarty.

<sup>a</sup> Plant parts used: Ap, Aerial parts; Br, Branches; B, Bulb; Ca, Capitulum; Fl, Flowers; Fp, Fruit peel; Fr, Fruits; Lx, Latex; L, Leaves; R, Roots; S, Seeds; St, Stems; Wp, Whole plant.

<sup>b</sup> Preparations: Crs, Crushed; Dec, decoction; Dr, drying; Frh, fresh; Scr, the seeds are crushed; In, infusion; Lc, leaves crushed; Lr, latex is removed; Pw, powdered.

<sup>c</sup> Utilization method: Com, compress; Chw, chew, Doa, drink 1 cup after meals; Doc, drink 1 glass of the plant on an empty stomach in the morning; Dtt, drink 1 cup of the plant 2 times a day; Dct, drink 1 cup of the plant 3 times a day; Des, drink 1 glass of the plant 2 times a day on an empty stomach; Eat, eaten as meal; Ext, externally; Inh, Inhalation; Lei, latex is used internally; Lex, latex is used externally; Raw, the plant is eaten raw; Snf, sniff; Vap, vapor bath.

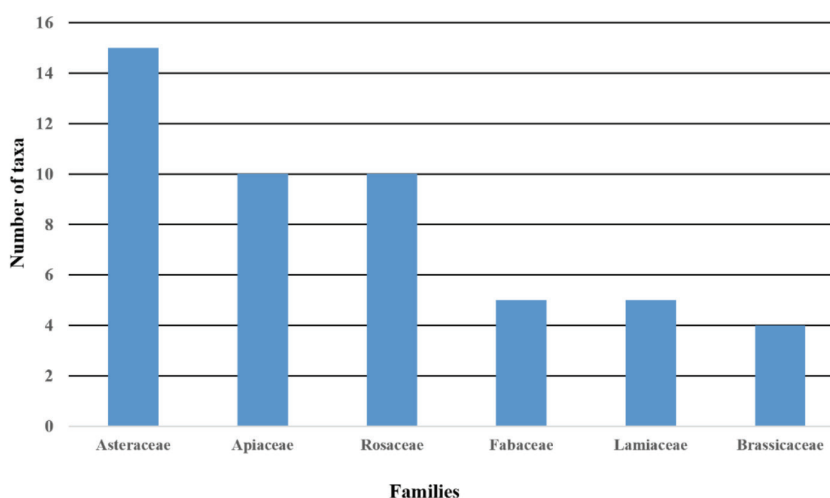


Figure 4. Most representative families.

(0.24), *Rumex tuberosus* (0.22), *Crataegus meyeri* (0.21), *Rubus sanctus* (0.20), and *Malva neglecta* (0.18) were found to be the highest use values (Table).

Informant consensus factor was abbreviated as FIC and ICF in the previous articles (Polat et al., 2013; Sargin et al., 2013; Hayta et al., 2014).

Local people used medicinal plants most frequently for the treatment of gastric disorders (20 use reports), respiratory tract problems (16), intestinal disorders (14), rheumatism (12), urinary disorders (10), diabetes (8), dermatological (7), gynecologic disorders (6), and cardiac disorders (4). Diabetes had the highest FIC score (0.57). *Arctium lappa* L., *Artemisia absinthium* L., *Avena sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne, *Cephalaria syriaca* (L.) Schrad. ex Roem. & Schult.,

*Quercus brantii* Lindl., *Phlomis lanceolata* Boiss. & Hohen., *Rheum ribes* L., *Rumex tuberosus* L., etc. were reported to be among the plant remedies indicated for this use.

Urinary disorders were recorded to have the 2nd highest FIC value (0.54), cardiac disease recorded by its all images like the 3rd group (FIC was 0.51), while the 4th level of FIC values (0.48) was recorded in the dermatological category. Gynecologic disorders were ranked as the 5th ailment with FIC value of 0.42. The last citations of this ranking were reported for plants used to treat rheumatism disorder, gastric disorders, respiratory tract problems, and intestinal disorders with FIC values of 0.39, 0.36, 0.30, and 0.28, respectively.

The use values in ethnopharmacological studies might be useful for researchers who investigate the drugs in

which these plants are used for the people living in this region.

#### 4. Conclusion

Geographical structures of our research area, lack of health and transportation opportunities, and the presence of numerous people maintaining a nomadic lifestyle have increased the demand of regional people to use wild plants.

As a result of this research study, in Ballakayati, 85 taxa belonging to 38 families were identified and their names, usage forms, and benefits were revealed.

Plants are used in the treatment of many health problems. Drying medicinal plants enabled the local people to use them in every season of the year. Most commonly used plants are *Urtica dioica*, *Mentha longifolia* subsp. *noeana*, *Juglans regia*, *Ocimum basilicum*, *Allium macrochaetum*, *Thymus kotschyanus* and *Gundelia tournefortii*.

These taxa which were determined as the most used ones in this region are consumed for first the treatment purposes, then for food purposes. In most of the ethnobotanical studies carried out in Iraq, it was found that these taxa are used for similar purposes. These plants have variability in local names; therefore, we think that there is a high probability that it will cause confusion and misunderstandings in terms of science.

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#### Appendix-A

1. Name and surname; age and sex; telephone and address; educational level of the participant.
2. Date of interview.
3. What is the vernacular name of the plants?
4. For which diseases do you use the plants?
5. Which parts of the plant do you use?
6. How and when do you use the plants?
8. What dose do you use?