Medicinal Plants Traditionally Used in the Management of COVID-19 in Kurdistan Region of Iraq

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Abstract—Coronaviruses are infectious respiratory tract illnesses, but they can also affect the digestive tract and infect both humans and animals. The new coronavirus results in complicated health problems all over the world. The most urgent concern of all researchers around the world has been the treatment of the virus. The following study aimed to use quantitative ethnobotany to help scientists in addressing the deadly virus. Expert sampling method was adopted with the aid of an in-depth interview guide. Thirty-nine respondents were interviewed. Eighty-one medicinal plant species from 35 families were documented. Males 25 (64.1%) constitute the greater percentage of the total respondents. Majority of the respondents had formal education. Eighty-one medicinal plant species from 35 families were documented. Leaves are the most utilized 25.8 followed by seed 17.7 and fruits 12.1%, respectively. Relative frequency of citation ranged from 0.5 to 0.9, whereas the FL value ranged from 0.4 to 0.85, revealing how effective the documented plant species are in the management of COVID-19 in the region. A greater amount of research into documented medicinal plants is warranted because of the high likelihood that they contain many active ingredients.

Index Terms—Coronaviruses, Expert sampling method, Iraqi Kurdistan, Medicinal plant, Relative frequency of citation.

I. Introduction

Man has long been using plants to treat ailments. Since the dawn of time, man has been enthralled by the knowledge and application of traditional medicinal plants, which has been passed down from generation to generation (Dogara, et al., 2022). Plants have long been known for their therapeutic properties, and people all over the world have traditionally employed them to cure a variety of diseases. Plant-based medicines are now commonly considered as the safest and most effective way to combat infectious diseases (Merouane, et al., 2022). Plant chemical compositions have a wide range of medical applications (Abdulrahman, et al., 2022). The most urgent concern of all researchers around the world has been the treatment of the virus. The dearth of effective vaccines against this devastating viral illness has prompted experts to look for natural remedies that could aid in the fight against the viral pandemic (Lim, et al., 2021). China has been using herbal traditional medicines since the start of the COVID-19 outbreak (Khadka, et al., 2021). Traditional medicines, on the other hand, were shown to help 90% of the 214 patients they were given. Healthy people were protected from SARS-CoV-2 infection, whereas patients with mild or severe symptoms saw improvements in their health after using specific traditional herbal remedies (Benarba and Pandiella, 2020). The pandemic has prompted researchers from a wide range of disciplines to investigate the virus’s origin, structure, causes, diagnostic techniques, and therapeutic alternatives. The following study aimed to use quantitative ethnobotany to help scientist unaddressing the deadly virus.

II. Materials and Methods

A. Sampling and Interview sessions

In this study, non-random probability approach and expert sampling methods were used. Traditional medical practitioners and elderly folks with traditional plant knowledge are interviewed. An in-depth questionnaire served as a guide for the interview.

B. Data Collection Procedure

Direct interviews with local people were done in the Kurdistan Region of Iraq from January 2021 to June 2022.
to gather data for this study. The responders’ verbal consent was sorted. The significance of the study was communicated to them. Each respondent was visited two to three times to ensure that the data were accurate. If there was a discrepancy between the information provided previously and the information received during subsequent trips to a particular plant, it was deemed unreliable and dismissed. Data were gathered using communicable dialects within the area, as per the traditional inquiry approach.

C. Plant Collection and Herbarium Specimen Deposition

Species of plants were collected or purchased from the herbalist during the interview. Plants with different names were avoided. A licensed botanist (Dogara, et al., 2022) from Tishk International University, Faculty of Education, Department of Biology, identified the collected plant specimens. Letters plants species were confirmed in the Salahaddin University herbarium. Plant names were verified according to http://www.worldfloraonline.org/.

D. Data Analysis

Based on the below information, the study used a simple descriptive analysis of the ethnobotanical data to calculate the frequencies and percentages:
1. Demographic information of the participants
2. Documentation of the reported plants, parts of plants used, preparation methods, prescription, administration methods, and toxicity of reported plants
3. Symptoms of COVID-19
4. Quantitative analysis was computed based on the following:
   a) Relative frequency of citation (RFC): \( = \frac{Fc}{N} \), where \( Fc \) is the number of people who mentioned a particular plant species and \( N \) is the overall number of respondents interviewed (Mahmoud and Abba, 2021).
   b) Fidelity level (FL): \( = \frac{Ns}{N} \times 100 \). Where \( Ns \) = 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 and Abba, 2021).

III. Results and Discussion

A. Demographic Profile of the Participants

The COVID-19 pandemic has engulfed the entire globe; people are dying by hundreds every day without access to effective treatment, and it is impossible to bring this global health crisis to an end without it (Adhikari, et al., 2021). There have been several different experiments, but none of them have given promising results (Khadka, et al., 2021). COVID-19 has been the subject of numerous hoaxes on social media, including the use of medicinal plant products to prevent or treat the disease. To prevent erroneous knowledge from spreading, ethnobotanists should connect with local people and record the therapeutic plants used. Participants are the most important part of any ethnobotanical study. Their age, gender, education level, occupation, religion, etc., provide insight into the survey and facilitate placing the data provided in its proper social context for analysis and interpretation (Abdulrahman, et al., 2022). Traditional practitioners in the research area were discovered, as they play an important part in the primary healthcare systems of the local people. Table 1 shows the demographic profile of the respondents, males 25 (64.1%) constitute the greater percentage of the total respondents, whereas females were represented by 14 (35.9%) respondents. The gender difference might be explained by the fact that male knowledge holders in communities are more comfortable to talk than female knowledge holders who faced cultural restrictions. Females were forbidden from conversing or discussing with stranger males. Due to these factors, fewer women participated in the documentation. Similar finding was also reported (Chinsembu, Hijarunguru and Mbangu, 2015; Kankara, et al., 2022). The survey also revealed that most of the respondents are members of the higher age group; the age range of 50 and above is shown in Fig. 1. This is an indication that there is a wide gap of ethnomedicinal knowledge between the elderly and the younger generation. This, however, poses a serious threat to the indigenous knowledge because it may eventually be lost following the demise of the older generation (Abdulrahman, et al., 2018; Kankara, et al., 2015). Cultural changes brought about by modernization have

| Parameters | Frequency | Percentage (%) |
|------------|-----------|----------------|
| Gender     |           |                |
| Male       | 25        | 64.1           |
| Female     | 14        | 35.9           |
| Education  |           |                |
| None       | 15        | 38.5           |
| Basic      | 8         | 20.5           |
| Secondary  | 9         | 23.1           |
| Tertiary   | 7         | 17.9           |
| Experience |           |                |
| 5–10       | 9         | 23.1           |
| 11–20      | 19        | 48.7           |
| 61–80      | 11        | 28.2           |

Fig. 1. Experience of the respondents.
contributed to the younger generation’s rejection of traditional values. Majority of the respondents had formal education (Table 1). Formal education has been cited as a major element in the decline of traditional knowledge. The study revealed that 64.1% of the respondents are traditional medical practitioners and 35.9% are indigenous people with traditional knowledge of using medicinal plants (Fig. 2). This revealed how reliable the information documented in the following studies are.

B. Documented Medicinal Plants

Natural products have been depended on for thousands of years due to their strong efficacy and safety records (Adhikari, et al., 2021). People and plants interact deeply based on their requirements. People used medicinal herbs to fight pandemics in the past (Arora, et al., 2010; Mukhtar, et al., 2008), and their use as a means of combating COVID-19 in the current world may have increased. Medicinal plants have been used by the Kurdish people since ancient times, and they play an important role in traditional medical practices (Kayfi and Abdulrahman, 2021). The current investigation was carried out to catalogue the various plant species that have been utilized for both culinary and medicinal purposes. Eighty-one medicinal plant species from 35 families were identified in this study (Table 2). The results showed that Lamiaceae was the taxonomic family with the most utilized plants (19.75%), followed by Apiaceae (9.9%), Fabaceae (8.6%), Asteraceae (7.4%), Lauraceae, Myrtaceae, Malvaceae, and Rutaceae (3.7% each), Anacardiaceae, Amaryllidaceae, Zingiberaceae, Burseraceae, and Moraceae (2.5% each), and finally, all remaining families (1.2% each; Table 2 and Fig. 3). The results of the study are not in line with the ethnobotanical studies carried out in Choman, Kurdistan, where they reported Asteraceae as the most abundant family in the area (Kayfi and Abdulrahman, 2021). As the informant mentioned during fieldwork, this family’s widespread distribution is related to its members’ resistance to drought and other environmental stresses. The vast bulk of them are imported from nearby nations. Many different illnesses, including diabetes, common cold, fever, cancer, ulcers, and body immune boosters, were treated using the plants that were documented, as reported by the respondents (Table 2).

C. Parts of the Plant Method of Preparation, Administration, and Duration of treatment

Utilizing plant aerial parts are quite beneficial. Despite being well known for their medical properties, these plants’ metabolic make-up is unknown to traditional practitioner (Vasquez, et al., 2013). Traditional healers use various plant parts despite the absence of genuine understanding about the contents of those parts. Among all plant parts, medicinal plants’ leaves are utilized most frequently (25.8%) than any other portion, followed by seed (17.7%), flowers (12.9%), and fruits (12.1%), Fig. 4. Previously, similar parts of the plant were also reported (Abdulrahman, et al., 2018; Mahmoud and Abba, 2021; Mahmoud, Labaran and Yunusa, 2020). Whereas some studies have indicated various portions of the plant, these results are consistent with research done in other parts of the world. The fact that leaves are used may also be due to their greater availability and abundance in nature compared to other plant parts. In addition, they have

Fig. 2. Status of the respondents.

Fig. 3. Family distribution of the documented families.

Fig. 4. Different parts of the plant used in the area for the management of COVID-19.
| S/N | Family    | Scientific name                  | Vernacular name | Part used | Preparation                                                                                                                                                                                                 | Administration                        |
|-----|-----------|----------------------------------|-----------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 1   | Apiaceae  | *Cuminum cyminum* L.             | zîrre kemun      | Seeds     | Add teaspoon of cumin seed or 1/2 teaspoons of cumin powder into a boiled cup of water, add 1 teaspoon of fresh ginger or 1/2 teaspoons of ginger powder, heat the mixture for 5 min, leave it to rest for 5–7 min, then strain and get rid of the seeds | Oral (drink 3 times a day after each meal) |
| 2   | Apiaceae  | *Carum carvi* L.                 | kerrawye (zeiyî kerrawye) | Seeds and oil | 1. Grind and place 1 tablespoon of seed in cattle and add 2 cups of water, boil it for 5 min, and leave it to rest for 15 min (if you let it to rest for 1 h is better or overnight will be optimal) after it is done, strain, and get rid of the seeds. You can add honey or a few leaves of mint or 1/4 teaspoons of mint powder for more benefit and taste.  
2. Mix a few drops (1–2 drops) of caraway oil with a carrier oil (warmed sweet almond, coconut, avocado oils, or any vegetable oil), and apply directly to the neck, throat, and chest. Massage the area gently for better absorption. | Oral (drink it at evening before you go to bed. keep the rest in the refrigerator for the 2nd day). Dermal (Do this at the evening before bedtime). |
| 3   | Apiaceae  | *Ridolfia segetum* (L.) Moris    | toyi šwît (toyi šbît) | Seeds     | Boiled the seed, then strain, and get rid of the seeds                                                                                                                                                    | Oral (2–3 times/day) for 2 weeks       |
| 4   | Apiaceae  | *Ammi visnaga* (L.) Lam.         | xultan (toyi xultan) | Seed      | 1. Boiled water with tablespoon of seeds and cinnamon bark.  
2. Place 1 tablespoon of seeds crushed and tied up in a small cloth bundle that is used for inhalation: for nasal congestion. Use a similar bundle, place it near the pillow while sleeping; for cough, drink hot water after chewing little | Oral (for 3 days 3 times a day)         |
| 5   | Apiaceae  | *Petroselinum crispum* (Mill.) Fuss | mu’dh nus         | Leaves & stems | 1. Add parsley into your food and salads.  
2. Boil a cup of parsley leaves and stem in 1 L of water for 10–15 min, let it to seep and strain, and then drink a cup after each meal.                                                   | Oral                                    |
| 6   | Apiaceae  | *Pimpinella anisum* L.           | yanison          | Seeds     | 1. Place 1 teaspoon of Anise seed in one cup, water, boil for 2 min, let it to rest for 5 min, then strain and drink it.  
2. Chew 1 teaspoon of anise seed for 5 min or grind the seeds and put it in a glass of warm water and drink it. | Oral                                    |
| 7   | Apiaceae  | *Foeniculum vulgare* Mill.       | raztyane (şumerr yan fibe hu lu zeyti) | Seeds     | Taking 1 tablespoon of crushed fennel seeds in a glass cup, then pouring boiling water over it immediately, covering for 10 min, then strain and drink the extract.                                           | Oral                                    |
| 8   | Apiaceae  | *Coriandrum sativum* L.          | gijnîj (kezberre) | Leaves and seeds | 1. Boiling 1/2 small cup of fresh leaves of coriander into 500 mL of boiled water for 30 min or  
2. One tablespoon of powder coriander with boiled water for 10 min, then add 1 lemon and 1/2 teaspoon salt. | Oral (3 times a day after each meal, and the last cup you need to drink it before going to sleep) |
| 9   | Anacardiaceae | *Pistacia eurycarpa* Yalt.         | talle binîşit yan binişîte tall | Trunk     | 1. Chew a small piece (like a chewing gum), this will enhance the secretion of saliva during coronavirus and solve the dry mouth and nose.  
2. Grind and add 1 tsp to 1 cup warm water, drink 1 cup/day.                                                                 | Oral                                    |
| 10  | Anacardiaceae | *Rhus coriaria* L.              | smaq             | Seeds     | 1. Grind or use whole; mix 2 teaspoons of fresh or dry seed into 1 cup of warm water, leave it for 20 min.  
2. Add sumac to your food and salads, it is good anti-inflammatory, fight coronavirus, and raise up the immunity of the body to resist the viruses. | Oral (1 time/day for 7 days)             |
| 11  | Amaryllidaceae | *Allium cepa* L.               | piyaz            | bulb/ leaves | 1. Add onion to your daily food and salad  
2. Boil 1 chopped onion in 1 cup of water for 10 min. Leave it to cool a little and strain, then add a tablespoon of honey to it.  
3. Roast or grill the onion for 5 min when the outer peel is burnt and is cooked | Oral (2/times a day).                     |
| S/N | Family                  | Scientific name                  | Vernacular name | Part used       | Preparation                                                                                                                                                                                                 | Administration                          |
|-----|-------------------------|----------------------------------|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 12  | Amaryllidaceae          | Allium sativum L.                | sîr (yarrawî sîr) | Fruits, Oil     | 1. Place 12 garlic cloves and 1 cup of honey in a jar to make fermented garlic honey. 2. Add garlic into your foods 3. N.B: The above mixture has immune boosting properties and fights the inflammations in the body. | Oral (to an empty stomach) 1 time/day, then eat after 30-45 min. |
| 13  | Apocynaceae             | Hoodia gordonii (Masson) Sweet ex Decne. | xuba            | Seeds and flowers (oil) | 1. Put 1 drop of oil in each nose twice for 40 days. 2. Take 1 teaspoon of oil twice/day.                                                                                                                      | Oral (1 time/day for 7–10 days)        |
| 14  | Arecaceae               | Phoenix dactylifera L.           | xurma           | Fruit           | 1. The patient needs to eat 3 or 5 dates (odd numbers only) every day. Dates are a very good remedy for coughing, phlegm, and bronchitis and inflammation during COVID-19. Note: Do not use this recipe if diabetics. | Oral                                      |
| 15  | Burseraceae             | Commiphora myrrha (Nees) Engl.   | binêşite tall   | Bark            | 1. Put some of the gum and put in warm water then used for gargling 2. Take 1 g of gum                                                                                                                      | Oral (3 times/day)                     |
| 16  | Burseraceae             | Boswellia sacra Flueck.          | dar bun (darî binêşitî kurdî) | Gum resins     | 1. Crush 1 tablespoon of frankincense, 1 teaspoon of fenugreek seed, 1 teaspoon of black seeds, 1/2 teaspoon of mastic and place them in a small pan, add 2 cups of water, put it on a low heat for 5 min, 2. Place 1/2 tablespoon of frankincense in a cup of cold water for 12 h, then stir, filter and drink. | Oral (1/day on empty stomach)          |
| 17  | Brassicaceae            | Brassica nigra (L.) K. Koch      | xirtele (xerdel) | Seeds           | 3. Eat 5–10 seeds with 1–2 cups of water                                                                                                                                    | Oral (1/7 days)                        |
| 18  | Asteraceae              | Bellis perennis L.               | gulle beybun    | Flower          | Boiling and filtrate or boiling with clove and filtration                                                                                                                                | Oral (2)                                |
| 19  | Asteraceae              | Artemisia vulgaris L.            | şîhî            | Seed            | 1. Take 1 teaspoon of grinded dried roots, add it to 1 cup of warm water, then add 1 teaspoon of honey to get rid of the bitter taste. 2. Use thin slices of the roots of these herbs to prepare hot baths. | Oral (1 day, morning and evening before 1 h of sleeping) |
| 20  | Asteraceae              | Saussurea costus (Falc.) Lipsch. | qst hndî (qst hndî) | Root            | 1. Place 1 tablespoon of leaves and roots of fresh or dry dandelion in a boiled cup of water, let it boil for 3–5 min, then leave it for 10 min, then filter it. 2. Soak 7 leaves at night, and drink in the morning once every 4 nights, | Oral (2/day)                            |
| 21  | Asteraceae              | Taraxacum fontanum Hand. -Mazz. | tallîşk tallk  | Roots, leaves, stems | 1. Put 1 teaspoon of chamomile in 1 cup of warm boiled water, leave it for 10–15 min, strain and drink. It twice a day. 2. Mix 1 teaspoon of chamomile with 1/2 teaspoon of ginger in 1 cup warm water (boiled before), let it seep for 5 min, strain and drink twice | Oral (1 morning and evening)           |
| 22  | Asteraceae              | Chamaemelum nobile (L.) All.     | gulle facicle (beybune rumanî) | flower | 1. Place 1 tablespoon of powered flowers in a cup of boiled water or cold water, for 2–3 min.                                                                 | Oral (2/day)                            |
| 23  | Asteraceae              | Matricaria chamomilla tzvelevii Pohed. | gullu filîlu (bubunî ullmanî) | Flower | 1. Add 1 teaspoon of Fenugreek powder to 2 cups of water and boiled for 1–2 min, then filtered and drink in multiple doses, 2. One tablespoon every h for 5 days or till feel better 3. Mix 2 tablespoon of fenugreek powder with 2 tablespoon of olive oil, take 1/2 tablespoon till feel better. | Oral (2)                                |
| 24  | Fabaceae                | Ceris siliquastrum L.            | gulle wenewse   | Flower          | Boil 1 cup of flowers with 2 litter of water                                                                                                                                               | Oral (1/2 cup/day, until better for 5 days) |
| 25  | Fabaceae                | Trigonella foenum-graecum L.     | şmillî yan îbü (şîmbuluk) | Seeds          | 1. Place 1 tablespoon of dried leaves or pods in hot water and boil it for 10 min, let it to seep for 3–5 min, strain and drink it. 2. Soak 7 leaves at night, and drink in the morning once every 4 nights, | Oral (4 times a day)                    |
| 26  | Fabaceae                | Senna alexandrina Mill.          | sinemkî (zît)   | Leaves, fruits, oil | 1. Place 1 tablespoon of dried leaves or pods in hot water and boil it for 10 min, let it to seep for 3–5 min, strain and drink it. 2. Soak 7 leaves at night, and drink in the morning once every 4 nights, | Oral (3/day/day)                        |
| 27  | Fabaceae                | Glycyrrhiza glabra L.            | mêkuk yan rhge buluk | Root          | Place 1 teaspoon of root and put it in a cup of boiling water and leave for ten min, then drain and drink it. N.B: High pressure patients should not use it as it raises blood pressure. | Oral                                     |
| S/N | Family       | Scientific name | Vernacular name           | Part used | Preparation                                                                 | Administration       |
|-----|--------------|-----------------|---------------------------|-----------|------------------------------------------------------------------------------|----------------------|
| 28  | Fabaceae     | *Ceratonia siliqua* L. | doşawî xurinub | Carob pods | Take 1 tablespoon of carob extract twice a day after meals                   | Oral (twice a day)   |
| 29  | Fabaceae     | *Acacia senegal* (L.) Wild. | smxî ’errebî | Bark       | 1. Chew the gum for 10 min five times daily for 7 days  
2. Add 2 teaspoon of Arabic gum with 1 glass of water, and then drink it.  
3. Add Arabic gum powder to food during cooking.  
N.B: Arabic gum relieving cough and sore throat, promote better digestion, anti-inflammatory, and enhance more secretion of saliva during dry mouth problem during COVID-19.  
N.B: Drink plenty of water after drinking it, as T contains a high amount of fiber. | Oral                 |
| 30  | Fagaceae     | *Quercus cerris* L. | burruwî kurdî | Fruit      | Put 5–6 oaks in a pot boiled in 4 cups (1 L) of water, let it seep and strain, then gargle and wash the mouth and throat. | Oral (2/morning and evening) |
| 31  | Lamiaceae    | *Mentha piperita* L. | nu’naiyibîrî | Leaves, flower, oil | 1. Add up to 7–10 drops of oil to 4 cups of boiling water; cover your head with a towel and inhale the steam through your nose.  
2. Add 2 or 3 drops of oil to a cotton ball; breathe deeply for direct inhalation. (Apply this for 10 days till you feel better).  
3. Add 1/2 cups of chopped peppermints and fresh leaves combined with 1 teaspoon of basil or cilantro to be added to your salad and food on a daily basis till cure. | Oral                 |
| 32  | Lamiaceae    | *Glechoma hederacea* L. | lawlaw | Leaves | Take a medium spoonful of crushed leaves and put it in a cup, leave it for 15 min, then drink. | Oral (1–2 cups/day, lunch, after dinner or when going to bed) |
| 33  | Lamiaceae    | *Ocimum tenuiflorum* L. | şarreyḧan | Leaves, flowers | Boil leaves (1 cup) with 1/2 tablespoon of clove in 2 cups of water, when the water gets reduced to half, strain the liquid, and drink immediately. | Oral                 |
| 34  | Lamiaceae    | *Thymus vulgaris* L. | catire û zeytî catire | Stems, leaves, oil | 1. Add thyme to your daily food and salads  
2. Fill a teaspoon of the powdered leaves to fill a cup of boiled water and leave for ten min, then drink a cup after each meal. | Oral                 |
| 35  | Lamiaceae    | *Zataria multiflora* Boiss. | ze’ter (catire şîrazî) | Leaves, flower | Add 1 teaspoon of dried flower and leaves into 1 cup of warm water for 5 min.  
N.B: This mixture is good for calming coronavirus patients | Oral (2/day for 15 days). |
| 36  | Lamiaceae    | *Lavandula latifolia* Medik. | zeytî gulle xeziṁ yan gulle erxewan | Flower, oil | Apply few drops of Lavender essential oil to the ears cotton stick and rub the nose, massaging it gently (the skin inside nose holes) do not put it inside the nose).  
N.B: Lavender oil is relaxing and giving the ability to have a good sleep and reduce stress and anxiety, depression, and insomnia during the coronavirus) | Dermal               |
| 37  | Lamiaceae    | *Thymus serpyllum* L. | (xuzamî yan lavînder) | Leaves, flowers | 1. Add 1 teaspoon of dried thyme leaves into 1 cup of warm water, leave it for 15 min, and drink once a day before or after meal.  
2. Gaggle 1 teaspoon of soaked thyme in warm water for 30 min, keep it for a few min if you can, then spit out.  
3. Place 1 teaspoon dried leaves into the cup of boiled water then leave it to rest for 15 min, strain add honey or lemon for more benefit. | Oral                 |
| 38  | Lamiaceae    | *Salvia officinalis* L. | giya me yrh mî (mwirîh mî yan gullu mwirîh mî) | Leaves, flowers | 1. Place teaspoon of dried sage (2 teaspoons of fresh sage) and 1 cup of water in a small pan to cover, heat or boil it for 2–3 min, then let it cool down and seep for 10 min but with putting a cover, then seep and add 1 teaspoon of honey.  
2. Add 1 tablespoon of dried sage leaves into 1 cup of boiled water, leave it for 5-10 min then seep to get rid of the leaves, and drink it once a day | Oral (1 time/day) |
| S/N | Family       | Scientific name               | Vernacular name | Part used | Preparation                                                                 | Administration                          |
|-----|--------------|-------------------------------|-----------------|----------|----------------------------------------------------------------------------|------------------------------------------|
| 39  | Lamiaceae    | Clinopodium menthifolium (Host) Stace | pung            | Leaves   | 1. Make a tea from fresh or dried leaves.  
2. Grind 1 tablespoon with 1 cup water. | Oral (1/day for 2 days)                  |
| 40  | Lamiaceae    | Mentha spicata L.             | awï ne’na       | Leaves, oil | 1. Wash fresh leaves or use dry leaves to make tea or use in food as much as you want.  
2. Apply a few drops of mint oil to the ears cotton stick and rub the mixture onto the nose, massaging it gently for 5–7 days | Oral (1 cup/day) at early morning before breakfast to 1 h. |
| 41  | Lamiaceae    | Rosmarinus officinalis L.     | rozimari         | Leaves   | 1. Make a tea from fresh or dried leaves.  
2. Grind 1 tablespoon with 1 cup water.  
3. Apply a few drops of oil to the ears cotton stick and rub the mixture onto the nose, massaging it gently for 5–7 days | Oral (1/day) at early morning before breakfast to 1 h. |
| 42  | Lamiaceae    | Ocimum basilicum L.           | reyḩan (şarreyḩan ) | Leaves, flower | Place 2–3 teaspoons of dried or 5 teaspoons of fresh leaves in a cup of boiled water and let it to rest for 5–6 min, strain, and drink. | Oral (3 to 5 times a day) |
| 43  | Lamiaceae    | Origanum majorana L.          | merde guş (merize) | Leaves   | Place equal portion of 1 teaspoon of each of marjoram, melissa, and linden leaves into a cup of boiled water, drink it whereas it is warm. N.B: The above mixture will respiratory problems during coronavirus infection. | Oral (once per day) |
| 44  | Lamiaceae    | Salvia hispanica L.           | toyï şiya (bzuраlşïya) | Seed     | 1. Place 1 teaspoon of seed into 1 glass of water, cover it and leave it for 20–30 min, then drink the jelly mixture to an empty stomach.  
2. Add seed into your salad.  
3. Soak 1 teaspoon of seed in 1 cup of water, after 20 min, squeeze 1/2 lemon lime into it for more benefit and flavor. | Oral (1/day) most favorable time is on early morning on empty stomach before breakfast with 30–45 min |
| 45  | Lamiaceae    | Rosmarinus officinalis L.     | klîl alcbil      | Leaves and oil | 1. Place 1 teaspoon of seed into 1 glass of water, cover it and leave it for 20–30 min, then drink the jelly mixture to an empty stomach.  
2. Add a few drops of oil to a few drops cinnamon oil, then rub and massage the mixture on the chest and throat and neck.  
3. Dilute drops of oil in boiled water about 500 mL/L of water and inhale the steam. | Oral (once per day) |
| 46  | Lamiaceae    | Melissa officinalis L.        | giyalîmo (gîrawe ū zeyt) | Leaves, oil | 1. Place 1/2 of teaspoon of dried lemon balm herb in hot water. Steep and drink up to 4 times daily.  
2. Take 1 capsule (300–500 mg) of dried lemon balm, 2–3 times daily.  
3. Use a few drops of dried lemon balm oil on the skin of chest, neck, and stomach and massage gently (2 times, morning and before sleep) | Oral (once per day) |
| 47  | Lauraceae    | Laurus nobilis L.             | gwalli bwlîyi (urq ałîar) | Leaves | Add 3–5 leaves with 1 teaspoon of ginger and 2 big Cinnamon sticks with 1 cardamom pod in chicken broth, eat every day till cure | Oral (once a day) |
| 48  | Lauraceae    | Cinnamomum verum J. Presl     | darçîn           | Bark     | 1. Add 1 teaspoon of cinnamon back powder to 1 big cup of boiled water, mix them well. Let the water simmer for 2–3 min and add 1 teaspoon of honey and drink it right away.  
2. Mix 1 big teaspoon of cinnamon back powder with 2 teaspoons of honey to make a paste or added to a warm cup of water. | Oral (1–2 on empty stomach) |
| 49  | Lauraceae    | Cinnamomum camphora (L.) J. Presl | kafur leaves and shoots (oil) | 1. Put 3 drops of camphor oil with 2 drops of peppermint oil in a bowl, then put boiling water over it. Inhale the steam rising from the mixture of oils with boiling water.  
2. Put in the palm of your hand 2 drops of camphor oil with 3–4 mL of apricot oil, 3 drops of pine oil, and add two drops of tea tree | Oral (Contd...) |
Table 2 (Continued)

| S/N | Family     | Scientific name | Vernacular name | Part used | Preparation | Administration |
|-----|------------|-----------------|-----------------|-----------|-------------|---------------|
| 50  | Linaceae   | Linum usitatissimum L. | toyi kutan       | Seed      | Mix 1/2 tablespoon of flaxseeds, 2 teaspoons of sesame seeds, and 1 tablespoon of honey with a small amount of salt and combine them properly and consume this mixture daily before bed. | Oral (daily before bed) for 5 days |
| 51  | Lythraceae | Punica granatum L. | hh nar û pullkî hh nar | Peel      | 1. Make pomegranate juice everyday so as your body fights the viruses and resist infection when immunity is raised up.  
2. Boil 1 cup of pomegranate peel in 1 L of water for 15 min, when it cools down, try to drink 1 cup per day or gargling the mouth and throat with it. | Oral |
| 52  | Moraceae   | Ficus sycomorus L. | hencîrî kêwî     | Fruits, leaves | Place 10 fresh or 3–5 dried fig leaves in a small pot containing 1 L of boiled water for 15 min and then remove the leaves and drink the tea. | Oral (1/day) |
| 53  | Moraceae   | Morus alba L. | doşawî tû | Fruits | Eat the fruits early morning because it gives energy. Add a few drops of the oil in boiling water. Then cover the head with a towel and breathe in the steam. | Oral  (once a day for 5–7 days) |
| 54  | Myrtaceae  | Eucalyptus globulus Labill. | (zeytî kalîptos) zeytî kafû | Leaves/oil | Take 1 tablespoon of the leaves and boil with a cup of water for 2 min, then cool filter. | Oral (1/day) |
| 55  | Myrtaceae  | Myrtus communis L. | murtk | Fruits, leaves, and branches | 1. Mix 1/2 teaspoon of clover powder with warm water and gaggle with it  
2. Chew some cloves raw  
3. Mix it with hot water and drink it early morning. | Oral |
| 56  | Myrtaceae  | Syzygium aromaticum (L.) Merr. & L.M. Perry | méxek flower bud | Fruits, leaves | Boiled and take 2 tablespoon 3 times daily and birth with it twice | Oral |
| 57  | Meliaceae  | Azadirachta indica A. Juss. | tusbhî (şcrh alînim yan şbbbhî) gule hîro | Leaves, seeds, flower | Put 3–5 flowers in 2 cups of hot water and covered for 10–15 min, then strain and drink 1/2 cups. | Oral |
| 58  | Malvaceae  | Alcea kurdica Alef. | gule hîro | Flower | 1. Place 1/2 teaspoon flower or powder into 1 cup of warm water, shake well, leave it for 10 min to rest, strain or used without strain.  
2. Place 1 cup of leaves/flower into 2 cups of water, add 1 teaspoon sugar, and 1 teaspoon of rose water, let it boil for 5 min, seep for 10 min, and strain. | Oral (1 cup at morning and a cup at evening) |
| 59  | Malvaceae  | Hibiscus sabdariffa L. | kucerat (gülî kerkedî, çayî tirî yan gülî xene) | Flowers, leaves | 1. Inhale essential oils by sniffing the bottle directly or adding a few drops to a cotton ball.  
2. Massage body of the COVID-19 patient with lavender oil every night until cure.  
N.B: Lavender oil can help the coronavirus patient to sleep better and speed the recovery process from viral and other infections. | Oral |
| 60  | Malvaceae  | Sphaeralcea angustifolia (Cav.) G. Don | xuzamî (lavênder gülî xezêm û zeytî ) | Flower | One teaspoon of powdered seed and put it in a cup of warm water and drink it once until cure every day. | Oral 1/day/day and steaming once a day (at night before sleeping) |
| 61  | Nitrariaceae | Peganum harmala L. | ûrimî ezîyî hirmall | Seeds, bark, and root | One teaspoon of powdered seed and put it in a cup of warm water and drink it once until cure every day. | Oral 1/day/day and steaming once a day (at night before sleeping) |
| 62  | Oleaceae   | Olea europaea L. | gelayî zeytun û zihyî û zeytî | Leaves & seeds (oil) | 1. Put olive oil into your food and salads.  
2. Take 1 tablespoon of olive oil at early morning to an empty stomach.  
3. Use a few drops of olive oil for massaging the chest, neck, back, and stomach.  
N.B: Olive mentioned in Verses of Holy Quran and Muhammad (PBUH) said “Eat olive oil and massage it over your body since it is a holy (Mubarak) tree”. He also stated that olive oil cures 70 diseases. | Oral 1/day/day and steaming once a day (at night before sleeping) |
| 63  | Orchidaceae | Masdevallia molossus Rchb.f. | doşawî tû | Fruits | Eat fruits at early morning on an empty stomach, give the patient power and energy for whole day | Oral (1/day). |

(Contd...)
| S/N | Family          | Scientific name                        | Vernacular name | Part used | Preparation                                                                                                                                                                                                                                                                                                                                 | Administration          |
|-----|----------------|----------------------------------------|----------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 64  | Pteridaceae    | Adiantum capillus-junonis Rupr.        | bîberî rhiş     | Leaves, stalk | Mix 2 cups of fresh leaves or 1 cup of dry leaves with 4 cups of water, boil for 5 min, and leave it to rest for 3 h. Then, strain add 1 cup of honey.                                                                                                                                     | Oral (take 1 tablespoon three times per day) |
| 65  | Piperaceae     | Piper nigrum L.                        | bîberî reş       | Seeds and fruits | 1. Mix 1/2 teaspoon of black pepper and 1/2 of ginger (chopped), boil in 2 cups of water, then let it to rest for 5 min, shake well, and add 2 small teaspoons of honey.  2. Mix 1/2 of black pepper with 1/2 of turmeric to make a paste and eat it twice before meal.  3. Add black pepper to your food and salads. | Oral (twice/day)        |
| 66  | Pinaceae       | Pinus sylvestris L.                    | sinewber yan zeytî sinewber | Buds, leaves, oil | 1. Soaked 1 cup of pine tree buds (ground buds) and place it in a liter of cold water and leave it for 3 h, filter and drink the extract.  2. Mix a few drops of oil with 1 tablespoon of coconut or almond oil and apply it directly to the chest, back, and neck.  3. Use 3 drops of oil for inhalation. | Oral (1 cup morning and evening) |
| 67  | Rutaceae       | Citrus limon (L.) Osbeck               | lîno (liamz)    | Fruits      | 1. Place 1 tablespoon of fresh Lemon juice to 1/4 teaspoons of turmeric powder in a glass of warm water, then add 3 teaspoons of honey.  2. Mix 1/2 of ginger (fresh or powder) with 2 tablespoons of fresh lemon juice in a cup or glass of warm water, add 1 teaspoon of honey.  3. Add lemon to your food and salads.  4. Use dried lemon peel for making a tea, to have it twice a day. | Oral                    |
| 68  | Rutaceae       | Citrus reticulata Blanco               | lalengî         | Fruits      | Mix 1 cup of cow yogurt with 1/2 cup honey with 3 fresh mandarin oranges and drink before meal twice a day.                                                                                                                                                                                                 | Oral                    |
| 69  | Rutaceae       | Citrus aurantifolia (Christm.) Swingle | lîmo besirh    | Fruits      | Boil 1 fruit with 1 cup of water, leave it for 15–20 min. Strain and drink it two times a day after meal for 3 days. drink i                                                                                                                                                                                                                     | Oral                    |
| 70  | Ranunculaceae  | Nigella sativa L.                      | reşke (bereke)  | Seeds, oil  | 1. Mix 3 drops of black seed oil with 1 teaspoon of honey in a cup of warm water (You can add two tablespoons of apple cider vinegar).  2. Heat few drops of black seed oil and massage the chest, back and throat properly.  3. Eat 1 teaspoon of black seed on 1 teaspoon of honey with empty stomach at morning.                                                                 | Oral, Dermal            |
| 71  | Rhamnaceae     | Rhamnus alaternus L.                   | sîdr yan wereqet sîdf | Bud and leaves | Boiled tablespoon of dried buckthorn or leaves and drink it twice a day for treating infection in your body. N.B: Rhamnus (buckthorn) treats sweating problems, helps in relaxation, solving sleeping problems & insomnia. It treats the psychological problems such as anxiety and tension during COVID-19 infection by calming the nerve of the patient. | Oral                    |
| 72  | Rosaceae       | Malus pumila Mill.                    | sirkeyi sêw (xelli sêw) | Fruit      | Boil 3 cups of water, add 1 cinnamon stick, 1 peeled and smashed clove garlic, then add 1 tablespoon apple cider vinegar, finally place 1 tablespoon honey and stirring all ingredients.                                                                                                                                                                         | Oral (drink a cup 3 times a day (before the meal, if you have a problem with your stomach then drink a cup of it after meals) |
| 73  | Solanaceae     | Capsicum annuum L.                     | bîberî surî tij | Fruits      | Bring one cup of warm water, put a dash of cayenne pepper (1/8 of teaspoon), then add 1 teaspoon of apple cider vinegar, ¼ teaspoon of ginger, then add ¼ of turmeric (either fresh or powder), to it, you can add ½ lemon and 1 clove of smashed garlic, but it optional.                                                                                                 | Oral (drink three times a day after each meal) |
| 74  | Salicaceae     | Salix alba L.                         | darebî (şorre bî yan çnar) | Bark, Leaves | Boil bark in 4 cups of water for 30 min. N.B: The above recipe reduces the pain fever during COVID-19.                                                                                                                                                                                                                                          | Oral (take 1 cup/3 times a day) |
| 75  | Theaceae       | Camellia sinensis (L.) Kuntze         | çayî kesk yan sewz | Leaves      | Boil water and add 1/tablespoon of green tea leaves, then add 2 slices of fresh ginger, 1/2 lemon slice. Afterward, add 1/2 tablespoons of honey.                                                                                                                                                                                                  | Oral (2/day 30 min before breakfast and dinner) |

(Contd...)
Table 2
(Continued)

| S/N | Family     | Scientific name          | Vernacular name                | Part used     | Preparation                                                                 | Administration        |
|-----|------------|--------------------------|-------------------------------|---------------|----------------------------------------------------------------------------|-----------------------|
| 76  | Urticaceae | *Urtica dioica* subsp. *afghanica* Chrtek | ruwekî gezgeze (xerekeçuze) zeytî gezn | Leaves, root, oil | 1. Make a tea of boiled leaves or roots for 15 min.  
2. Heat several drops of nettle oil and massage your body, chest, back, muscles, and joints before bedtime to reduce the pain and give good sleep during coronavirus infection.  
N.B: The above recipe will open the pulmonary airways. The oil has analgesic and anti-inflammatory properties, so the nettle and the oil extracted from it becomes an effective treatment for joint pain and various body infections | Oral (once a day) |
| 76  | Urticaceae | *Urtica dioica* subsp. *afghanica* Chrtek | ruwekî gezgeze (xerekeçuze) zeytî gezn | Leaves, root, oil | 2. Heat several drops of nettle oil and massage your body, chest, back, muscles, and joints before bedtime to reduce the pain and give good sleep during coronavirus infection.  
N.B: The above recipe will open the pulmonary airways. The oil has analgesic and anti-inflammatory properties, so the nettle and the oil extracted from it becomes an effective treatment for joint pain and various body infections | Oral (once a day) |
| 77  | Violaceae  | *Viola odorata* L. | gulle wenewşe | Flowers, root | Grind 1 teaspoon of the dried leaves and roots together and put in a cup of boiling water and left before using for 3–5 h, then drink 1 cup twice a day till feel better. | Oral (2 times/day) |
| 78  | Vitaceae   | *Vitis vinifera* L. | mêwjî tirê reş | Fruits | Mix dates+raisins+dried figs as following:  
Make a syrup consisting of 1 cup of dried dates, 1 cup grams of black raisins, and 1 cup of dried figs.  
Place this mixture in a pot, then add a liter (or 5 cups) of water, leave it on the fire to boil until the contents of the pot soften, then it is eaten by dividing into three after each meal during the day.  
N.B: This treatment can be used for cough, taking out phlegm, and lung and breathing problems during coronavirus infection. Moreover, the grape is mentioned in Holy Quran.  
*This recipe should not be used by diabetics | Oral (3 times/day) |
| 79  | Zingiberaceae | *Curcuma longa* L. | zerdêçû | Rhizomes | 1. Add 1 tablespoon of turmeric powder to a cup of milk, stirring and boiling it, then drink once a day.  
2. Mix the powder of turmeric with honey and make a paste. | Oral (3/day on an empty stomach) |
| 80  | Zingiberaceae | *Zingiber officinale* Roscoe | zenceffl | Rhizome and Root | 1. Boiling (Zingiber+Thyme+clove+saffron) then filtered it and drink the extract.  
2. Mix 2 teaspoons of honey with 1/2 teaspoons of ginger powder or 1 teaspoon of fresh ginger and 1/2 teaspoons of turmeric with make a paste and eat it early morning before breakfast.  
3. Boil 2 cups of water, put 1 tablespoon of fresh ginger or 3 teaspoons of ginger powder, add 3 teaspoons of fresh turmeric or 2 teaspoons of turmeric powder, mix them together, then squeeze 1/2 lemon, then add 1 tablespoon of apple cider, afterward add 1 teaspoon of honey. | Oral (twice a day) |
| 81  | Zingiberaceae | *Elettaria cardamomum* (L.) Maton | hî | The seeds, pods and the oil from the Seeds | 1. Put 2–3 seed or one pod of cardamom in a boiled cup of water and honey in it, leave it for 10 min then drink it after taking out the cardamom seed/pods.  
2. Mix 1/2 teaspoon of cardamom powder with a cup of boiled water and drink it with a bit of sugar or 1 teaspoon of honey.  
4. Chewing a cardamom pod or seed for 30 min | Oral |

S/N=Serial number

been said to be more effective in the past since secondary metabolites are formed largely before being transferred to other areas of the plant (Kankara, et al., 2015). Respondents in the study reported using a variety of techniques to prepare the medicinal plants (Table 2). Water, honey, yogurt, vinegar, and many other substances were used as a diluent in the preparation of different recipes of medicinal plant species (Table 2). The results revealed oral treatment as the most popular form of administration (92.9%, Table 2 and Fig. 5). However, the complexity of the disease explains why a combination of approaches and oral treatments proved the most effective. The finding of the study is in line with other studies in the region and other parts of the world (Achour, et al., 2022; Megersa and Woldetsadik, 2022). According to the study’s findings, respondents in the study region said that they prepared traditional herbal medicine using one, two, three, or more plant species, respectively (Table 2).

D. Quantitative Ethnobotany
A significant quantitative parameter describing the relative value of medicinal plant species in the management of COVID-19 in the research area. The RFC calculated for the
Table 3
Quantitative Indices

| S/N | Scientific name                  | RFC% | FL% |
|-----|----------------------------------|------|-----|
| 1   | Cuminum cyminum L.               | 0.85 | 0.85|
| 2   | Carum carvi L.                   | 0.6  | 0.7 |
| 3   | Ridolfia segetum (L.) Moris       | 0.6  | 0.7 |
| 4   | Ammi visnaga (L.) Lam.            | 0.9  | 0.82|
| 5   | Petroserinum crispum (Mill.) Fuss| 0.7  | 0.4 |
| 6   | Pimpinella anisum L.              | 0.85 | 0.85|
| 7   | Foeniculum vulgare Mill.          | 0.7  | 0.4 |
| 8   | Coriandrum sativum L.             | 0.5  | 0.6 |
| 9   | Pistacia eurycarpa Yalt.          | 0.85 | 0.85|
| 10  | Rhus coriaria L.                  | 0.7  | 0.4 |
| 11  | Allium cepa L.                    | 0.6  | 0.7 |
| 12  | Allium sativum L.                 | 0.5  | 0.6 |
| 13  | Hoodia gordonii (Masson) Sweet ex Deene. | 0.8  | 0.7 |
| 14  | Phoenix dactylifera L.            | 0.7  | 0.4 |
| 15  | Commiphora myrrha (Nees) Engl.    | 0.9  | 0.82|
| 16  | Boswellia sacra Flueck.           | 0.8  | 0.5 |
| 17  | Brassica nigra (L.) K. Koch       | 0.5  | 0.6 |
| 18  | Bellis perennis L.                | 0.7  | 0.4 |
| 19  | Artemisia vulgaris L.             | 0.6  | 0.7 |
| 20  | Sausurea costus (Falc.) Lipsch.   | 0.9  | 0.82|
| 21  | Taraxacum fontanum Hand-Mazz.     | 0.5  | 0.6 |
| 22  | Chamaemelum nobile (L.) All.      | 0.9  | 0.82|
| 23  | Matricaria chamomilla tzvelevii Pobed. | 0.7  | 0.4 |
| 24  | Cerastium silicatum L.            | 0.5  | 0.6 |
| 25  | Trigonella foemina-graecum L.     | 0.7  | 0.4 |
| 26  | Senna alexandrina Mill.           | 0.8  | 0.5 |
| 27  | Glycyrrhiza glabra L.             | 0.9  | 0.82|
| 28  | Ceratonia silqua L.               | 0.5  | 0.6 |
| 29  | Acacia senegal (L.) Willd.        | 0.9  | 0.82|
| 30  | Quercus cerris L.                 | 0.7  | 0.4 |
| 31  | Mentha piperita L.                | 0.8  | 0.5 |
| 32  | Glechoma hederacea L.             | 0.5  | 0.6 |
| 33  | Ocimum tenuiforum L.              | 0.9  | 0.82|
| 34  | Thymus vulgaris L.                | 0.5  | 0.6 |
| 35  | Zataria multiflora Boiss.         | 0.7  | 0.4 |
| 36  | Lavandula latifolia Medik.        | 0.5  | 0.6 |
| 37  | Thymus serpyllum L.               | 0.9  | 0.82|
| 38  | Salvia officinalis L.             | 0.5  | 0.6 |
| 39  | Clinopodium mentholifolium (Host) Stace | 0.8  | 0.5 |
| 40  | Mentha spicata L.                 | 0.8  | 0.4 |
| 41  | Rosmarinus officinalis L.          | 0.5  | 0.7 |
| 42  | Ocimum basilicum L.               | 0.5  | 0.7 |
| 43  | Origanum majorana L.              | 0.9  | 0.82|
| 44  | Salvia hispanica L.               | 0.7  | 0.5 |
| 45  | Rosmarinus officinalis L.          | 0.5  | 0.7 |
| 46  | Melissa officinalis L.            | 0.6  | 0.7 |
| 47  | Laurus nobilis L.                 | 0.8  | 0.5 |
| 48  | Cinnamomum verum J.Presl          | 0.5  | 0.7 |
| 49  | Cinnamomum camphora (L.) J.Presl  | 0.9  | 0.82|
| 50  | Linum usitatissimum L.            | 0.8  | 0.4 |
| 51  | Punica granatum L.                | 0.7  | 0.5 |
| 52  | Ficus sycomorus L.                | 0.6  | 0.7 |
| 53  | Morus alba L.                     | 0.8  | 0.4 |
| 54  | Eucalyptus globulus Labill.        | 0.8  | 0.5 |
| 55  | Myrtus communis L.                | 0.5  | 0.7 |
| 56  | Syzygium aromaticum (L.) Merr. & L.M. Perry | 0.8  | 0.4 |
| 57  | Azadirachta indica A.Juss.        | 0.5  | 0.7 |
| 58  | Alcea kurdica Alef.               | 0.6  | 0.7 |
| 59  | Hibiscus sabdariffa L.            | 0.85 | 0.85|
| 60  | Sphaeralexia angustifolia (Cav.) G.Don | 0.5  | 0.6 |

(Contd..)

Table 3 (Continued)

| S/N | Scientific name                  | RFC% | FL% |
|-----|----------------------------------|------|-----|
| 61  | Peganum harmala L.               | 0.7  | 0.5 |
| 62  | Olea europaea L.                 | 0.8  | 0.5 |
| 63  | Masdevallia molossus Rehh.f.      | 0.5  | 0.6 |
| 64  | Adiantum capillus-junonis Ruhr.   | 0.7  | 0.5 |
| 65  | Piper nigrum L.                  | 0.85 | 0.85|
| 66  | Pinus sylvestris L.              | 0.7  | 0.5 |
| 67  | Citrus limon (L.) Osbeck         | 0.6  | 0.7 |
| 68  | Citrus reticulata Blanco         | 0.7  | 0.5 |
| 69  | Citrus aurantifolia (Christm.) Swingle | 0.85 | 0.85|
| 70  | Nigella sativa L.                | 0.7  | 0.5 |
| 71  | Rhamnus alaternus L.             | 0.6  | 0.7 |
| 72  | Malus pumila Mill.               | 0.85 | 0.85|
| 73  | Capsicum annuum L.               | 0.9  | 0.82|
| 74  | Salix alba L.                    | 0.5  | 0.6 |
| 75  | Camellia sinensis (L.) Kunze      | 0.9  | 0.5 |
| 76  | Urtica dioica subsp. afghanica Chrtik | 0.6  | 0.7 |
| 77  | Viola odorata L.                 | 0.9  | 0.82|
| 78  | Vitis vinifera L.                | 0.6  | 0.7 |
| 79  | Carcuma longa L.                 | 0.85 | 0.85|
| 80  | Zingiber officinale Roscoee      | 0.6  | 0.7 |
| 81  | Eletraria cardamonum (L.) Maton   | 0.9  | 0.82|

Fig. 5. Methods of administration of medicinal plants used in the area for the management of COVID-19.

different species ranged from 0.5 to 0.9, suggesting that the respondent made regular use of these plants. Whereas the FL value ranged from 0.4 to 0.85, revealing how effective the documented plant species are in the management of COVID-19 in the region. Consequently, high levels of RFC and FL in medicinal plants are suggestive of therapeutic efficacy and make them promising candidates for future, more in-depth studies (Kayfi and Abdulrahman, 2021; Mahmoud, et al., 2020).

E. Symptoms Considered by the Respondents

The primary signs and symptoms referred by traditional herbalists as evidence of virus infection include breathing issues, obstructions of the airways brought on by mucus or phlegm, dizziness, fatigue, headache, fever, shortness of breath, insomnia, nausea, occasional vomiting, and diarrhea, cloudy
thinking, dementia, chest pain, digestive issues, sore throat, runny nose, muscle pain, chills, and eye redness (conjunctivitis). Since physical health has been harmed by the viral infection, patients’ psychological conditions tend to be unstable, and they frequently experience anxiety, stress, and sadness.

IV. Conclusions and Recommendations
This is the first study of its sort to document the medicinal application to the treatment of COVID-19 among the Kurdish people of Kurdistan, Iraq. Eighty-one plant species were identified with RFC and FL values that were employed for conventional COVID-19 management. Traditional practitioners and elders of the area are the keepers of the region’s traditional knowledge. It is suggested in this study that these plants may be the subject of additional research, including phytochemical, toxicological, and clinical studies so that we can have a better understanding of the safety and efficacy of their dosages. The indigenous knowledge of medicinal plants and their use must be protected and preserved, and this can only be done if people are made aware of the importance of these plants. In addition, it’s important to inspire the local population to work on conservation.

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