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REVIEW

Ethnomedicinal Plants for Kidney Disorders in Iraq and Türkiye

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Abstract

The purpose of this study is to identify the plant species that are used traditionally as herbal medicines for kidney disorders in both Iraq and Türkiye, as well as to compare their traditional medicine based on the practical use of plants and highlight the same ones. Ethnomedicine is defined as the study or comparison of traditional medicine based on plants' bioactive compounds. Traditional herbal applications for kidney disorders are frequently used among people, as kidneys have a major role in the maintenance of homeostasis of the body, fluid, and electrolyte, and also, have a role to fulfill many metabolic functions. Iraq and Türkiye are homeland for many medicinal plants and it is crucial to understand local medicinal plant uses and their relationship with surrounding areas. To obtain valuable information, approximately 100 ethnobotanical and ethnomedicinal articles were scanned. As a result of this study, it has been found that 9 taxa are used for renal disorders in Iraq only while, 30 taxa are used for kidney diseases in Türkiye only, and 5 taxa were found to be effective against renal diseases in both countries. Furthermore, 22 plant families have been recorded in which Apiaceae (4 taxa), Compositae (8 taxa), Malvaceae (3 taxa) and Lamiaceae (3 taxa) were the most used ones. The fact that the same plant species are used for the same disease in both countries will give us an idea about the development of herbal medicine with these plant species in the future.

INTRODUCTION

Ethnomedicine is a combination of the prefix "ethno" with suffix "medicine", in which ethno means an ethnic group or people while the medicine is a term deals with health and illnesses (Pieroni *et al.*, 2005; Quinlan, 2011). Ethnomedicine could be defined as the comparison or study of traditional medicine based on bioactive compounds in herbs and animals that are already used by varied ethnic groups (Bhasin, 2007). In other words, ethnomedicine is a term used to define the relationship of herbs with the health of the human and the usage of them as a treatment for diseases by local people (Quinlan, 2011). Kidneys are the organs in the body that have variable responsibilities such as, maintenance of homeostasis of the body, fluid, and electrolyte, and also, have a responsibility to fulfill many metabolic functions (Dipiro *et al.*, 2014). As every organ of the body, kidneys also may be faced with a variety of disorders due to irregularities of its functions or hormones of the body or any other disease that may cause the kidney to fail to do its function correctly such as diabetes mellitus (Booth *et al.*, 2011). People investigate herbal remedies as they are interested in wellness and are trying to get the benefit of botanicals for thousands of years (Wright *et al.*, 2007). Kidney pain which could be caused by many reasons,

inflammation of kidney and kidney stones is the most known kidney disorder that used to be treated by herbal medicines (Al-Douri and AlEssa, 2010; Altundağ and Öztürk, 2011). Türkiye is a country where located on both European and Asia continents (Ergener, 2002). The wide geographical location of Türkiye makes the climate of the country to be different from a region to another and this variable climate allows plants to grow in different regions with different characteristics (Sensoy *et al*., 2008). Iraq is a country where located in the Asia continent. Like Türkiye, Iraq is a hometown for many plants that have variable properties, however, the difference is that the climate of Iraq is mostly hot and dry with low rainfall (Malinowski, 2003). Many plants have been used by Turkish and Iraqi people for the treatment of many disorders, including kidney disorders (Al-Douri and Al-Essa, 2010; Altundağ and Öztürk, 2011; Kaval *et al*., 2014; Naqishbandi, 2014; Özdemir and Alpınar, 2015; Ahmed, 2016; Khodadadi *et al*., 2016; Bahmani *et al*., 2016; Çakır *et al*., 2017; Bulut *et al*., 2017; Al-Snafi, 2018; Mohammed and Akgül, 2018; Aldulaimi and Husain, 2019). In this study, as these types of herbs are called ethnomedicinal plants, the ones that have been used by local people for kidney diseases will be investigated with the help of recent ethnomedicinal and ethnobotanical studies. Previously, many of ethnobotanical and ethnomedicinal studies have been done in different locations of Iraq and Türkiye separately and the plants have been noted for a variety of diseases. Current review aims to indicate the ethnomedicinal plants that are used for kidney disorders in both countries and highlight the same ones.

MATERIALS and METHODS

The access date of the study was between the 1st March and 24th May 2021 and "Google scholar" has been used as a database for the literature. Since kidney disorders are common in overall the world and Iraq and Türkiye are neighboring countries, there are similar ethnomedicinal plants for renal diseases, as well as different ones. Based on this idea, this review study started to be conducted.

To make the literature review, first of all, the review topic was selected. After that, starting from the definition of ethnobotany, ethnomedicine, kidneys, functions of the kidney, the geography of Iraq and Türkiye, the role of herbal medicine in the treatment, the common renal disorders, and the role of diuresis in the treatment were searched respectively and included in this study.

Before starting the plants, the terms ethnobotany and ethnomedicine were researched. The keywords were ethnomedicine and ethnobotany, as well as the term traditional medicine also used during the researches. Based on these words, the articles scanned and the main points included in this study.

In order to make the kidney disorders clear, books and articles about physiology and pathophysiology investigated and the common kidney diseases summarized. Then, each disorder was searched alone to make a clear and basic idea about them. The approach of these explanations was to make a satisfactory content for the reader, when reads the usage of plants, and makes the reader know about the disease and its pathological effect on the body.

In order to obtain valuable information, approximately 100 articles were scanned. During the research, the keywords were kidney, ethnomedicine, ethnobotany, Iraq, Türkiye, and herbs. Especially, the ethnobotanical articles were the starry ones for this study, as well as the ethnomedicinal articles. Each ethnobotanical article for each of Iraq and Türkiye was searched and only the plants that are used for kidney disorders or as diuretic collected for this review study from a total of 193 plants in Iraq and 395 plants in Türkiye. Finally, every selected plant was searched on its own for the family name, chemical composition, and reported pharmacological activities, as well as the plants listed alphabetically according to their families.

Since the study is based on the herbs of two neighboring countries, the major geographical data is researched and explained briefly in this review study.

The world of the plants is full of benefits and during the literature review, the most remarkable point was the uses of plants as the same plants could be present in both countries but the ethnomedicinal usage of it can be very different in each country. Due to these types of differences, every plant, that is written in an ethnobotanical article for one of the countries, was scanned in all ethnobotanical articles of the other country. With the help of this researches, the similar and different ethnomedicinal plants were selected and introduced to this review study.

RESULTS and DISCUSSION

With the help of previous studies, ethnomedicinal plants in Iraq (Table 1), ethnomedicinal plants in Türkiye (Table 2) and common ethnomedicinal plants in both Iraq and Türkiye (Table 3) are listed.

Table 1. Ethnomedicinal plants in Iraq.

Family	Species	Used part(s)	Vernacular name	Preparation method	Therapeutic effect(s)	Reference(s)
Apiaceae	*Pimpinella anisum* L.	Seed	Turkish: Anason Iraqi: Yensun	Decoction	Diuretic and renal impairment	(Naqishbandi, 2014)
Brassicaceae	*Raphanus raphanistrum* subsp. s*ativus* (L.) Domin	Roots and leaves	Turkish: Turp Iraqi: Fijl	Eaten	Diuretic and kidney stone	(Ahmet, 2016; Mohammed and Akgül, 2018)
Cucurbitaceae	*Citrullus colocynthis* (L.) Schrad.	Seed and fruit	Turkish: Acıkarpuz Iraqi: Handel	Decoction	Diuretic and urinary diseases	(Al-Douri, 2010; Asia *et al.*, 2015; Mohammed and Akgül, 2018; Al-Snafi, 2018)
Cyperaceae	*Cyperus rotundus* L.	Root	Turkish: Topalak Iraqi: Saed	Decoction	Diuretic and kidney stone	(Naqishbandi, 2014; Al-Snafi, 2018)
Fabaceae	*Alhagi maurorum* Medik.	Seed	Turkish: Aguldikeni Iraqi: Aqool	Decoction	Kidney stone	(Al-Snafi, 2018)
Fabaceae	*Trigonella foenum-graecum* L.	Seed	Turkish: Çemen otu Iraqi: Halba	Decoction	Diuretic, kidney stone and Urinary tract infection	(Ahmed, 2016; Naqishbandi, 2014)
Rutacaeae	*Citrus limon* (L.) Osbeck	Fruit	Turkish: Limon Iraqi: Leymun	Decoction	Kidney stone	(Naqishbandi, 2014)
Rutaceae	*Citrus aurantiifolia* (Christm.) Swingle	Dried fruit	Turkish: Bergamot Iraqi: Lumi Basra	Decoction	Diuretic and kidney disorders	(Naqishbandi, 2014)
Salicaceae	*Salix alba* L.	Leaves	Turkish: Aksöğüt Iraqi: Safsaf	Decoction	Kidney sand	(Mohammed and Akgül, 2018)

Table 2. Ethnomedicinal plants in Türkiye.

Family	Species	Used part(s)	Vernacular name	Preparation method	Therapeutic effect(s)	Reference(s)
Apiaceae	*Carum carvi* L.	Fruit	Turkish: Kimyon Iraqi: Kamun	Decoction	Kidney stone	(Altundağ and Öztürk, 2011)
Apiaceae	*Daucus carota* L.	Fruit	Turkish: Tarak otu Iraqi: Eklyl	Decoction	Kidney stone	(Altundağ and Öztürk, 2011)
Aspleniaceae	*Asplenium ceterach* L.	Leaves	Turkish: Eğrelti otu Iraqi: Xanshar	Infusion	Kidney stone and urinary antiseptic	(Polat and Satıl, 2012)
Asteraceae	*Achillea arabica* Kotschy	Aerial part	Turkish: Civan perçemi Iraqi: Yaru	Infusion	Kidney disorders	(Özdemir and Alpınar, 2015)
Asteraceae	*Cichorium intybus* L.	Leaves	Turkish: Hindiba Iraqi: Hindiba	Decoction	Kidney stone	(Polat and Satıl, 2012)
Asteraceae	*Centaurea benedicta* (L.) L.	Whole plant	Turkish: Bostan otu Iraqi: Kenger	Infusion, decoction	Nephralgia and kidney stone	(Akaydın *et al*., 2013; Sargın *et al*., 2013)
Asteraceae	*Cynara cardunculus* L.	Flower and leaves	Turkish: Enginar Iraqi: Xarshuf	Decoction	Diuretic, nephralgia and kidney stone	(Akaydın *et al*., 2013; Sargın *et al*., 2013)
Asteraceae	*Gundelia tournefortii* L.	Latex, root, aerial part	Turkish: Kenger Iraqi: Kaob	Decoction	Kidney stone and kidney pain	(Özdemir and Alpınar, 2015)
Asteraceae	*Helichrysum arenarium* (L.) DC.	Flowering branch	Turkish: Yayla çiçeği Iraqi: Zahratel-murtafaat	Infusion	Diuretic, kidney gravel and kidney pain	(Sargın *et al*., 2013; Özdemir and Alpınar, 2015)
Asteraceae	*Helichrysum plicatum* DC.	Aerial part	Turkish: Herdemtaze Iraqi: not found	Infusion	Kidney gravel	(Saraç *et al*., 2013)
Asteraceae	*Scolymus hispanicus* L.	Aerial part	Turkish: Şevketi bostan Iraqi: Kenger	Decoction	Kidney stone and kidney sand	(Ilker *et al*., 2009; Polat and Satıl, 2012; Tuzlacı, 2016)
Brassicacae	*Lepidium sativum* L.	Leaves	Turkish: Tere Iraqi: Cercir	Infusion	Nephritis	(Ilker *et al*., 2009)

Table 2. Ethnomedicinal plants in Türkiye.

Family	Species	Used part(s)	Vernacular name	Preparation method	Therapeutic effect(s)	Reference(s)
Cupressaceae	*Juniperus oxycedrus* L.	Fruit*, cone^	Turkish: Dikenli ardıç Iraqi: Al-arar el-shaik	Decoction*, eaten^	Kidney stone	(Özdoğru *et al*., 2011; Akaydın *et al*., 2013; Sargın *et al*., 2013; Tuzlacı, 2016; Özdemir Nath, 2016; Çakır, 2017)
Cyperaceae	*Cyperus longus* L.	Aerial part	Turkish: Kara topalak Iraqi: Dombalan	Decoction	Kidney stone	(Ait-Ouazzou *et al.*, 2012; Akaydın *et al.,* 2013;)
Equisetaceae	*Equisetum arvense* L.	Aerial part	Turkish: At kuyruğu Iraqi: not found	Infusion	Kidney stone and kidney sand	(Güner and Selvi, 2016; Güler *et al.,* 2015; Cakilcioglu *et al*., 2011)
Hyperiaceae	*Hypericum perforatum* L.	Aerial part*, leaves^	Turkish: Binbirdelik otu Iraqi: Haybercum	Infusion*, decoction^	Kidney stone*, diuretic^	(Uysal *et al*., 2012)
Lamiacae	*Rosmarinus officinalis* L.	Leaves	Turkish: Biberiye Iraqi: Iklik cebel	Infusion	Kidney sand	(Sargin, 2015)
Lamiaceae	*Teucryum chamaedrys* L.	Aerial part	Turkish: Dalak otu Iraqi: Tahal	Infusion and decoction	Kidney pain	(Altundağ and Öztürk, 2011)
Lamiaceae	*Thymbra spicata* L.	Flower and leaves	Turkish: Zahter Iraqi: Zaa'ter	Infusion	Kidney diseases	(Korkmaz *et al*., 2016)
Lamiaceae	*Vitex agnus-castus* L.	Fruit	Turkish: Hayıt bitkisi Iraqi: Afif	Eaten	Kidney sand	(Çubukçu *et al*., 2002; Akaydın *et al*., 2013)
Lauraceae	*Persea vanderwerffii* Doweld.	Leaves	Turkish: Avokado Iraqi: Avokado	Decoction	Kidney stone and diuretic	(Akaydın *et al*., 2013; Korkmaz *et al*., 2016)
Malvaceae	*Malva neglecta* Wallr.	Aerial part^, flower*	Turkish: Ebegümeci Iraqi: Pencer	Decoction^, infusion*	Kidney diseases^ and diuretic*	(Cakilcioglu and Turkoglu, 2010; Akgul *et al*., 2018)
Malvaceae	*Malvella sherardiana* Jaub. and Spach	Leaves	Turkish: Hubazi Iraqi: not found	Decoction	Kidney stone	(Akaydın *et al*., 2013)

Table 2. Ethnomedicinal plants in Türkiye.

Family	Species	Used part(s)	Vernacular name	Preparation method	Therapeutic effect(s)	Reference(s)
Poaceae	*Panicum miliaceum* L.	Flower	Turkish: Darı Iraqi: Dura	Decoction	Kidney stone and diuretic	(Akaydın *et al*., 2013)
Poaceae	*Zea mays* L.	Hair and fruit	Turkish: Mısır Iraqi: Dura	Infusion	Kidney stone	(Akgül *et al.*, 2016; Aydın and Yeşil, 2018)
Portulacacaeae	*Portulaca oleracea* L.	Aerial part	Turkish: Semizotu Arabic: Berbin	Decoction*, infusion^	Nephritis*, kidney stone^	(Akaydın *et al*., 2013; Polat *et al*., 2015)
Rosaceae	*Crataegus orientalis* (Mill.) M.Bieb.	Fruit*, leaves^	Turkish: Alıç Iraqi: Zarur	Eaten*, decoction and infusion^	Nephralgia and kidney stone	(Akaydın *et al*., 2013; Sargın *et al*., 2013)
Rosaceae	*Prunus avium* (L.) L	Pedicels	Turkish: Kiraz Iraqi: Kerez	Decoction	Kidney problems	(Güner and Selvi, 2016)
Rosaceae	*Rubus sanctus* Screb.	Root and fruit*	Turkish: Böğürtlen Iraqi: Tut berri	Decoction	Kidney stone and nephralgia*	(Akaydın *et al*., 2013)
Urticaceae	*Urtica urens* L.	Aerial part	Turkish: Küçük ısırgan Iraqi: Nabat el-aqras	Decoction	Kidney stone	(Çubukçu *et al*., 2002; Akaydın *et al*., 2013)

(The signs (*,^) are used to match different preparation methods, used parts and therapeutic effects).

Table 3. Common ethnomedicinal plants in both Iraq and Türkiye.

Family	Species	Used part(s) in Türkiye	Preparation method in Türkiye	Therapeutic effect(s) in Türkiye	Used part(s) in Iraq	Preparation method in Iraq	Therapeutic effect(s) in Iraq	Reference(s)
Apiaceae	Anethum graveolens L.	Leaves	Eaten	Diuretic and kidney stone	Leaves	Eaten	Diuretic and kidney stone	(Kaval *et al*., 2014; Ahmed, 2016)
Aspleniaceae	Asplenium trichomanes L.	Aerial part	Decoction	Kidney stone	Aerial part	Decoction	Diuretic	(Al-Snafi, 2018; Aydın and Yeşil, 2018)
Fabaceae	Glycyrrhiza glabra L.	Root	Decoction	Kidney stone	Root	Decoction	Kidney pain	(Altundağ and Öztürk, 2011; Ahmed, 2016)
Malvaceae	Alcea rosea L.	Flower	Decoction	Kidney stone	Flowers and root	Decoction	Nephritis	(Bulut *et al.*, 2017; Al-Snafi, 2018)
Pteridaceae	Adiantum capillus-veneris L.	Leaves	Infusion	Kidney stone	Leaves	Decoction	Kidney stone and nephritis	(Altundağ and Öztürk, 2011; Mati and de Boer, 2011; Naqishbandi, 2014)

As shown in Table 3, there are five common ethnomedicinal plants within five different families in both Iraq and Türkiye.

Anethum graveolens

The leaves of the plant have been used by local Turkish and Iraqi people as greens to be eaten for the diuretic effect and treatment for kidney stone (Kaval *et al*., 2014; Ahmed, 2016) (Figure 1).

Figure 1. The flowers and leaves of *Anethum graveolens* (Retrieved from: https://www.gbif.org/occurrence/2974371411).

Asplenium trichomanes

It has been recorded that the aerial part of the plant is used by Turkish local people for kidney stone by preparation as a decoction, as well as it has been recorded in ethnomedicinal reports that the aerial part is used by Iraqi local people as a diuretic by the same preparation method like Turkish people (Al-Snafi, 2018; Aydın and Yeşil, 2018) (Figure 2).

Figure 2. The aerial part of *Asplenium trichomanes* (Retrieved from: https://www.gbif.org/occurrence/3044788761).

Glycyrrhiza glabra

The root of *G. glabra* has been used ethnomedicinally by local Turkish and Iraqi people for the treatment of kidney stone, nephralgia, and as a diuretic in Türkiye and treatment of kidney pain in Iraq. It is used internally and prepared by decoction method (Altundağ and Öztürk, 2011; Ahmed, 2016) (Figure 3).

Figure 3. The roots of *Glycyrrhiza glabra* (Retrieved from: https://commons.wikimedia.org).

Alcea rosea

The flower and root of *A. rosea* have been recorded as medicinal plants used in traditional medicines of both Türkiye and Iraq. The decoction method is used for preparation in both countries, however, the differences are that only the flower is used for the treatment of kidney stones in Türkiye, whereas the flower and root are used for the treatment of kidney inflammation in Iraq (Bulut *et al*., 2017; Al-Snafi, 2018) (Figures 4 and 5).

Figure 4. The flowers of *Alcea rosea* (Retrieved from: https://bs.plantnet.org).

Figure 5. The root of *Alcea rosea* (Retrieved from: https://www.flickr.com/photos/151469898@N02/37116473762/).

Adiantum capillus-veneris

The leaves of *A. capillus-veneris* have been recorded as a drog in the traditional medicine of both Türkiye and Iraq and both countries are using the plant for the aim of the treatment of kidney stone and additionally for nephritis in Iraq. However, the local people are using different preparation methods, in which decoction method is used for preparation in Iraq whereas the infusion method is used for the preparation in Türkiye (Altundağ and Öztürk, 2011; Mati and de Boer, 2011; Naqishbandi, 2014) (Figure 6).

Figure 6. The leaves of *Adiantum capillus-veneris* (Retrieved from: https://www.gbif.org/occurrence/3013858673).

The Prevalent Chemical Components for Kidney Disorders

The aliphatic ester glyceryl-n-tetracosan-17-ol-1-oate is the compound that has been accepted as the active compound of *Alhagi maurorum*. On the other hand, the phytochemical studies showed that *A. maurorum* mainly contains flavonoids such as, kaempferol 3-O-galactoside, quercetin 3-O rhamnoside, adn catechin (Ahmad *et al*., 2015; Samejo *et al*., 2012). The diuretic activity of the *A. maurorum* authanticates the ethnomedicinal use of it as a treatment for renal calculi as the diuresis has a positive impact on the stone of the kidney. Moreover, an *in-vivo* study also has been proved that *A. maurorum* has nephroprotective activity especially against calcium oxalate stones (Shafaeifar *et al*., 2012).

The biologically active component of *Salix alba* is salicin (Zabihi *et al*., 2018). Apart from that, glycosides, vanillin, and ferulic acid and sesquiterpenes such as eudesmol and bisabolol have been isolated from *S. alba* as major compounds (Silici and Kutluca, 2005). It has been suggested that the effects of *S. alba* are due to its flavonoids, tannins, and salicyl alcohol derivatives, as well as some further unknown compounds are still present and the plant has to be investigated further (Bodîrlău *et al*., 2009). The result of an *in-vivo* study suggested that *S. alba* regulates the redox homeostasis in kidney and heart tissues and attenuates the oxidative stress thanks to phenolic contents especially salicin (Zabihi *et al*., 2018).

Carvone, carvacrol, alpha-pinene, γ - terpinene, limonene, carvenone, linalool, and p-cymene are the main chemical compounds that have been recorded for *Carum carvi* and the experimental studies have been shown that *C. carvi* has a diuretic effect and has a positive impact on renal calculi in which authenticates the ethnomedicinal use of the plant as well as the same study suggested that the extract of *C. carvi* showed no renal toxicity or any other toxicity (Johri, 2011).

The *in-vitro* studies have been demonstrated that *Ceterach officinarum* can show inhibitory effect on the growth of calcium oxalate monohydrate (COM), which is one of the basic reasons for kidney stone, as well as it has an activity to reduce the size of the COM crystals thanks to the bioactive compound of *Ceterach officinarum* which are p-coumaric and ferulic acid. As a result of that study, *C. officinarum* could be used as a medical remedy against kidney stones as it is already indicated in the ethnomedicinal use of the plant (Đurđević *et al*., 2007; De Bellis *et al*., 2019).

The active compounds of *Hypericum perforatum* are gathered under six major natural product groups which are naphthodianthrones, phloroglucinols, flavonoids, biflavones, phenylpropanes, and proanthocyanidins. Especially the compounds hypericin and pseudohypericin are concerned to be the biologically active compounds of *H. perforatum*, and quercetin, which is an aglycone flavonoid, is accepted as active components as well (Patocka, 2003). The nephroprotective activity of *H. perforatum* has been proven by in-vivo studies (Abd El Motteleb and Abd El Aleem, 2017; Çakır *et al*., 2017). Moreover, xanthones are also reported to be present in the plant and they are responsible for diuretic effect (Saddiqe *et al*., 2010).

Gallic acid and catechin are present in *Asplenium trichomanes* as phenol and flavonoid compounds (Naseri *et al*., 2012; Al-Snafi, 2014). Due to the popularity of *A. graveolens*, a variety of activities has been experimentally proven. The remarkable activity is being a diuretic and it is also applied ethnomedicinally (Naseri *et al*., 2012).

Glycyrrhizin (glycyrrhizic acid; glycyrrhizinate) is a triterpene saponin that has a sweet taste due to its structure and it is the compound that considered to be the biologically active component of *G. glabra* as it presents in the root of the plant (Fenwick *et al*., 1990; Kaur *et al*., 2013). As a result of an experimental analysis of the root of *G. glabra*, the root's bioactive principle could help to improve the renal function by lowering blood and kidney cholesterol levels (Sitohy *et al*., 1991).

Six major flavonoids, that are responsible for biological effects, have been identified for the plant which are kaempferol-3-*O*-[6″-(E-coumaroyl)]-*β*-d-glucopyranoside, dihydrokaempferol, Dihydrokaempferol-4′-*O*-*β*-d-glucopyranoside, kaempferol-3-*O*-*β*-d-glucopyranoside, kaempferol-3-*O*-*α*-l-rhamnopyranosyl-(1′″→6″)-*β*-dglucopyranoside, and apigenin (Abdel-Salam *et al*., 2018). As a result of an *in-vivo* study, *A. rosea* shows antiurolithiatic effects as protective and curative activity especially against calcium oxalate renal calculi (Ahmadi *et al*., 2012; Lim, 2014).

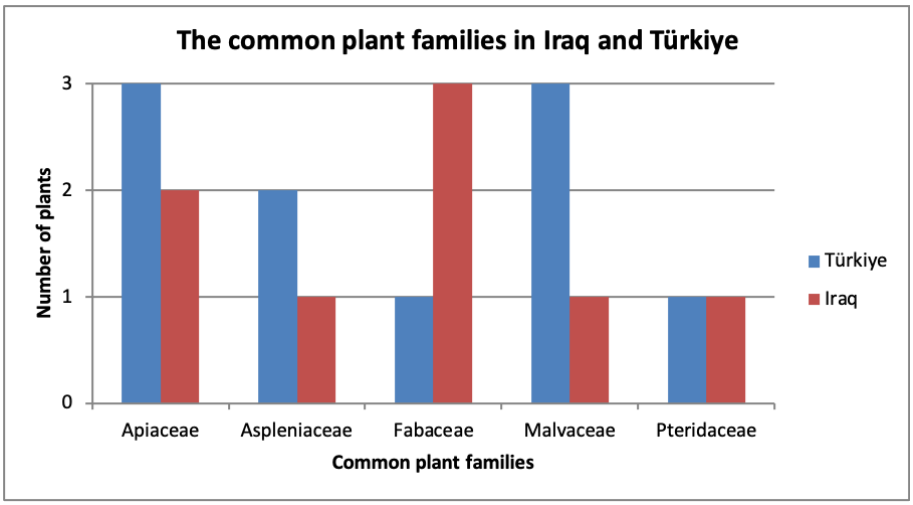
It has been reported that the leaves of *Adiantum capillus-veneris* contain quercetin, isoquercetin, querciturone, quercetin-3-O-glucoside, populnin, naringin, astragalin, nicotiflorin, kaempferol-3-sulfate, prodelphinidin, and procyanidin as flavonoids and based on an *in-vivo* study, it has been suggested that *A. capillus-veneris* has anti urolithiasis activity especially during the crystallization stage of kidney stone formation, which supports the ethnomedicinal use of the plant, thanks to flavonoid contents of the plants (Ahmed *et al*., 2013; Al-Snafi, 2015).

The pedicels of *Prunus avium* are rich in catechin and quercetin and they are concerned as major bioactive compounds for the plant which are thought to be responsible for the diuretic effect (Lim, 2012; Ademović *et al*., 2017; Hussain *et al*., 2021).

The Prevalent Plant Families

Based on the data that have been given in the tables above, the common ethnomedicinal plants in Iraq and Türkiye are shown in Chart 1.

Chart 1. The common plant families in Iraq and Türkiye.



• Apiaceae: *Pimpinella anisum, Carum carvi, Daucus carota* and *Anethum graveolens* (Shojaii and Abdollahi Fard, 2012).
• Aspleniaceae: *Ceterach officinarum* and *Asplenium trichomanes* (Tomou and Skaltsa, 2018).
• Compositae: *Achillea arabica, Cichorium intybus, Cnicus benedictus, Cynara scolymus, Gundelia tournefortii, Scolymus hispanicus, Helichrysum arenarium* and *Helichrusym plicatum* (İlker *et al*., 2009; Polat and Satıl, 2012; Akaydın *et al*., 2013; Sargın *et al*., 2013; Özdemir and Alpınar, 2015; Tuzlacı, 2016).
• Fabaceae: *Trigonella foenum-graecumand and Glycyrrhiza glabra* (Kaur *et al*., 2013).
• Lamiaceae: *Rosmarinus officinalis, Teucryum chamaedrys* and *Thymbra spicata* (Altundağ and Öztürk, 2011; Sargın, 2015; Korkmaz *et al*., 2016)
• Malvaceae: *Malva neglecta, Malvella sherardiana* and *Alcea rosea* (Akaydın *et al*., 2013; Saremi *et al*., 2015).
• Pteridaceae: *Adiantum capillus-veneris* (Ahmed *et al*., 2013).
• Rosaceae: *Prunus avium, Crataegus orientalis* and *Rubus sanctus* (Akaydın *et al*., 2013; Sargın *et al*., 2013; Güner and Selvi, 2016).

Based on the data that have been given in the tables above, the drog parts of the plants and the preparation methods have been shown in Chart 2 and Chart 3.

Chart 2. The used organs of plants.

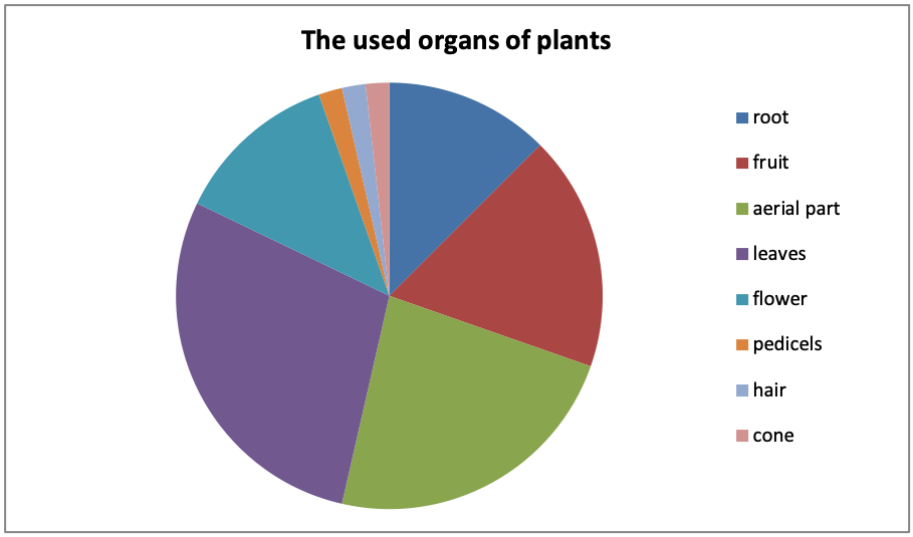
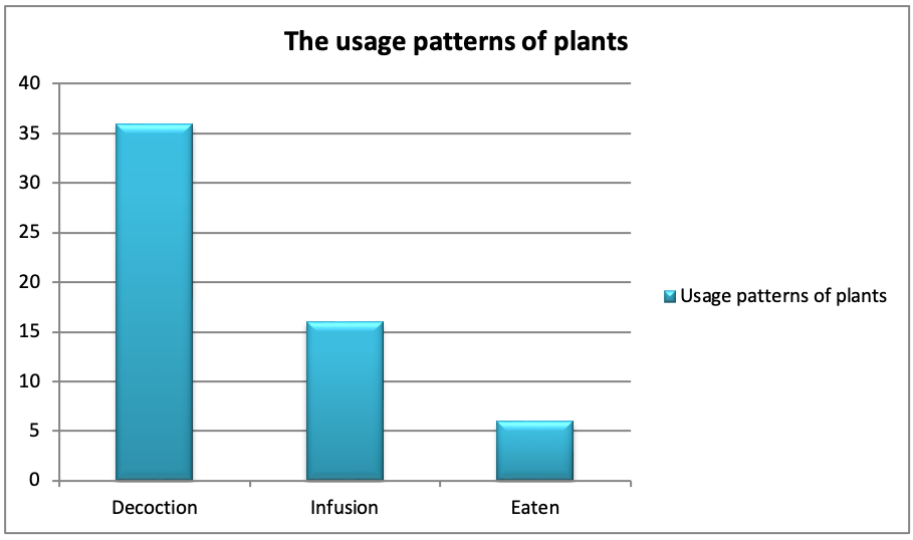


Chart 3. The usage patterns of plants.



The study includes 9 plants (*Pimpinella anisum, Raphanus raphanistrum* subsp. *sativus, Citrullus colocynthis, Cyperus rotundus, Trigonella foenum-graecum, Alhagi maurorum, Citrus aurantiifolia, Citrus limon* and *Salix alba*) from Iraq only in which almost all prepared with the decoction method and 30 plants from Türkiye only in which 14 of them (*Carum carvi, Daucus carota, Cichorium intybus, Cynara scolymus, Cyperus longus, Juniperus oxycedrus, Malvella sherardiana, Panicum miliaceum, Persea gratissima, Prunus avium, Rubus sanctus, Urtica urens, Scolymus hispanicus* and *Gundelia tournefortii*) are prepared by decoction method; 8 of them (*Ceterach officinarum, Achillea arabica, Helichrysum arenarium, Helichrysum plicatum, Lepidium sativum, Rosmarinus officinalis, Thymbra spicata* and *Zea mays*) are prepared by infusion method; 5 of them (*Hypericum perforatum, Teucrium chamaedrys, Malva neglecta, Crataegus orientalis* and *Portulaca oleracea*) are prepared by both infusion and decoction methods, while 5 plants are common in both country as *Anethum graveolens* is eaten in both; *Asplenium trichomanes*, *Glycyrrhiza glabra* and *Alcea rosea* are prepared by decoction method and *Adiantum capillus-veneris* is prepared by infusion method in Türkiye whereas it is prepared by decoction method in Iraq. The chemical composition and pharmacological activities of each plant is searched separately and the most noticeable point was that the renal activity of these plants was mostly due to their flavonoid content. On the other hand, 4 plants (*Citrus aurantiifolia Cichorium intybus, Gundelia tournefortii*, and *Asplenium trichomanes*) have been founded to be used for renal disorders ethnomedicinally but there is no *in-vivo* or *in-vitro* study showing the nephroprotective activity.

CONCLUSION

Since *Anethum graveolens, Asplenium trichomanes, Glycyrrhiza glabra, Alcea rosea* and *Adiantum capillus-veneris* are the ethnomedicinal plants that are used for kidney disorders in both Iraq and Türkiye, they are considered as most effective herbs of this study. For *A. trichomanes*, further experimental studies are required to demonstrate the renal activity whereas the renal effects of the other plants have been proven. Apart from that, none of the plants are founded to be used as commercial products and the find outs of the study could be a light to start further investigations to produce new medicinal products which contain herbs as active ingredient.

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ADDITIONAL INFORMATION

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