Medicinal Plants as A Natural Immune Booster

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Abstract: There is a global concern about pandemic infections, which can inflict enormous morbidity and mortality, regardless of great medical resources in the current day. Currently, there is no standard treatment for most viral infections in the world. To improve the immune system, it is vital to recommend the use of plant parts. Medicinal plants are the finest way to boost our immune system naturally. The study aimed to document medicinal plants traditionally used by the Kurdish people in the Kurdistan Region of Iraq. Expert sampling method was utilised in the study. The study interviewed 20 respondents with dominance of men 90 and women 10 %, respectively. Among the interview respondents, only 35% did not attend western education. Fourty one medicinal plants were documented from 22 families with Compositae (6) having the highest abundance, followed by Fabaceae and Lamiaceae 5 species, respectively. Leaf is the most utilised part, followed by root and whole plant at 36.1, 18.0, and 13.1 %, respectively. All plants are reported to be boiled or macerated with water and drunk until fully recovered. Highest fidelity value was recorded as 85% for *P. atlantica*, *T. campylodes*, *A. propinquus*, *G. kola*, *R. communis*, *R. officinalis* and *C. sinensis* respectively, the least are those with 55% fidelity value. The study found that Kurdish people are consistently utilising medicinal plants for their wellbeing. High fidelity values are found in the documented medicinal plants. This study provides useful information for various fields, especially in exploring the plant parts as a source of lead for future development in the production of herbal medicines and in the pharmaceutical industry.

1. Introduction

For centuries, plants have been utilized as a source of traditional medicine to treat a variety of diseases and disorders (Dogara et al., 2022). Almost 80 percent of the population relies on traditional plants for their primary health care needs. Since the dawn of civilization, people have relied on medicinal plants to alleviate diseases and enhance their immune systems (Abdulrahman et al., 2021). Immunity is a state in the human body that aids in the maintenance of a healthy body, the development of strength to fight infectious diseases caused by bacteria, viruses, parasites, and toxins, and aids in the removal of foreign bodies and malignant cells from our system (Dogara, 2022). The immune system is the body's primary line of defense, activating in reaction to invaders like viruses. The innate immune response is a network of cells that actively seek out and destroy foreign invaders by engulfing them and then releasing chemicals to kill them (Khabour et al., 2021). Numerous therapeutic plants are also rich in phytochemicals, many of which have significant antioxidant (Lema et al., 2022). Several components and secondary metabolites found in plants can be used in the development of pharmaceuticals, drugs, and herbal medicine (Mahmoud et al., 2020). Many lessons may be learned from pandemics like COVID19, such as the importance of personal cleanliness and health (Patil & Kakde, 2020).

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When the world is battling the dead coronavirus, it is imperative that you take additional steps to avoid infection (Patil & Kakde, 2020). As a result, having a robust immune system is essential. The most effective strategy is to boost our immunity naturally, using medicinal plants and herbs. In the search for antibacterial, antiviral, and antiparasitic medicine, ethnobotanical expertise could help us identify an alternate method. The current study seeks to investigate medicinal plants used by the Kurdish people in the Kurdistan region, Iraq, for boosting of their immune system.

2. Study Area

The research was carried out in Erbil, the capital city of Iraq's Kurdistan province. Kurdistan is divided into four regions: south-eastern Turkey (Northern Kurdistan), northern Iraq (Southern Kurdistan), north-western Iran (Eastern Kurdistan), and northern Syria (Kurdistan) (Western Kurdistan) (Kayfi & Abdulrahman, 2021). The overall Kurdish population is projected to be between 36 and 45 million people, with 8 to 8.5 million coming from northern Iraq (Southern Kurdistan). However, around 6 million Kurds now live in Iraq's Kurdistan region (Figure 1).

3. Sampling and Interview Sessions

In Erbil, Kurdistan, an expert sampling approach was applied. An open-ended interview format was used. Before it was utilized in the study, the questionnaire was validated by experts, and a pilot study was conducted. This study's findings came from direct interviews with traditional herbalists (attar) between November 2021 to March 2022.

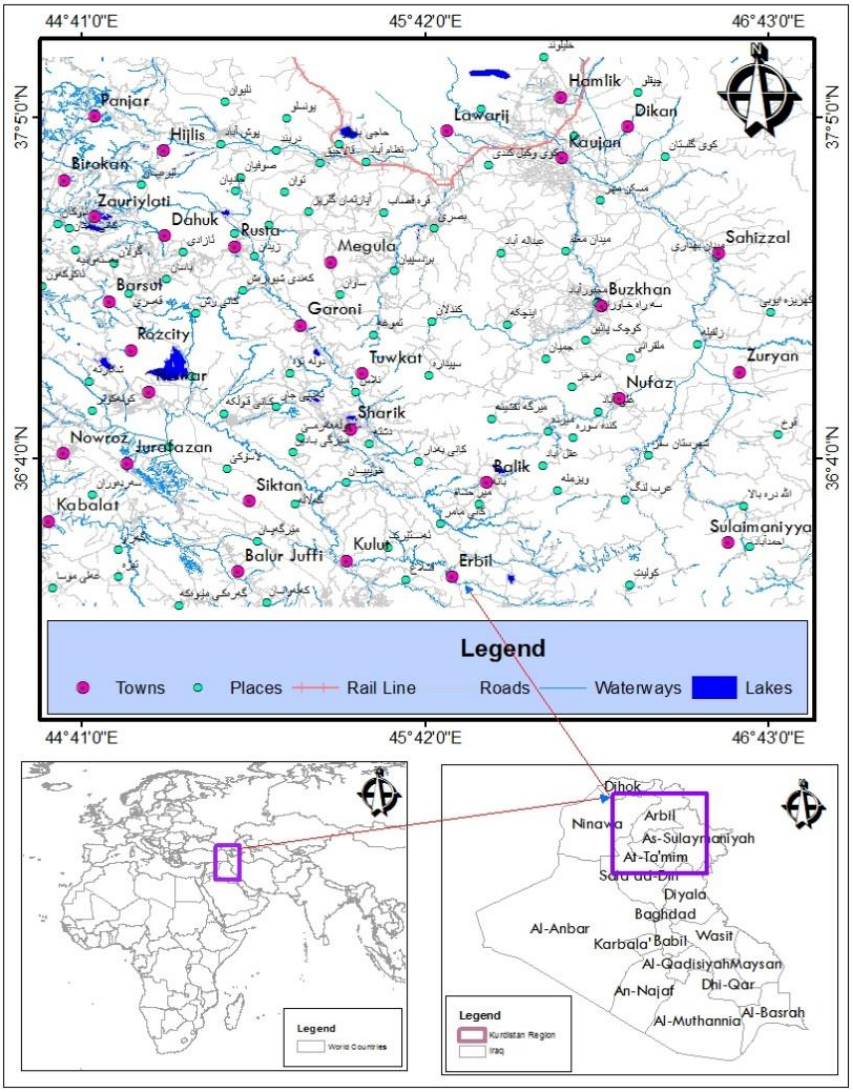

Figure 1: Map of Kurdistan Region of Iraq (Source: GIS Lab Department of Geography ABU, Zaria Using Arc GIS 10.3 Software)

4. Taxonomic Identification

The available plants were collected and identified by the certified taxonomist in the Department of Biology, Faculty of Education, Tishk International University.

5. 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:

1. Socio-demographic information of informants (Mahmoud *et al.*, 2020).
2. Plant taxonomic information, mode of administration, mode of preparation, growth form, and parts of plants used (Awang *et al.*, 2018).
3. The following quantitative ethnobotany indices were determined:
4. Quantitative data

5. Used Value: UV is equal to Ui / N. Where Ui is the total number of users reported by each respondent, and N represents the total number of informants interviewed (Abdulrahman, Ali, Fatihah, Khandaker, & Mat, 2018).
6. Relative Frequency of Citation (RFC): = Fc/N, where Fc is the number of people who mentioned a particular plant species and N is the overall number of respondents interviewed.
7. Fidelity level: FL = Ns / N × 100. Ns = total number of respondents who indicated they employed a specific plant species to treat a specific condition, and N = total number of informants who mentioned the plant species during the interview (Mahmoud et al., 2020).

6. Results and Discussion

6.1 Demographic Profile of the Respondents

Humanity is developing interest in plants due to their ability to treat a variety of ailments for decades (Mahmoud, et al., 2020). Archaeological evidence demonstrates that man has been using plants for medicinal purposes from prehistoric times (Kumar & Navaratnam, 2013). Traditional medicinal plants and their applications in immune responses were established by personal interview with traditional herbalists in Erbil, Iraq's Kurdistan area. Indigenous peoples are an important source of localized information regarding medicinal plant use, their management, and conservation, as well as cultural utilization to preserve good health through correct diagnosis, treatment, and prevention of a variety of mental diseases (Abdulrahman et al., 2018). Traditional medical practitioners or herbalists have made substantial contributions to the management of human health and the development of modern medication derived from plants (Alves & Rosa, 2007). The importance of traditional knowledge in the daily lives of many people around the world cannot be overstated. The relevance of medicinal plants has increased globally, influencing both global health and worldwide trade (Cordell & Colvard, 2005). Despite the fact that industrialized countries have produced synthetic pharmaceuticals, 70 to 80 percent of the world's population continues to rely on traditional medicinal herbs (Abdulrahman et al., 2018). Traditional healers in the study region have been discovered to play an essential role in the local people's primary healthcare system, particularly in the treatment of infectious infections. The demographic data of the interviewed respondents revealed that 90% were men and 10% were women (Figure 2). The following study's male dominance was consistent with the bulk of ethnobotanical research conducted in Iraq and other parts of the world. The phenomenon's dominance is attributable to the study community's culture and religion. However, the findings contradict previous research conducted in Choman, Iraq's Kurdistan area, which found female domination (Kayfi & Abdulrahman, 2021). Out of the 20 respondents interviewed, a significant number of them are found between the ages of 51-70 (70 %), followed by 30-50 (20 %) (Table 1). The distribution of their respective ages expresses how knowledgeable Kurdish people are in terms of utilisation of medicinal plants for their wellbeing. In terms of western education, only 35 % of the respondent did not attend the western education (Table 1). This shows despite their knowledge in terms of modernization regarding synthetic drugs, people in the region are widely patronizing traditional herbal medicines for their wellbeing. All interviewed respondents were found to be highly experienced and knowledgeable in the utilisation of medicinal plants for the wellbeing of human. All respondents reported to have a minimum of 10 years' experience as attar (traditional herbalist). Respondents were asked if traditional herbal medicine should be cooperated in the hospital in the region and all of them excellently agree with the idea.

Table 1: Demographic Profile of the Respondents

Parameters	Frequency	Percentage %
Gender		
Men	18	90
Women	2	10
Age		
30-50	4	20
51-70	14	70
71>	2	10
Education		
Basic	5	25
Post Basic	4	20
Tertiary	4	20
None	7	35

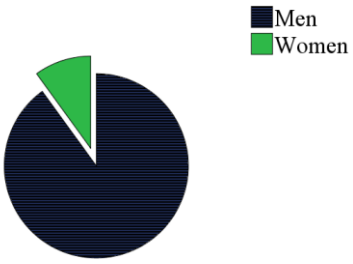

Figure 2: Gender Distribution of Respondents

Documented Medicinal Plants used for Body Immune Booster

The study found 41 medicinal plants from 22 families are popularly used in the region for the immune booster, especially during the pandemic of Covid-19. Compositae families (6) are found with the highest abundance, followed by Fabaceae and Lamiaceae 5 species, respectively (Table 2 and Figure 3). This family's widespread distribution is related to its members' resistance to drought and other environmental variables. The study is not in agreement with (Kawarty et al., 2020; Kayfi & Abdulrahman, 2021) where they reported abundance of Asteraceae. The disparity in the above study the distribution of different families reveals how diverse and rich the region is. The respondents revealed that some medicinal plants were imported from neighbouring countries. Other numerous diseases were reported to be treated by the documented plants (Table 2). The following study confirmed the diversity and riches of the of people in the utilisation of medicinal plants for the treatment of various ailments. Despite their knowledge in western education, they still utilised plant materials for their wellbeing.

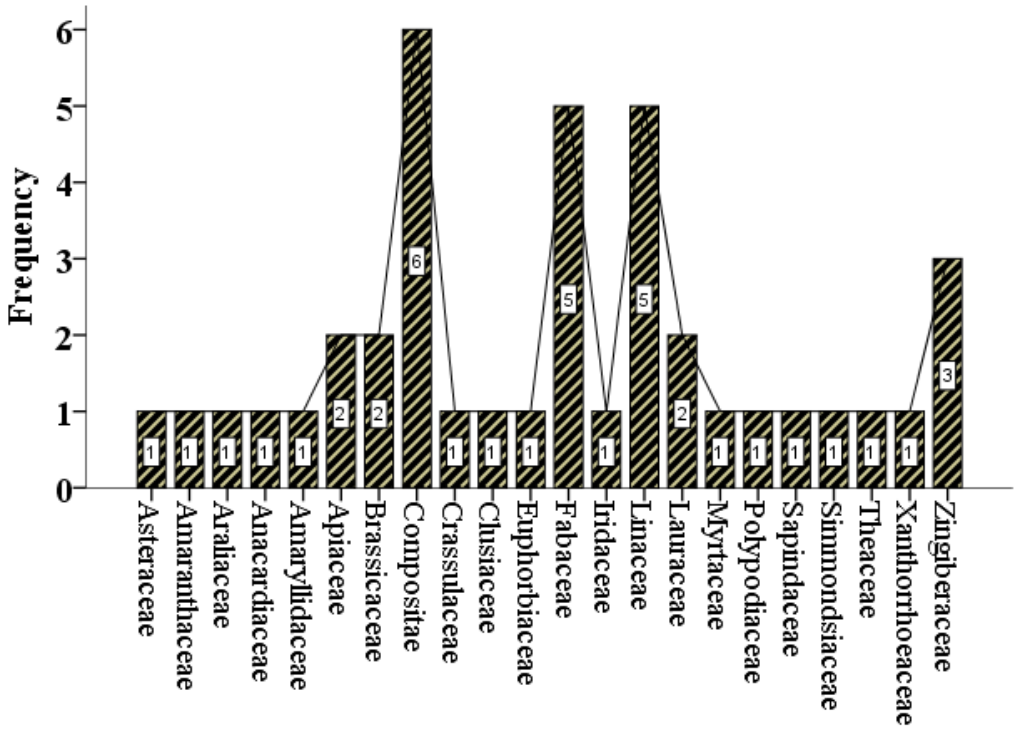

Figure 3: Family Distribution of Documented Medicinal Plants used for Body Immune

Table 2: Documented Medicinal Plants Used as Body Immune Booster by Kurdish People in Kurdistan

S/N	Family	Scientific name	Kurdish	Part of the plant	Method of Preparations	Other Diseases Treated
1	Asteraceae	*Echinacea purpurea* (L.) Moench	گولی پەمایی /قوچکی	Flower	Boiling	Antifungal, antibacterial
2	Amaranthaceae	*Beta vulgaris* L.	سلق/ چەوەندەر	Leaves	Cooking/ Cutting the beetroot then add pomegranate	Dandruff, constipation, rashes, antidiabetics
3	Araliaceae	*Panax ginseng* C.A.Mey.	جینسینگ	Root	Drink as tea/ Can eat freshly or powder	Hypertension , diabetes

4	Anacardiaceae	*Pistacia atlantica* Desf.	قەزوان	Leaves	Maceration and drink the extract	Cough, constipation, wound healing
5	Amaryllidaceae	*Allium cepa* L.	پیاز	Bulb	Freshly eating	Skin disease, mouth ulcer, appetizer, fever
6	Apiaceae	*Cuminum cyminum* L.	کەمون	Seed	Boiling	Skin infection, diabetes, constipation
7	Apiaceae	*Apium graveolens* L.	کەرەوز	Leaves	Eating freshly	Stomach pain, constipation, rheumatism
8	Brassicaceae	*Isatis tinctoria* L.	وسمه	Leaves/Roots	Drink with milk	Anti-allergic, skin infection, general well being
9	Brassicaceae	*Brassica oleracea* L.	بروکلی	Leaves/stem/fruits	Boiling or eating freshly	Appetizer
10	Compositae	*Silybum marianum* (L.) Gaertn.	شەکرۆلە	Flower	Boiling	Hepatitis, kidney, Liver, anti-allergy
11	Compositae	*Artemisia annua* L.	قەزوان	Leaves/bark/root or whole parts of plant	Boiling and mixed With honey	Fever, diabetes, inflammation
12	Compositae	*Taraxacum campylodes* G.E.Haglund	گولی هیوا	Whole plants/ Roots	Boiled and drink as tea	Skin infection, allergy

13	Compositae	*Artemisia dracunculus* L.	تەرخون	Leaves / whole plant	Boiling to drink or mixing with oil when make like powder	Appetizer, dandruff, skin diseases
14	Compositae	*Gundelia tournefortii* L.	قیوار	Root/flower/whole plant	Boiling to drink or extracted oil	Stroke, diabetes, constipation, kidney diseases
15	Compositae	*Artemisia vulgaris* L.	قەزوان	Leaves	Boiling to drink or eat Powdered form in the food	Stomach pain, menstrual abnormality
16	Crassulaceae	*Sedum roseum* (L.) Scop.	تۆی زەرد	Roots	Capsule or tablet	Skin infection, headache, anxiety, measles
17	Clusiaceae	*Garcinia kola* Heckel	سیر	Bulb/whole plants	Cooked or chewed, maceration drink water and apply also in the body	Respiratory illness, skin infection, diabetes, fever
18	Euphorbiaceae	*Ricinus communis* L.	خروح	Leaves/fruits	Boil to drink or combine with mint oil	Diabetes, hypertension, cancer, menstrual pain, inflammation
19	Fabaceae	*Acacia senegal* (L.) Willd.	کەتیرە عربی	Stem	Dry them then adding water and boiling	Skin infection, measles, children diseases
20	Fabaceae	*Ceratonia siliqua* L.	حسحسوک	Fruits	Boiling and drink	Stomach infection, skin diseases
21	Fabaceae	*Glycyrrhiza uralensis* Fisch.	مێکول	Roots/whole plants	Boiling to drink and apply in the skin	Cough, stomach disease, skin infection

22	Fabaceae	*Glycyrrhiza glabra* L.	میچووک	Stem /whole plant	Maceration and drink	Children diseases, menstrual pain, inflammation
23	Fabaceae	*Astragalus propinquus* Schischkin	دەمەشێر	Leaves/root	Boiling to drink and apply in the skin	Skin diseases, inflammation
24	Iridaceae	*Crocus sativus* L.	بیبەری سوور	Leaves/ stem	Boiling and drink	Stomach pain, constipation
25	Linaceae	*Linum usitatissimum* L.	تۆی کەتان	Seed	Boiling and drink	Diarrhea, cough, stomach pain
26	Lamiaceae	*Mentha pulegium* L.	نەعنا	Leaves	Boiling and drink	Respiratory, stomach pain
27	Lamiaceae	*Clinopodium abyssinicum* (Benth.) Kuntze	پوونگ	Leaves	Boiling and drink	Skin infection, measles, children diseases
28	Lamiaceae	*Thymus pulegioides* L.	زعتر	Leaves/stem	Cooked as soup	Anti-aging
29	Lamiaceae	*Hyssopus officinalis* L.	نوسەکە	Leaf/flower/stem	Soups and salad	Skin diseases
32	Lamiaceae	*Rosmarinus officinalis* L.	گولبەندی شاخ	Leaves	Boiling and drink	Skin infection, antidepression
30	Lauraceae	*Cinnamomum verum* J.Presl	دارجین	Stem	Boiling and drink	Cough, constipation, respiratory diseases
31	Lauraceae	*Persea americana* Mill.	ئافۆکادۆ	Fruit/leaves	Make like a juice and drink	Diabetes, antimalaria,

33	Myrtaceae	*Psidium guajava* L.	بەهێ	Leave/whole plant	Boiling and drink	Skin infection, diabetes, antimalaria
34	Polypodiaceae	*Pyrrosia lingua* (Thunb.) Farw	زمانی سەرخەس	Leaves	Boiling and drink	Anti-inflammation, menstrual pain
35	Sapindaceae	*Acer buergerianum* Miq.	کەروو	Leaves/stem	Dry then make like powder	Skin diseases, constipation, anti-inflammation, menstrual pain
36	Simmondsiaceae	*Simmondsia chinensis* (Link) C.K. Schneid.	جوجوبا	Leaves	Boiling and drink	Cough, stomach disease, skin infection
37	Theaceae	*Camellia sinensis* (L.) Kuntze	ڕوەکی چا	Leaves	Boiling and drink	Drinking
38	Xanthorrhoeaceae	*Aloe vera* (L.) Burm.f.	ئالۆڤیرە	Leaves	Applying on the topical	Skin disease, anti-aging
39	Zingiberaceae	*Zingiber officinale* Roscoe	زەنجەفیل	Root	Boiling and drink	Cough, constipation, respiratory diseases
40	Zingiberaceae	*Curcuma longa* L.	زەردەچووی درێژ	Root	Drinking and applying on the dermal	Skin infection

41	Zingiberaceae	*Kaempferia parviflora* Wall. ex Baker	جەنجەفیلی رەش	Roots	Boiling and drink	Stomach pain, anti-inflammation, diabetes

6.2 Parts of the plant, Method of Preparation, Methods of Administration and Dosage

Utilization of plant aerial parts is highly beneficial. However, the metabolic composition of these plants is poorly understood by healers. Traditional healers utilized various plant parts despite a lack of genuine information regarding the chemical composition of plant parts. The findings revealed that leaves (36.1%) were the most commonly utilized plant part, followed by roots (18%) and stem (11.5%) (Figure 4). According to a review of the relevant literature, the leaves were the most utilized plant portion in traditional medical systems around the globe (Abdulrahman et al., 2018; Mahmoud et al., 2020; Mahmoud et al., 2020). In addition to being more readily available or accessible in nature, leaves are also considerably more abundant than other plant parts, which may help explain why they are the most utilized plant. Moreover, secondary metabolites are predominantly produced in the leaves before they are transferred to other regions of the plant, causing the leaves to be more effective (Abdulrahman et al., 2018). Despite the fact that the frequent use of plant leaves poses a severe danger to biodiversity conservation and may contribute to global warming by reducing oxygen production and carbon dioxide uptake. The most common method of preparation was decoction and mixing the medicinal plant with water, honey, or another ingredient (Table 2). Oral administration was the most prevalent route of administration (Table 2).

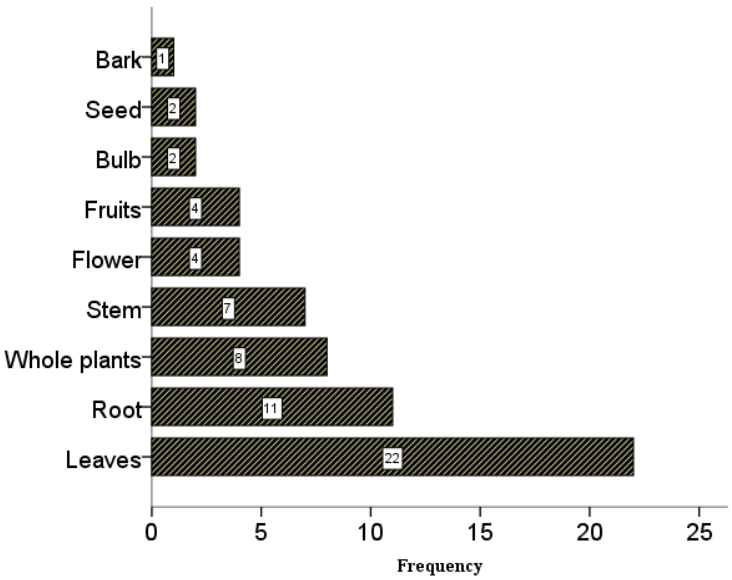

Figure 4: Different parts of the plants used for immune boosting by Kurdish people

6.3 Quantitative Ethnobotany

Quantitative indices were used in the following studies to determine the effectiveness of the documented plants in the boosting of immune. All documented plants were found to be very effective and utilised by the respondents in administering to their patience for wellbeing especially during the

Covid-19 pandemic. Highest fidelity value was recorded as 85% for P. atlantica, T. campylodes, A. propinquus, G. kola, R. communis, R. officinalis and C. sinensis respectively, the least are those with 55% fidelity value (Table 3). As reported previously, plants with high fidelity value are good indicators of containing compounds with high medicinal value (Abdulrahman et al., 2018; Dogara et sal., 2021; Kayfi & Abdulrahman, 2021; Mahmoud & Abba, 2021). The following plants can be fully utilised for the production of herbal medicine and in the pharmaceutical industry.

Table 3: Quantitative Values of Plants Used for Immune Booster in Kurdistan

S/N	Species	RFC	FL %
1	*Echinacea purpurea* (L.) Moench	0.15	75
2	*Beta vulgaris* L.	0.1	65
3	*Panax ginseng* C.A.Mey.	0.2	70
4	*Pistacia atlantica* Desf.	0.25	85
5	*Allium cepa* L.	0.25	70
6	*Cuminum cyminum* L.	0.2	65
7	*Apium graveolens* L.	0.1	70
8	*Isatis tinctoria* L.	0.2	55
9	*Brassica oleracea* L.	0.25	70
10	*Silybum marianum* (L.) Gaertn.	0.1	75
11	*Artemisia annua* L.	0.25	70
12	*Taraxacum campylodes* G.E.Haglund	0.2	85
13	*Artemisia dracunculus* L.	0.25	65
14	*Gundelia tournefortii* L.	0.1	70
15	*Artemisia vulgaris* L.	0.15	75
16	*Sedum roseum* (L.) Scop.	0.1	70
17	*Garcinia kola* Heckel	0.2	85
18	*Ricinus communis* L.	0.25	85
19	*Acacia senegal* (L.) Willd.	0.25	70
20	*Ceratonia siliqua* L.	0.15	65
21	*Glycyrrhiza uralensis* Fisch.	0.2	70
22	*Glycyrrhiza glabra* L.	0.15	70
23	*Astragalus propinquus* Schischkin	0.15	85
24	*Crocus sativus* L.	0.15	65
25	*Linum usitatissimum* L.	0.1	55
26	*Mentha pulegium* L.	0.3	70
27	*Clinopodium abyssinicum* (Benth.) Kuntze	0.25	70
28	*Thymus pulegioides* L.	0.15	55
29	*Hyssopus officinalis* L.	0.2	70
30	*Cinnamomum verum* J.Presl	0.1	70
31	*Persea americana* Mill.	0.2	55
32	*Rosmarinus officinalis* L.	0.25	85
33	*Psidium guajava* L.	0.2	75
34	*Pyrrosia lingua* (Thunb.) Farw	0.15	70
35	*Acer buergerianum* Miq.	0.3	65

36	*Simmondsia chinensis* (Link) C.K. Schneid.	0.2	55
37	*Camellia sinensis* (L.) Kuntze	0.25	85
38	*Aloe vera* (L.) Burm.f.	0.15	55
39	*Zingiber officinale* Roscoe	0.2	70
40	*Curcuma longa* L.	0.1	55
41	*Kaempferia parviflora* Wall. ex Baker	0.15	75

6.4 Dosage and Toxicity

In this study, the respondents stated that there is no recommended dosage for patients, even though some traditional herbalists have reported the age and severity of the disease, the discrepancy or variation might be due to the learned traditional knowledge from the elders or the community's experience. Despite the fact that it has been deemed safe for consumption, this poses a severe problem because it has not been scientifically demonstrated to be safe for consumption. There is no evidence of toxicity for any of the following plants documented in the following study, according to the respondents.

7. Conclusion

The current analysis discovered medicinal plants with high RFC and FL values, suggesting that Kurdish people in the Kurdistan region of Iraq have utilized these species for a long time to improve their immune system and treat a variety of maladies. It would be fascinating to assess the extracts and pure compounds of the recorded plants in vitro, in vivo, and clinical trials, so that they can be turned into effective, safe, and cost-effective herbal and pharmaceutical medications.

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