



Ethnopharmacological survey on medicinal plants used by Algerian population to prevent SARS-CoV-2 infection

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Research

Abstract

Background: The world is confronted with an acute pneumonia outbreak caused by SARS-CoV-2 and the use of plants remains the best choice for many populations to prevent the infection by this virus. This work is an ethnopharmacological survey on medicinal plants used for the prevention of SARS-CoV-2 infection by the Algerian population.

Method: This study was carried out in 2020 in three Algerian provinces (Bejaia, Bouira, and Boumerdes). Ethnobotanical information was obtained using a questionnaire by direct interview with 55 herbalists.

Results: The results indicated that the herbalists are predominantly men (94%) whose 70% of them have more than 5 years of experience in the field. The survey revealed that 25 medicinal plants belonging to 17 families were used by the population to prevent SARS-CoV-2 with a dominance of Asteraceae, Lamiaceae, and Zingiberaceae. The frequently used plants are *Syzygium aromaticum* (L.) Merr. & L.M. Perry (92.72%), *Origanum vulgare* L. (78.18%), *Mentha × piperita* L. (50.9%) and *Zingiber officinale* Roscoe (50.9%). The plant part used is depending on the plant; the aerial parts are the most used, followed by fruit, then leaf, rhizome, seed, and flower, whereas bark, bulb and root are rarely exploited. The more frequently used methods of plant preparation are infusion (72%) followed by decoction (68%), and then maceration (28%).

Conclusion: This survey is a good enrichment of knowledge on the plants used by the Algerian population for the prevention of SARS-COV-2 infection. This study also provides researchers with important information that can be exploited to develop remedies and preventive drugs against COVID-19.

Key words: SARS-Cov-2, ethnopharmacology survey, medicinal plant, Algerian population, herbalist.

Background

The new coronavirus, COVID-19 virus or SARS-CoV-2, first appeared in Wuhan city (China) in December 2019, then it spread very quickly across the world. Globally, as of July 9, 2021, there have been 185,291,530 confirmed cases of COVID-19, with 4,010,834 deaths (WHO 2021).

Coronaviruses are a group of enveloped viruses with a positive-sense single-stranded RNA genome approximately 26–32 kilobases in size (Su, et al. 2016). They belong to the order of Nidovirales, family of Coronaviridae, and subfamily of Orthocoronavirinae (Tang, et al. 2020). Seven coronaviruses infecting humans (HCoV) have been identified since 1960: HCoV-229E and HCoV-OC43 in the 1960s, SARS-CoV in 2003, HCoV-NL63 and HCoV-HKU1 identified in 2004 and 2005, respectively (Vabret, et al. 2009), MERS-CoV in 2012, and SARS-CoV-2 in December 2019 (Tang, et al. 2020). Four of these viruses cause common cold symptoms in humans: HCoV-229E, HCoV-OC43, HCoV-NL63 and HCoV-HKU1 (Zhu, et al. 2020). The other three strains SARS-CoV, MERS-CoV, and SARS-CoV-2 attack the lower respiratory system and cause viral pneumonia. In addition to lung infection, SARS-CoV-2 may also affect other organs like heart, kidney, liver, and gastrointestinal system (Liu, et al. 2020).

The electron microscopy studies reveal that SARS-CoV-2 has a spherical form with a diameter varied from about 60 to 140 nm and that its envelope is studded with glycoprotein spikes about 9 to 12 nm, which gave the virus its crown-like appearance (Zhu, et al. 2020). The complete genome sequencing revealed that SARS-CoV-2 RNA has 29.9 kb (Baig, et al. 2020), with 79.5% similarity in genetic sequence to SARS-CoV RNA (Guo, et al. 2020).

The death rate caused by SARS-CoV-2 in some countries is higher than in others (WHO 2021). This suggests that external factors such as diet habits, climate, and attachment of the populations to traditional treatment can influence the disease spread and hence the death rate.

In fact, the consumption of specific foods and the use of certain medicinal plants in order to prevent the transmission of infections is a method followed by several human societies. Currently, the practice of traditional medicine varies considerably from one region to another in the world, and this is based on the geography of countries, cultures, and heritage of human societies in medicinal plants and natural treatments (Antwi-Baffour, et al. 2014; Bellik, et al. 2020). In addition, the use of medicinal plants is more important in poor and developing countries than in developed countries (Mukhtar, et al. 2008; Shah, et al. 2015). Some societies depend on a healthier diet, which is usually rich in herbs and spices that contain biologically active components, such as antioxidants and immunostimulants (El Sayed, et al. 2020; Tapsell, et al. 2006). For example, in North African and Mediterranean societies, such as in Egypt, Libya, Tunisia, Algeria, and Morocco, spices constitute an indispensable part of the daily diet (Benkerroum 2013), with the common uses of numerous medicinal plants, special vegetables, and fruits known by their antiviral effect (Aanouz, et al. 2020).

Several studies have reported the potential effects of natural substances against replication of many viral species, such as influenza virus (Dang, et al. 2015; Watanabe, et al. 2014), hepatitis B virus (HBV) (Wu 2016), human immunodeficiency virus (HIV) (Rashed, et al. 2012), Herpes Simplex Virus (HSV) (Yildirim, et al. 2016), the Middle East respiratory syndrome-related coronavirus (MERS-Cov) (Jahan and Ahmet 2020), and severe acute respiratory syndrome coronavirus (SARS-CoV) (Sytar, et al. 2021).

Such studies attract the attention of scientists to explore natural antiviral components of plants, however, the investigation of antiviral natural substances is still insufficient and the search for new drugs from natural substances must be further enhanced (Mukhtar, et al. 2008).

Currently, the majority of viral infections are treated by synthetic drugs. However, several virus species remain without effective remedy to date (Ben-Shabat, et al. 2020). Furthermore, in certain cases, synthetic substances show a narrow spectrum of activity with limited therapeutic usefulness and considerable toxicity (Pushpa, et al. 2013). In this regard, medicinal plants and some natural products may be an important source of antiviral molecules and can serve as a proper alternative for treating numerous viral infections with limited side effects (Hussain, et al. 2017).

In Algeria, since the appearance of COVID-19 pandemic until July 9, 2021, in total, 143,652 confirmed cases and 3,798 deaths have been recorded by the World Health Organization (WHO 2021).

A large number of medicinal plants and spices are used by the Algerian population to treat or prevent many diseases. In this last decade, several ethnobotanical surveys showed that the Algerian population is very attached to phytotherapy and traditional treatment (Allali, et al. 2009; Boudjelal, et al. 2013). However, to our knowledge, no ethnobotanical study concerning SARS-CoV-2 pandemic has been carried out in the center of Algeria. Therefore, the purpose of the present investigation was to determine the most frequently used plants by the Algerian population, their availability (growth) in this region, their used parts, and the mode of their use.

Objectives of the study

The purpose of the present investigation is to determine the medicinal plants mostly used by the Algerian population to prevent SARS-CoV-2 infection.

Materials and Methods

Description of the survey area

The study was conducted in three different provinces, Bejaia, Bouira, and Boumerdes. These provinces are located in central northern Algeria; they are bordered by the Mediterranean Sea from the North, Jijel province from the East, Sétif, Bordj-Bou-Arreridj, M'sila, and Médéa provinces from the south, and Blida and Algiers provinces from the west (Fig. 1). The survey area covers 9135 km², with an estimated population of about 2,461,000 who speak Arabic and Kabyle. The density of population is estimated at 269 inhabitants/Km² and the majority occupies urban areas (ONS 2017).



Figure 1. Location of the study area in Algeria. The three provinces covered by the study are marked in bold, namely Bejaia, Bouira, and Boumerdes.

The study area is located in plain Tellian Atlas; it is characterized by the importance of the mountainous land which occupies more than half of the total surface of the study area. It is also characterized by an important vegetation cover where thousands of plant species are growing. The arboriculture is marked by the predominance of the olive tree, followed by fig and citrus tree. The dominant climate of the studied area is the Mediterranean, rainy and mild climate in winter and dry and hot in summer, but it varies from area to area. For example, in the mountains, the climate is characterized by rainy and very cold winter (ONS 2017).

Collection of information

An ethnobotanical study was conducted from June to September 2020 in three Algerian provinces, Bejaia, Bouira, and Boumerdes (Fig. 1). The Ethnobotanical information was obtained using a structured questionnaire by direct interview with 55 herbalists. The choice of herbalists was random, without taking into consideration any parameter about them. Whereas the most populated urban areas are given priority during this study, this allowed us to collect as much information as possible.

The used questionnaire was divided into two parts, the first aims to collect information about plants used, and the second aims to collect information about the herbalists themselves (Table 1).

Table 1. Questionnaire of the survey

Information about plants used				Information about herbalists			
Local name	Cultivated, wild or imported	Used parts	Preparation methods	Gender	Age	Professional experience	Academic level

Identification of medicinal plants used

All plants used by the population were presented by herbalists in their stores. The common names of each plant have been confirmed by experienced herbalists and ancient inhabitants of the study area then their binomial nomenclatures have been assigned for each plant based on various bibliographical references.

The frequency (F) of plant species used by the population was calculated according to the following formula: $F (\%) = U \times 100 / N$. Where U is the number of plant citations and N is the number of all herbalists interviewed.

Results

Information about herbalists

In the present investigation, 55 herbalists were interviewed, 52 men (94.54%) and 3 women (5.45%), in three different provinces, Bejaia (30 herbalists), Bouira (22 herbalists), and Boumerdes (3 herbalists). The majority of herbalists interviewed were between 20 and 40 years (about 52.72%); while 45.45% were between 40 and 60 years, and only 1.82% of them were over 60 years. The results show also that the majority of herbalists had a primary or secondary level education (over 90%) and the majority of them (over 70%) had more than 5 years of professional experience.

The information collected about herbalists is presented in Table 2.

Table 2. Information about herbalists (n=55)

Variables	Category	Number of herbalists	Percentage (%)
Gender	Male	52	94.54
	Female	3	5.45
Age group	20-40	29	52.72
	40-60	25	45.45
	Above 60	1	1.82
Academic level	Primary or Secondary	50	90.90
	University	5	09.09
Professional experience	Between 01-05 years	16	29.09
	Between 05-10 years	16	29.09
	Between 10-15 years	11	20
	Between 15-20 years	4	07.27
	Over 20 years	8	14.54

Information about plants used

The results show that 25 medicinal plants belonging to 17 families were used by the population, with a predominant use of Asteraceae, Lamiaceae, and Zingiberaceae with three species for each family (12% for each family), followed by Myrtaceae and Rutaceae by two species for each (8%). The remaining 12 families contribute by one species for each (4%) (Table 3). Some plants do not grow in this region, so they are imported from other regions of the country or from other countries. Of these plants, 36% grow in the wild, 36% are cultivated, and 28% are not indigenous to the area but brought from other parts of Algeria or outside the country. The vernacular and binomial names of plants, used parts, preparation methods, and the frequency of plants citations are illustrated in Table 3.

Table 3. List of medicinal plants used to prevent SARS-CoV-2 in the study area.

Family and name of plant species	Arabic name (Local name)	English name	Status	Used parts	Methods of preparation	Number of citations (Frequency %)
Anacardiaceae						
<i>Pistacia lentiscus</i> L.	Dharou (Amadagh)	Lentisk	W	Leaf	Dec.	6 (10.90%)
Apiaceae						
<i>Pimpinella anisum</i> L.	Yansoun (Avesvas)	Anise	Cu	Seed	Mac. or Dec.	3 (5.45%)
Asteraceae						
<i>Artemisia herba-alba</i> Asso	Chih (Chih)	White wormwood	Imp	A. parts	Dec. or Inf.	18 (32.73%)
<i>Chamaemelum nobile</i> (L.) All.	Babondje (Wamlal)	Ramon chamomile	W	A. parts	Dec. or Inf.	1 (1.82%)
<i>Aucklandia costus</i> Falc.	Al-Qust Al- hindi	Indian costus	Imp	Root	Dec., Inf. or Vap. (Inh.)	20 (36.36%)
Brassicaceae						
<i>Lepidium sativum</i> L.	Rechad (Guerninouche)	Garden cress	W	Seed	Dec. or Fresh	1 (1.82%)
Iridaceae						
<i>Crocus sativus</i> L.	Zâafrane	Saffron crocus	Imp. Cu.	Flower	Inf. or cooked	1 (1.82%)
Lamiaceae						
<i>Lavandula stoechas</i> L.	Khozama (Amezir)	Spanish lavender	W	A. parts	Dec. or Inf.	2 (3.63%)
<i>Mentha × piperita</i> L.	Naânaâ (Naâna)	Peppermint	Cu	A. parts	Inf. or extracted essential oil	28 (50.90%)
<i>Origanum vulgare</i> L.	Zaâtar (Zaâtar)	Oregano	W	A. parts	Dec., Inf. or Mac.	43 (78.18%)
Lauraceae						
<i>Neolitsea cassia</i> (L.) Kosterm.	Korfa (Elqurfa)	Chinese cinnamon	Imp	Bark	Dec. or Inf. (in tea)	6 (10.90%)
Liliaceae						
<i>Allium sativum</i> L.	Thoum (Thicherth, thiskerth)	Garlic	Cu	Bulb	Dec., Inf. or Fresh	3 (5.45%)
Moraceae						
<i>Ficus carica</i> L.	Tine (Thanqultt)	Fig tree	Cu	Fruit (dried)	Fresh (in olive oil)	1 (1.82%)
Myrtaceae						
<i>Eucalyptus globulus</i> Labill.	Oukalitous (kalitous)	Eucalyptus	W	Leaf	Inf.	11 (20%)
<i>Syzygium aromaticum</i> (L.) Merr. & L.M. Perry	Coronfel (qranfel)	Clove	Imp.	Flower buds	Dec., Inf. (in tea), Mac. or Fresh	51 (92.72%)

Oleaceae						
<i>Olea europaea</i> L.	Azzitoune (Azmeour)	Olive	Cu, W.	Fruit	Extracted fixed oil	4 (7.27%)
Pinaceae						
<i>Pinus halepensis</i> Mill.	Sanaoubar (Azimba)	Aleppo pine	W	Bark (Resin)	Mac.	8 (14.54%)
Ranunculaceae						
<i>Nigella sativa</i> L.	Habasaouda (Sinoudj)	Black cumin	W, Imp.	Seed	Fresh (powder in honey milk), Inf. or extracted fixed oil	10 (18.18%)
Rutaceae						
<i>Citrus × limon</i> (L.) Osbeck	Laymoune (Lqares)	Lemon tree	Cu	Fruit	Dec., Inf. or Fresh	9 (16.36%)
<i>Ruta graveolens</i> L.	Sadhab (Awarmi)	Rue	W	A. parts	Dec. or Inf.	1 (1.82%)
Solanaceae						
<i>Capsicum annuum</i> L.	Folfol (Ifelfel)	Chili pepper	Cu	Fruit	Cooked	2 (3.63%)
Verbenaceae						
<i>Aloysia citrodora</i> Palau	Louisa	Lemon verbena	Cu	Leaf	Dec. or Inf.	15 (27.27%)
Zingiberaceae						
<i>Alpinia officinarum</i> Hance	Kolendjane	Lesser galangal	Imp	Rhizome	Dec., Inf. or Mac.	3 (5.45%)
<i>Curcuma longa</i> L.	Korkom	Turmeric	Imp	Rhizome	Dec., Inf. or Mac.	2 (3.63%)
<i>Zingiber officinale</i> Roscoe	Zindjabil (Zindjabil)	Ginger	Imp	Rhizome	Dec., inf. or Mac.	28 (50.90%)

Where A. parts, Aerial parts; Dec., Decoction; Inf., Infusion; Inh., Inhalation; Mac., Maceration; Cu., Cultivated; Imp., Imported; Vap., Vaporization; W, Wild.

Frequency of plants used

Among the 25 medicinal plants used by the population to prevent SARS-CoV-2 infection, some of them are used frequently and cited by at least 9 herbalists (over 15% of frequency); the plants mostly used are respectively: *Syzygium aromaticum* (L.) Merr. & L.M. Perry (92.72%), *Origanum vulgare* L. (78.18%), *Mentha × piperita* L. (50.9%), *Zingiber officinale* Roscoe (50.9%), *Aucklandia costus* Falc. (36.36%), *Artemisia herba-alba* Asso, (32.73%), *Aloysia citrodora* Palau (27.27%), *Eucalyptus globulus* Labill. (20%), *Nigella sativa* L. (18.18%), and *Citrus × limon* (L.) Osbeck (16.36%) (Fig. 2).

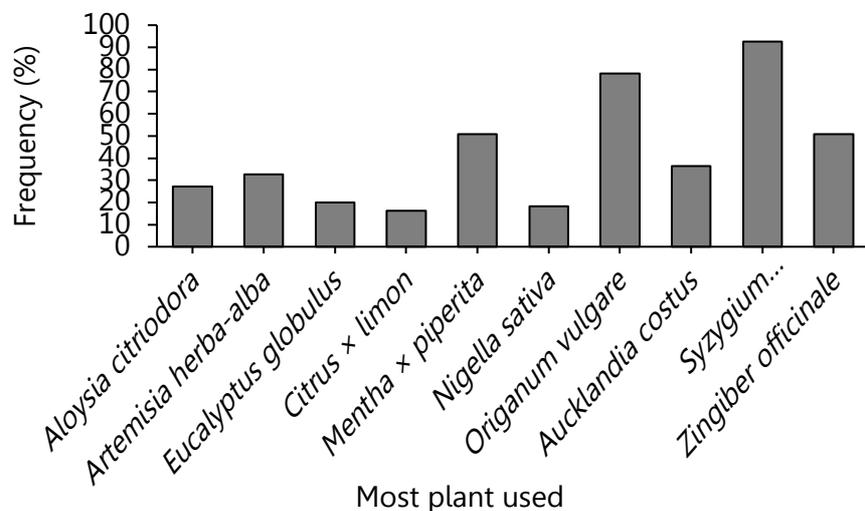


Figure 2. Frequency of popular plants used by the population to prevent SARS-CoV-2 infection.

Parts of the plants used

The result obtained in this study shows that several plant parts are used by the population to prepare herbal remedies (Fig. 3). The parts of plants most commonly used by the population are the aerial parts with 24%, followed by fruit (16%), then leaves, rhizome, and seed with 12% for each part, flower, and bark by 8%. The other parts of plants namely bulb and root are used only by 4% for each.

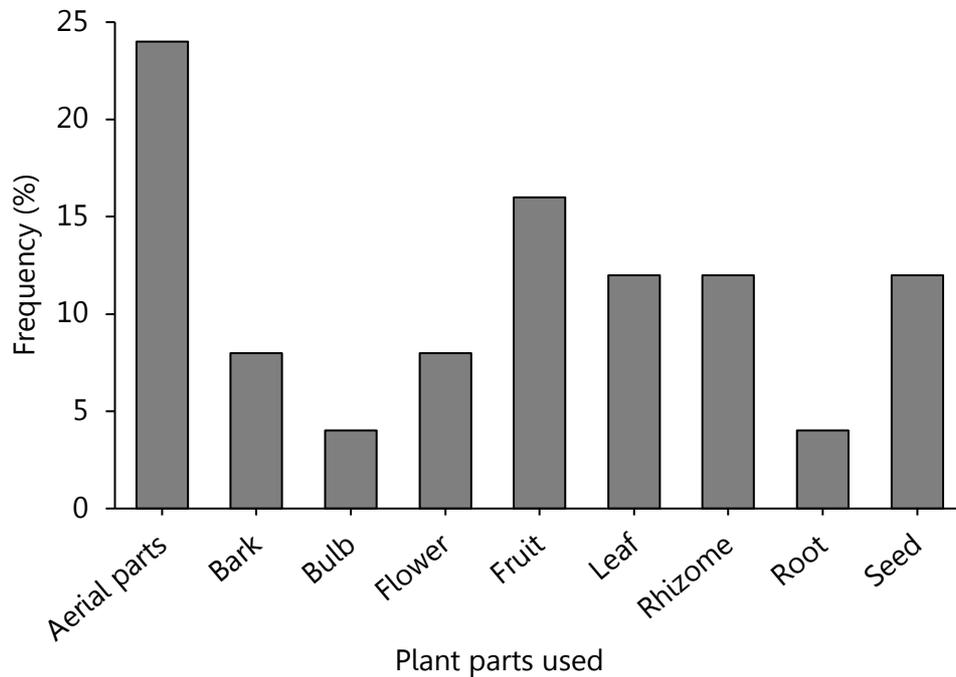


Figure 3. Frequency of plant parts used for the preparation of anti-SARS-Cov-2 remedies.

Methods of preparation

The results showed that the studied population employed various methods to use medicinal plants; the principal method reported was infusion (72%), followed by decoction (68%), and then maceration (28%). The percentage of other preparation methods did not exceed 20% (Fig. 4).

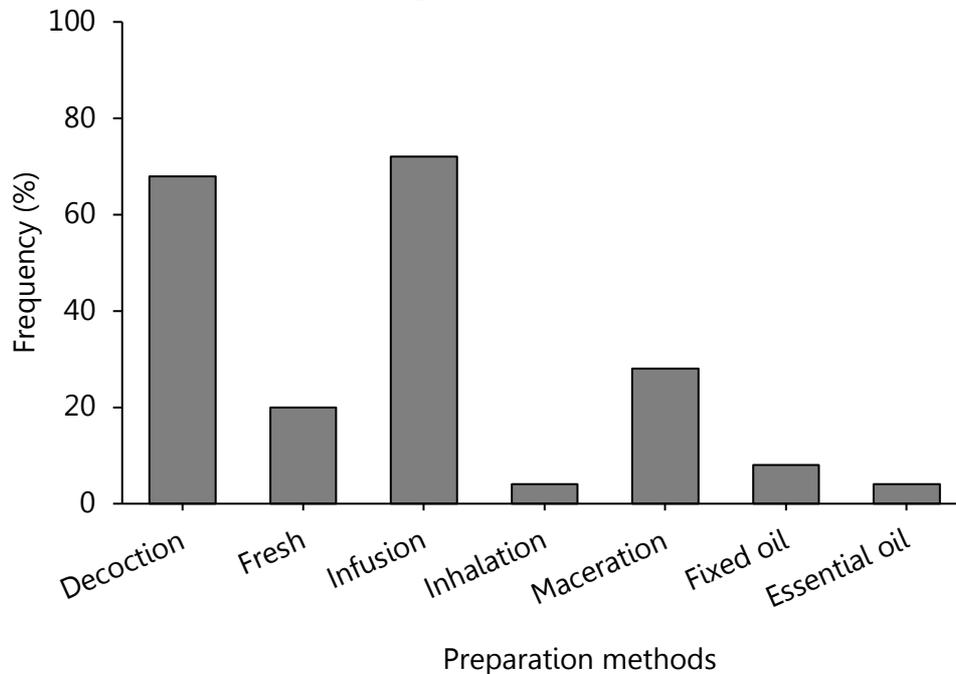


Figure 4. Preparation methods followed by population to use medicinal plants.

Concerning the most frequently used plants (Fig. 5), several methods are followed to use each plant; four different methods are used for *A. costus* and *S. aromaticum*, three for *A. herba-alba*, *C. × limon*, *N. sativa*, *O. vulgare*, and *Z. officinale*, and two methods are followed for *A. citriodora* and *M. × piperita*. The solvent most frequently used is water, but milk, tea, olive oil, and honey are also used to dissolve some plant powders.

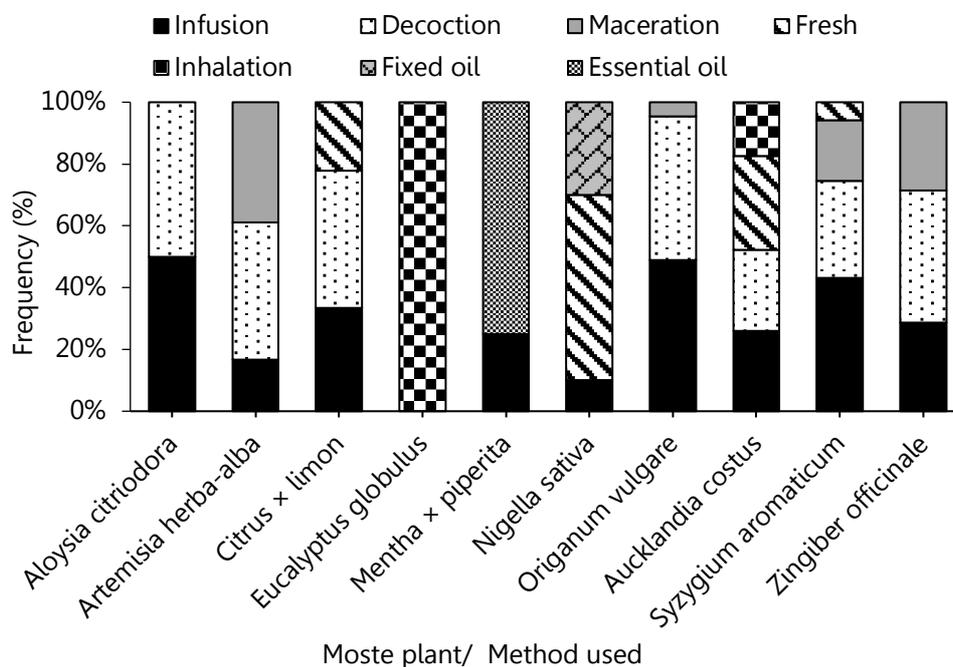


Figure 5. Methods of preparation used according to plant.

Discussion

Currently, several societies around the world try to prevent or treat SARS-CoV-2 using traditional treatments, especially in the poor and developing countries. In Algerian society for example, since the apparition of this pandemic, people use more medicinal plants and some natural products known for their curative effect against viral and bacterial infections, especially infections affecting the respiratory system. In fact, during our study, the herbalists interviewed noted that the demand for plants by the population has increased enormously during this period.

In this study, men dominate the practice of traditional medicine in the study area with over 94% that is probably due to the type of work and to the cultural traditions of the region, where women are not oriented to practice some works such as trade and hard works. Nevertheless, in Algerian society, women practice traditional medicine and have important knowledge, especially old women, but their practice is done at home to treat especially their relatives.

The age of all herbalists varies between 20 and 60 years, except one, and more than half (52.72%) are young men (20-40 years). The majority of herbalists interviewed (90%) have only primary or secondary academic levels, but more than 70% of them have over 5 years of professional experience.

Although none of the herbalists had a certificate or diploma in herbalism, the majority of them have a long professional experience (5 to over 20 years), and they have acquired their knowledge from generation to generation.

The present study revealed that 25 medicinal plants belonging to 17 families were used by the population to prevent SARS-CoV-2 infection (Table 2). Some plants are significantly used (Fig. 2), that being the case of *S. aromaticum* (92.72%), *O. vulgare* (78.18%), *M. × piperita* (50.9%), *Z. officinale* (50.9%), *A. costus* (36.36%), *A. herba-alba* (32.73%), *A. citriodora* (27.27%), *E. globulus* (20%), *N. sativa* (18.18%), and *C. × limon* (16.36%).

The choice of medicinal plants used by the Algerian population against SARS-CoV-2, the preparation methods, and plants parts used are not based on scientific knowledge, but rather on a traditional medicine heritage and social culture of the population, as has been confirmed by the interviewed herbalists. On the other hand, some plants chosen by the population are inspired from Islamic medicine such as Black cumin, ginger, and Indian costus, which is the case of other Muslim countries (Alqethami, et al. 2017; El Sayed, et al. 2020; Sheikh 2016). Some authors have reported that the Muslim societies are interested in the remedies mentioned in prophetic medicine (Aati, et al. 2019; Alqethami, et al. 2017) such, *N. sativa* (Maideen 2020), *A. costus* (Abdallah, et al. 2017), honey (El Sayed, et al. 2020), *Z. officinale*, and olive oil (Mehmood, et al. 2021).

Although the anti-SARS-CoV-2 effect of the plants used in this study has not yet been scientifically demonstrated, but several experimental studies confirmed that some of these plants inhibit the multiplication of many other viral species and can probably inhibit SARS-CoV-2 multiplication.

Recent experimental studies have reported that some components of *S. aromaticum*, such as β -caryophyllene Narkhede, et al. (2020) and Eugenol (Rizzuti, et al. 2021), present a high degree of interaction with the main protease of SARS-CoV-2, thus these herbal molecules may be potent inhibitors of SARS-CoV-2 multiplication. On the other hand, *S. aromaticum* extract can improve the function of the immune system by immunomodulatory effect of eugenol present in its essential oils (El-Saber Batiha, et al. 2020). Other studies have shown that phenolic compounds of *O. vulgare* have a potent inhibitory effect against respiratory syncytial virus (RSV) multiplication (Zhang, et al. 2014). Kumar, et al. (2020) have shown that carvacrol, a monoterpenoid phenol found in *O. vulgare*, can interact with SARS-CoV-2 main protease and exert its inhibition.

Concerning *Z. officinale*, it is well known by the Algerian population for its beneficial effect on the respiratory system. This plant is commonly used in Algeria as spices and as a medicinal plant. In this last decade, several studies showed the potent effect of ginger extract to treat respiratory system diseases. The study conducted by Chang, et al. (2013) showed that the water extract of fresh ginger is effective against the human respiratory syncytial virus (HRSV). Another study showed that Ginger extract efficiently protects the lungs from histopathological damage due to hyperoxia and inflammation (Çifci, et al. 2018).

In addition, our study showed that *M. × piperita* is commonly used to prevent SARS-CoV-2 infection; in fact, this plant is used daily by the population as herbal tea. Some publications reported that this plant has a high antiviral activity against coronavirus group (Serlahwaty and Giovani 2020; Sytar, et al. 2021). The study conducted by (Li, et al. 2017) has shown that phenolic acids and flavonoids of *M. × piperita* have good anti-inflammatory action and exert a potent effect against RSV.

Although *A. costus* is imported from other countries (India and Pakistan), it is well known in Algerian society and is widely used in complementary medicine (Ahmad, et al. 2009). This plant is known in Arab countries as "Al-Qust Al-Hindi" and used by traditional healers since the era of the Islamic civilization (Abdallah, et al. 2017). In prophetic medicine, the Prophet Muhammad peace be upon him cited that *A. costus* contains seven types of remedies among them being a treatment for pleurisy (El-Far, et al. 2018). Currently, the roots of this plant are commonly used in Algeria to prevent SARS-CoV-2 infection, either by inhalation, infusion, or decoction.

Some studies have shown that dehydrocostus lactone and alantolactone, two sesquiterpenes of *A. costus*, have a good anti-inflammatory (Butturini, et al. 2011; Lim, et al. 2015) and immunomodulatory effects (Yuuya, et al. 1999). In addition, the experimental study conducted by El-Rahman, et al. (2020) showed that the ethanolic extract of roots of *A. costus* exerts a protective action against damaged lung tissue.

Another study has shown that active compounds isolated from *A. costus* such as costunolide and dehydrocostus lactone exert a considerable activity against hepatitis B virus (HBV) (Chen, et al. 1994).

The present investigation revealed also that other plants are used by the Algerian population, whose probable effects against SARS-CoV-2 have been shown by recent studies. Among these plants, *A. herba-alba* (Asdadi, et al. 2020), *E. globulus* (Asif, et al. 2020; Cermelli, et al. 2008), *N. sativa* (Mukhtar, et al. 2008), and *C. × limon* (Senthil Kumar, et al. 2020).

In addition, certain foods and spices which are part of the daily diet in Algeria may prevent the infection by SARS-CoV-2, as has been reported by some studies, such as olive oil (Chowdhury 2020; Michele, et al. 2020), vinegar

(Pagani, et al. 2020), honey (Zahra, et al. 2020), green tea (Henss, et al. 2021), turmeric (*Curcuma longa* L.) (Thimmulappa, et al. 2021), red pepper (*Capsicum annuum* L.), black pepper (*Piper nigrum* L.) (Ademiluyi, et al. 2020) and coriander seeds (Llivosaca-Contreras, et al. 2021).

Conclusion

The present investigation clearly shows that phytotherapy is widely adopted by Algerian society, and there is a high diversity of medicinal plants used for the complementary treatment of viral infections especially in cases of lack or total absence of drug treatment. In addition, the studied population showed significant knowledge in the traditional treatment of viral infections and carefully selects herbs that have beneficial effects on lung infections. In fact, the antiviral activity of the majority of the plants used has been demonstrated by experimental studies; however, their action against SARS-CoV-2 has not yet been confirmed. This work constitutes a good contribution of the Algerian heritage of medicinal plants in the fight against the spread of SARS-CoV-2, thorough pharmacological and phytochemical investigations are needed to reveal the real effect of these plants on SARS-CoV-2 as well as their active components involved.

Declarations

Ethics approval and consent to participate: The author discussed with individual herbalists individually before interviewing and permissions were obtained from all participants prior to each interviews/discussion.

Consent for publication: The manuscript contains original field and investigation/interviews of herbalists.

Availability of data and materials: The data sets and report generated are available for interested researchers, students, and institutions upon request.

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Authors' contributions: *Messaoud Belmouhoub:* Conceptualization, original draft; Writing - review & editing, Data curation, Investigation, Methodology, Validation. *Boubekeur Aberkane:* Data curation, Formal analysis. *Mostapha Bachir-Bey:* Validation, Supervision, Writing- Reviewing and Editing.

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