



ETHNOPHARMACOLOGY OF PLANTS IN CHOMAN, THE KURDISTAN REGION OF IRAQ

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ABSTRACT

Plants with therapeutic value are still the only way forward for health care as their acceptance has grown all over the world. The information of the utilization of traditional medicinal plants in Kurdistan region is still at hand of the traditional herbalist. The study aimed at to identify different medicinal plants used by traditional herbalist in Choman locale of Erbil in Northern Iraq. Non-random probability sampling and expert method with the aid of a in-depth interview guide were used. Only plant species with a minimum of 0.5 relative frequency of citation were reported. Forty-one plants exhibiting medicinal properties have been documented. The family Asteraceae has highest abundance in the area. *Allium sativum* had highest used value (0.5). Leaves (32.7%) and fruits (23.6%) are the most utilized parts of medicinal plants in the study area. The most prepared form of preparation is decoction (45.5%) and direct form (30.9%). Oral is the most common application form (61.8%). People of Choman in Kurdistan region of Iraq have long been using medicinal plants for the treatment of various ailments like cold, cough, fever, diabetes. It is, therefore, necessary to conduct ethnobotanical studies in all the communities of Kurdistan region in Iraq.

Keywords: Choman, Erbil, ethnobotanical, Iraq, medicinal plants, traditional herbs

INTRODUCTION

Human-plant interactions are considered as one of the forces shaping human civilization, especially in health career (Abdulrahman, 2021). Plants with therapeutic value have since long been used around the world to prevent and treat a variety of human diseases (Eshete *et al.*, 2016; Tounekti *et al.*, 2019). The therapeutic significance of medicinal and aromatic plants is documented through ethnobotanical investigations which paved way for development of modern medicines (Abe and Ohtani, 2013). Ethnobotany is the study of local people's interactions with their natural environment, in particular with respect to the identification, management, use and conservation of plants (Sheng-Ji, 2001). Indigenous peoples are excellent information source of localized knowledge about the medicinal plant-use, their management and conservation as well as cultural utilization to maintain good health through proper diagnosis, treatment and prevention of several mental disorders (Mahwasane *et al.*, 2013).

Traditional medicinal practitioners or herbalists have made significant contribution in human health management and advent of modern medicine from plant sources (Mahwasane *et al.*, 2013). Traditional knowledge is extremely important in many people's daily life around the world. Medicinal plants have grown in importance around the world, having an impact on both global health and international trade (Alves and Rosa, 2007). According to the World Health

Organization, more than 80% of world's population now use traditional medications, mostly plant extracts, as their primary source of health care (Khandaker *et al.*, 2021). Approximately 70-90% population in under-developed countries rely on traditional medical practitioners for their health improvement (Stangeland *et al.*, 2008). Diseases are nowadays more frequently treated with synthetic medicines but their specific side-effects have led to the rise in the use of traditional medicinal plants or herbal medications (Jamshidi *et al.*, 2018). Thus, the importance of traditional medicinal plants or herbal products is increasingly recognized, and public trust in their use is growing (Ekor, 2014). However, the traditional medicinal knowledge has encountered rapid loss of plant biodiversity and the culture of traditional knowledge of plants (Bhat *et al.*, 2013). Traditional medicinal knowledge is on rapid decline all over the world. Presently, the young and new generation have meagre knowledge about the medicinal significance of plants around their community (Mahmoud *et al.*, 2020). Hence, it is imperative to document traditional medicinal knowledge of each community before such inherited knowledge perish and plant biodiversity is lost due to fast urbanization (Mahmoud *et al.*, 2020).

People of Iraq are known to be knowledgeable in the culture of using medicinal plants to cure ailments (Al-douri, 2000). But unfortunately, such information is passed verbally from one generation to another (Ahmed, 2016). Meagre inherited medicinal knowledge of medicinal plants in Kurdistan region of Iraq has been documented (Ahmed, 2016). Choman is a village well-known in Kurdistan for rich cultural heritage. No studies on the documentation of medicinal knowledge of Choman people in Kurdistan, Northern region of Iraq, has so far been done. The present study aims at to document the medicinal plants used in Choma (Kurdistan) according to their culture.

MATERIALS AND METHODS

Study area

Fieldwork was carried out in Choman, Erbil Governorate, Kurdish Independent Locale, Iraq, from February to May 2021. Choman is an ancient Kurdish city in North-eastern Iraq. For the most part, it is considered an agrarian zone and gives a green view throughout the seasons. Erbil is 160 km to the northeast of the city. Choman is located 45 km to the east of Soran (Fig. 1). The Hallgurd-Sakran mountain chain district is an important agricultural and cattle breeding region. Because of a variety of tourist facilities (such as summer resorts, parks, rivers, green pastures and waterfalls) available in the Choman, the area attracts a large number of tourists.

Interview sessions, herbarium deposition and taxonomic identification

The methods of non-random probability and expert sampling were employed in this study (Awang *et al.*, 2018; Mahmoud *et al.*, 2020). Collected plants specimen were identified by a taxonomist (Dr. A.M. Dogara) in Department of Biology, Tishk International University, Erbil (Iraq) and subsequently deposited in the department.



Fig. 1: The site map of Choman, Iraq

Data analysis

The study employed a simple descriptive analysis of the collected ethnobotanical data to determine the frequencies and percentage based on the following information:

- i. Socio-demographic information of informants (Awang *et al.*, 2018; Mahmoud *et al.*, 2020).
- ii. Plant taxonomic information, mode of administration, mode of preparation, growth form and parts of plant (Awang *et al.*, 2018; Mahmoud *et al.*, 2020).
- iii. Quantitative data were computed based on the following indices:
 - a. The relative importance of medicinal plants was assessed using the following formula of Used Value Index (UV). In order to determine the relative importance of a plant the following equation was used.

$$UV = \sum U_i / N.$$

Where, U_i = is the total number of uses mentioned by each respondent and N is the total number of informants interviewed (Abdulrahman *et al.*, 2018; Mahmoud *et al.*, 2020).

- b. The relative frequency of citation (RFC) was used to assess the popularity of medicinal plant species. The above characteristic was utilized to determine the plant's relative popularity within a community.

$$RFC = F_c / N$$

where F_c is the number of informants who mentioned a certain plant species and N denotes the total number of informants interviewed (Abdulrahman *et al.*, 2018).

RESULTS AND DISCUSSION

Demographic information and Diversity of documented plants in Choman

The foundation for treating human ailments is the natural compound(s) derived from plants (Ji *et al.*, 2009). Many ancient cultures around the world have a long history of using some selective plants as medicine to treat diseases or improve health status (Gurib-Fakim, 2006; Abdulrahman *et al.*, 2018). Traditional medicinal plants are currently in high demand all over the world due to the increased acceptance of tradition health care systems (Alves *et al.*, 2007; Abe and Ohtani, 2013; Abdulrahman *et al.*, 2018). Plants undoubtedly play a crucial role in ecosystem restoration and conservation by providing necessary services (Sheng-Ji, 2001). Early men recognized and utilized the surrounding plants for clothing, fuel, shelter, food and medication (Abdulrahman *et al.*, 2018; Eshete *et al.*, 2016). The demographic information of the selected individuals revealed that 55.6% of interviewed persons were females (Table 1). The majority of interviewed persons (55.6%) were

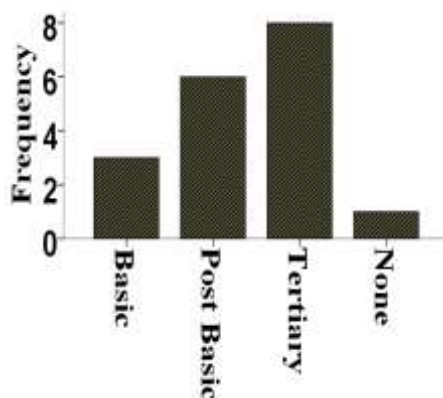


Fig. 2: Educational demographic information of informants

in the age group of 40 to 50 years. Moreover, 44.4% of interviewed informants possessed tertiary education (Fig. 2). The study revealed that the people of Choman are good custodians of their traditional knowledge with respect to medicinal plants and always tend to improve their health status. Both males and females interviewed in the present study had good knowledge of their culture which corroborates with the ethnobotanical findings of Al-douri (2000), Ahmed (2016) and Abdulrahman *et al.* (2018) conducted in Kurdistan region of Iraq.

The taxonomic information about the documented medicinal plants used by the people of Choman is presented in Table 2. It revealed that the family Asteraceae had highest abundance and distribution in Choman (Fig. 3). The results are in line with earlier report

Table 1: Demographic information of the persons interviewed

Parameters	Frequency	Percentage
<u>Gender</u>		
Male	8	44.4
Female	10	55.6
<u>Age</u>		
40-50	10	55.6
51-60	8	44.4
61-70; >70	0	0
<u>Education</u>		
Basic education	3	16.7
Post basic education	6	33.3
Tertiary	8	44.4
None	1	5.6

from Erbil (Kawarty *et al.*, 2020). The study revealed that most elderly people in Choman community could formulate traditional medicinal recipes for treatments of common cold, cough, fever, hair loss, immune system booster, etc. The observed diversity of different plant families of medicinal significance, documented in present study, is perhaps due to the favourable agroclimatic conditions of Kurdistan region for plant growth (Ahmed, 2016). Previously, it is reported the nature of environment determines the kind of plant acclimatized in a particular area (Awang *et al.*, 2018).

In order to determine the preference ranking, effectiveness and conservational status of medicinal plants, the quantitative

Table 2: Inventory of medicinal plants in Choman

S. No.	Species Name	Family	Common name (English)	Common name (Kurdi)	P. P	M.P	M.A	Diseases treated
1	<i>Allium sativum</i> L.	Amaryllidaceae	Garlic	سیر	Fruits	Dec, Inf	Oral	Immune booster, Coughing, Cold
2	<i>Achillea millefolium</i> L.	Asteraceae	Yarrow	بیزان	Leaf	Dec	Oral	Fever, Dysentery, Menstruation
3	<i>Apium graveolens</i> L.	Apiaceae	Celery	که ره وه ز	Leaves, Bark	Dir	Oral	Hypertension
4	<i>Artemisia absinthium</i> L.	Asteraceae	Wormwood	گیابند	Leaves	Dec, Inf, Dir	Oral	Immune booster, Appetite enhancer
5	<i>Bellis perennis</i> L.	Asteraceae	Lawn daisy	باباتی	Flower	Dec	Oral	Toothache
6	<i>Beta vulgaris</i> L.	Amaranthaceae	Chard		Seed, Leaves	Dec	Oral, Der	Wound healing, Constipation
7	<i>Brassica oleracea</i> L.	Brassicaceae	Wild cabbage	له هانه	Leaves, Fruits	Dec, Inf	Oral	Fever
8	<i>Cucumis melo</i> L.	Cucurbitaceae	Melon	کاله ک	Fruits	Dec	Der	Heart diseases
9	<i>Cinnamomum verum</i> J. Presl	Lauraceae	True cinnamon tree	دارچین	Bark, Oil	Dir	Oral	Immune booster
10	<i>Camellia sinensis</i> (L.) Kuntze	Theaceae	Tea shrub	چا	Leaves	Dec	Oral	Digestion, Constipation
11	<i>Capsicum annuum</i> L.	Solanaceae	Pepper	ببیه ر	Fruit	Dir	Oral	Cold, immune booster
12	<i>Curcuma longa</i> L.	Zingiberaceae	Turmeric	زه رده جیره	Leaves, Fruits	Dir	Der	Pain Killer
13	<i>Citrus sinensis</i> (L.) Osbeck	Rutaceae	Lemon	لیمو	Leaves, Fruit	Dec, Dir	Oral	Cold, Cough
14	<i>Cucurbita pepo</i> L.	Cucurbitaceae	Pumpkin	کوله که	Oil	Dir	Oral, Der	Boost immunity
15	<i>Cicer arietinum</i> L.	Fabaceae	Chickpea	نوک	Fruits	Dir	Oral	Immune booster
16	<i>Dianthus barbatus</i> L.	Caryophyllaceae	Sweet william		Flower	Dec	Der	Headache, Hair loss
17	<i>Dianthus caryophyllus</i> L.	Caryophyllaceae	Carnation	میخهک	Fruits, Oil	Dec	Oral	Mouth ulcer
18	<i>Narcissus poeticus</i> L.	Amaryllidaceae	Pinkster lily	نیرگز	Leaves	Dec, Inf, Dir	Oral, Der	Skin infection
19	<i>Juniperus communis</i> L.	Cupressaceae	Juniper	عرعر	Bark, Root	Dec, Inf	Oral	Digestion, Urinary infection
20	<i>Lactuca sativa</i> L.	Asteraceae	Lettuce	خاس	Leaves	Dir	Der	Hair loss, Skin infection
21	<i>Mentha spicata</i> L.	Lamiaceae	Mint	نعناع	Leaves	Dec, Inf	Oral	Digestion, Asthma, Cold, Cough
22	<i>Morus alba</i> L.	Moraceae	Mulberry	تور	Leaves, Fruits	Inf	Oral, Der	Skin infection
23	<i>Nasturtium officinale</i> Br.	Brassicaceae	Yellowcress	بهریممی	Leave, Fruit	Dec	Oral	Immune booster
24	<i>Olea europaea</i> L.	Oleaceae	Olive oil	زه بتون	Oil	Dir	Oral, Der	Control blood pressure

25	<i>Origanum majorana</i> L.	Lamiaceae	Origanum majorana	جائره	Bark	Dec	Oral	Increases libido
26	<i>Prunus avium</i> (L.) L.	Rosaceae	Sweet cherry	كلاس	Fruit	Dir	Der	Pain killer
27	<i>Pimpinella saxifrage</i> L.	Apiaceae	burnet-saxifrage	گيا برسد شكين	Root	Dec, Inf	Oral	Respiratory infection, Urinary infection
28	<i>Pistacia lentiscus</i> L.	Anacardiaceae	Lentisk	مه سه كي	Oil	Dir	Der	Headache
29	<i>Punica granatum</i> L.	Lythraceae	Lythraceae	هه نار	Fruit	Dir	Oral	Reduce inflammation in the body
30	<i>Petroselinum crispum</i> (Mill.) Fuss	Apiaceae	garden parsley	مه عده نوس	Leaves, Bark	Dir	Oral	Pain killer
31	<i>Rosa abietina</i> Gren. ex H. christ	Rosaceae	Rose		Flower	Dec	Oral	Fever, Diarrhea, Cough
32	<i>Rheum palmatum</i> L.	Polygonaceae	Chinese rhubarb	ريواس	Leaf, Root	Dec, Inf	Oral	Constipation, Digestion
33	<i>Raphanus raphanistrum</i> L.	Brassicaceae	Radish	تور	Root	Inf	Oral	Digestion, Immune booster
34	<i>Solanum lycopersicum</i> L.	Solanaceae	Tomato	تمماته	Whole plants	Dec	Oral	Wight loss
35	<i>Syzygium aromaticum</i> (L.) Merr. and LM. Perry	Myrtaceae	Clove	سير	Seed	Dec, Dir	Oral	Teeth inflammation
36	<i>Spinacia oleracea</i> L.	Amaranthaceae	Spinach	سبيناخ	Leaves	Dec, Inf	Der	Wound healing
37	<i>Solanum melongena</i> L.	Solanaceae	Eggplant	باينجان	Leaves, Oil	Dec	Oral, Der	Digestion
38	<i>Triticum aestivum</i> L.	Poaceae	Bread wheat	كه نم	Seed	Dir	Oral	Management of Diabetes
39	<i>Thymus vulgaris</i> L.	Lamiaceae	German thyme	كيا نانه	Flower	Dec	Oral	Pain killer
40	<i>Vigna radiata</i> (L.) R. Wilczek	Fabaceae	Green gram	ماشه ره شه	Seed	Dec	Oral, Der	Body temperature control
41	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Ginger	زمنجفيل	Leaves, Bark, Fruits	Dec	Oral	Skin infection

Note: S/N; Serial No, P.P; Parts of the plant, M.P; Method of preparation, M.A; Method of Administrations, Dec; Decoction, Inf; Infusion, Dir; Direct, Der; Dermal

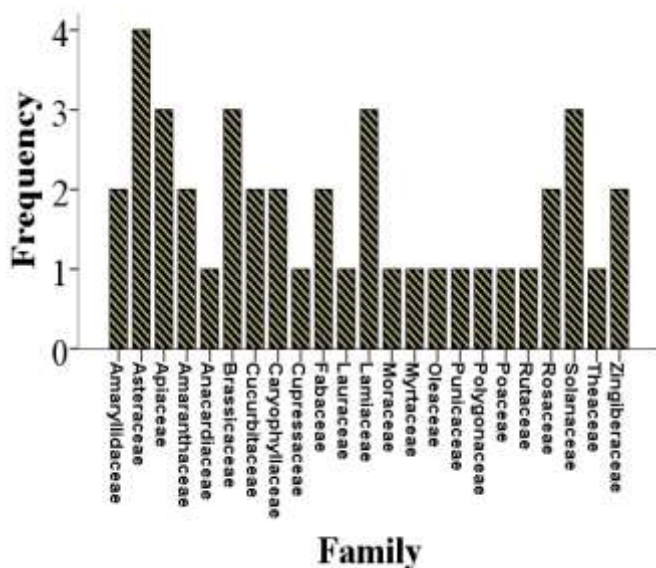


Fig. 3: Plants family distribution of medicinal plants in Choman, Kurdistan region of Iraq

Part of the plant and methods of preparation and administration

A variety of chemical compounds reportedly accumulate in plant parts (Abdulrahman, 2021). Most portions of medicinal plants have active biochemicals compounds that have direct or indirect

ethnobotany is frequently utilized (Abdulrahman *et al.*, 2018). Quantitatively, several studies found many medicinal plants very effective in traditional medicinal system of Choman. Only the plant with a minimum of 0.5 relative frequency citation were reported. Determination of plant parts is significant to assess the medicinal importance of those parts (Antal *et al.*, 2021; Mattalia *et al.*, 2021). The UV (used value) of *Allium sativum* was highest (0.5), followed by *Bellis perennis*, *Cinnamomum verum*, *Nasturtium officinale* and *Rheum palmatum* with UV of 0.4 (Table 3). Similarly, the relative frequency citations were performed to determine the most popular species of medicinal plants used by the people of Choman.

Table 3: Quantitative analysis of medicinal plants in Choman, Kurdistan (Iraq)

S. No.	Species name	UV	RFC
1	<i>Allium sativum</i> L.	0.5	0.6
2	<i>Achillea millefolium</i> L.	0.2	0.9
3	<i>Apium graveolens</i> L.	0.1	0.8
4	<i>Artemisia absinthium</i> L.	0.2	0.9
5	<i>Bellis perennis</i> L.	0.4	0.6
6	<i>Beta vulgaris</i> L.	0.1	0.9
7	<i>Brassica oleracea</i> L.	0.1	0.8
8	<i>Cucumis melo</i> L.	0.1	0.9
9	<i>Cinnamomum verum</i> J. Presl	0.4	0.9
10	<i>Camellia sinensis</i> (L.) Kuntze	0.1	0.6
11	<i>Capsicum annuum</i> L.	0.5	0.9
12	<i>Curcuma longa</i> L.	0.3	0.8
13	<i>Citrus sinensis</i> (L.) Osbeck	0.3	0.9
14	<i>Cucurbita pepo</i> L.	0.3	0.6
15	<i>Cicer arietinum</i> L.	0.3	0.9
16	<i>Dianthus barbatus</i> L.	0.3	0.8
17	<i>Dianthus caryophyllus</i> L.	0.2	0.9
18	<i>Narcissus poeticus</i> L.	0.3	0.9
19	<i>Juniperus communis</i> L.	0.2	0.6
20	<i>Lactuca sativa</i> L.	0.3	0.5
21	<i>Mentha spicata</i> L.	0.2	0.5
22	<i>Morus alba</i> L.	0.2	0.9
23	<i>Nasturtium officinale</i> R.Br.	0.4	0.6
24	<i>Olea europaea</i> L.	0.3	0.5
25	<i>Origanum majorana</i> L.		0.8
26	<i>Prunus avium</i> (L.) L.	0.3	0.5
27	<i>Pimpinella saxifrage</i> L.	0.2	0.5
28	<i>Pistacia lentiscus</i> L.	0.3	0.8
29	<i>Punica granatum</i> L.	0.2	0.5
30	<i>Petroselinum crispum</i> (Mill.) Fuss	0.3	0.5
31	<i>Rosa abietina</i> Gren. ex H. Christ	0.2	0.5
32	<i>Rheum palmatum</i> L.	0.4	0.5
33	<i>Raphanus raphanistrum</i> L.	0.3	0.6
34	<i>Solanum lycopersicum</i> L.	0.2	0.8
35	<i>Syzygium aromaticum</i> (L.) Merr. & L.M. Perry	0.3	0.5
36	<i>Spinacia oleracea</i> L.	0.2	0.8
37	<i>Solanum melongena</i> L.	0.2	0.5
38	<i>Triticum aestivum</i> L.	0.3	0.6
39	<i>Thymus vulgaris</i> L.	0.2	0.5
40	<i>Vigna radiata</i> (L.) R. Wilczek	0.3	0.8
41	<i>Zingiber officinale</i> Roscoe	0.2	0.6

Note: UV = Used Value,
RFC = Relative frequency of citation

therapeutic value (Shakya, 2016; Jamshidi-Kia *et al.*, 2018;). Different plant parts were found utilized in traditional medicinal practice. Leaves were the most utilized part of the plant in treating various ailments as well as for health improvement in Choman (32.7%), followed by fruits (23.6%) and bark (10.9%); while whole plant was the least reported (1.8%) (Fig. 4). The preference of leaf utilization was reported in present study. Similarly, previous ethnobotanical studies documented the medicinal importance of the leaves as the most utilized plant part. Leaves are prepared parts due to their ability to produce enormous metabolites. In terms of conservation, collection of leaves or plant parts do not pose a challenge to the plant. Traditional herbalists reported preference of the leaves was due to the easy handling as compared to the bark or root parts.

Three major methods of traditional medicinal plant utilization were documented. The present study revealed that decoction is the most pronounced method of preparation of medicinal plants in the community (45.5%) while only 30.9% reported direct plant use (Fig 5). Decoction is the most utilized form in the preparation of medicines. It is believed decoction method extract 95% of the bioactive components of plant part leading to the increase in plant bioactivity (Street and Prinsloo, 2013; Tan *et al.*, 2015). The oral method of administration had the highest form of application at 61.8% (Fig. 6). Oral is the most utilized form of application in traditional medicinal plants (Baharvand *et al.*, 2016; Randrianarivelojosia *et al.*, 2003). This is due to the direct synergistic effect on the body system. The study looks at the statistical number of diseases mostly cured in the area with the traditional medicinal. A total number of 28 diseases were reported to be cured with the aid of plant extract (Fig. 7). Immune booster is the one with the highest frequency of citations at 13.6 %.

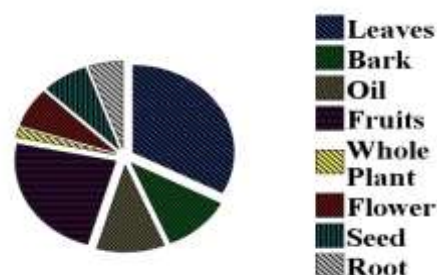


Fig. 4: Parts of the plant used for medicinal plants in Choman, Iraq

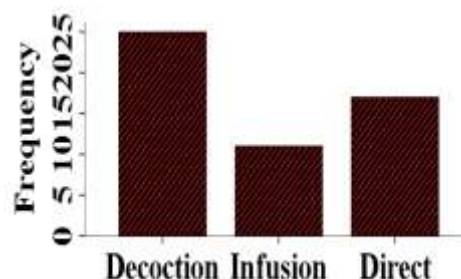


Fig. 5: Methods of preparation of medicinal plant in Choman, Iraq



Fig. 6: Methods of administration of medicinal plant in Choman

Human populations have recovered from many ailments with the aid of plant parts (Abidullah *et al.*, 2021; Zaman *et al.*, 2020). Today, pharmaceutical companies worldwide utilize more than 60,000 plant species for extraction and derivation of modern medicines (Ullah *et al.*, 2019). This study assessed the indigenous traditional medicinal knowledge in Choman, Kurdistan region of Iraq. The people of Choman realized the effectiveness of traditional medicinal plants based on their observations for a long period. Documented plants in present study will serve

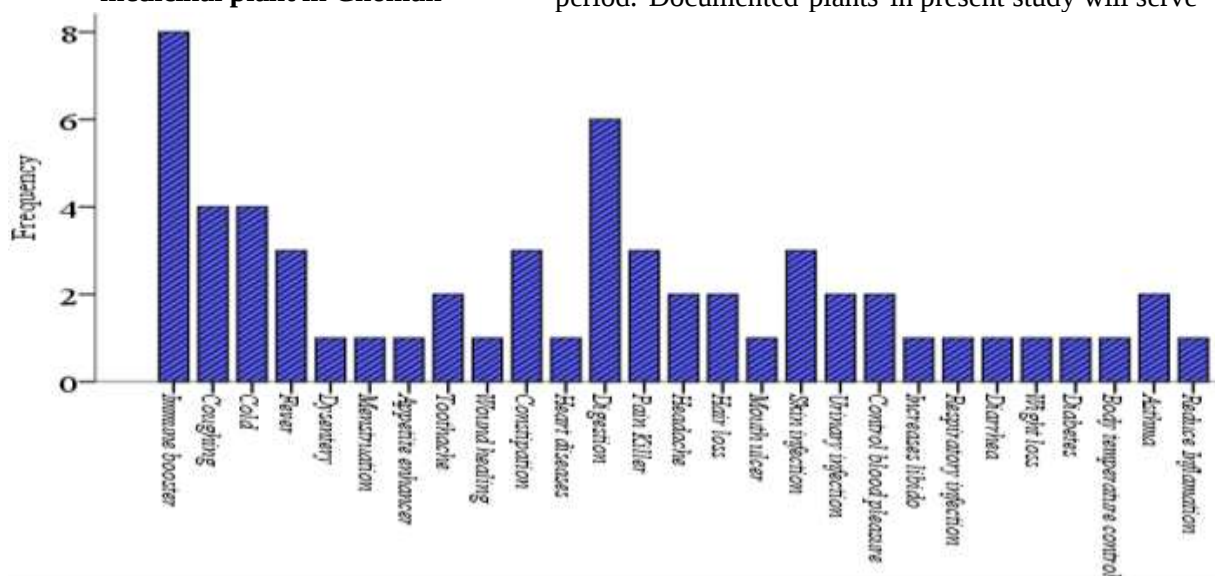


Fig. 7: Diseases reported to be curing with medicinal plant in Choman

as a source for the identification of bioactive compounds for the development of herbal formulation and new modern medicines for pharmaceutical use. Traditional medicinal knowledge in Erbil is not properly documented as the information is passed from one generation to another verbally. The study showed that the preservation of know-how is rapidly declining in the present generation due to their interest in modernization and deforestation system all over the world. These factors contributed significantly to the loss of traditional medicinal knowledge.

Conclusions: The people of Choman Kurdistan region of Iraq have long been using medicinal plants for the treatment of various ailments like cold, cough, fever, diabetes, etc. However,

urbanization deforestation and lack of commitment in younger generation are the major threats posed to the traditional medicinal plants in the area. To preserve the traditional medicinal knowledge and popularize the use of medicinal plants in the Kurdistan region of Iraq, it is essential to conduct ethnobotanical studies in all the communities of Kurdistan at frequent time intervals.

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