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## MOROCCAN TRADITIONAL MEDICINE FOR THE PREVENTION AND RELIEF OF CORONA VIRUS COVID-19 SYMPTOMS

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### Abstract

March 2, 2020; Morocco announced its first positive new coronavirus case in a Moroccan from Italy after the epidemic of this new infection emerged in Wuhan, China in December 2019. Since then, new coronavirus pneumonia has spread quickly and many countries and territories were affected. Influenza virus, a common virus often occurring in winter as well, appears to be similar to COVID-19 in terms of transmission characteristics [1] [2]. The common clinical manifestations of patients with influenza virus included fever, cough, rhinitis, sore throat, headache, dyspnea, myalgia, and radiographic evidence of pneumonia, which are similar to those of COVID-19 patients [2] [3]. The speed of transmission is an important point of difference between the two viruses. Influenza has a shorter median incubation period and a shorter serial interval than COVID-19 virus. Also the Mortality for COVID-19 appears higher than for influenza, especially seasonal influenza. Currently, there are few specific antiviral strategies, but several potent candidates of antivirals and repurposed drugs are under urgent investigation [4]. Pending the discovery of a specific vaccine or treatment, many have carried out hygienic rules and traditional herbal medicine to prevent or relieve the common symptoms of corona virus diseases (cough; fever; runny nose) and strengthen the immune system. In this mini review, we report traditional recipes based on medicinal plants used in Moroccan folk medicine and known for their virtues therapeutic.

## 1. Introduction

On 30 January 2020, World Health Organization (WHO) officially declared the COVID-19 epidemic as a public health emergency of international concern. The clinical symptoms of COVID-19 patients include fever, cough, fatigue and a small population of patients appeared gastrointestinal infection symptoms [5]. However, some cases develop pneumonia and require medical care or hospitalization.

Morocco has the technical skills to diagnose the new coronavirus COVID-19, at several of its national laboratories. But so far, there is no specific treatment or vaccine for this disease, except for symptomatic treatment to reduce its severity and avoid complications, so it is recommended to follow the usual rules of hygiene.

The lack of drugs or a vaccine effective against the COVID-19 means that some are turning to aromatic and medicinal plants to stem this pandemic in their own way. There are herbal drugs, at least some of which have medicinal properties [5].

In Morocco, phytotherapy is an ancient practice, which owes greatly to the “Arabo-Islamic” medicine, even if non-Muslims, Jews and Christian particularly, have played an important part in this regard [6]. Our country having a great richness in plants and many of them have been the subject of different studies which have validated their indication. For example: Fenugreek, *Chenopodium* and Thyme which are the oldest medicinal and culinary plants.

## 2. Methods

The medicinal treatment treats similar symptoms of coronavirus, particularly cough, fever and runny nose. It is used in the region of Chiadma-Regraga: a territory located in the South of Morocco, dwelling mainly at the Atlantic coast in the region between Safi and Essaouira.

### For cough

- **Medicinal plant used:** Fenugreek, *Trigonella foenum graecum*, Helba in Arabic.
- **Preparation protocol:** A 500 g of fenugreek seeds were rinsed; dried and reduced to soft powder with Millstones: a grain grinder is a technical object, traditionally made of stone, which allows grinding, crushing, crushing, or more specifically grinding of various substances. It operates with manual power. After this, add 10 of the yolks from the field (beldi) to the powder and mix manually for a homogeneous preparation. This preparation is dried in the open air and in the shade in order to be preserved longer without losing its therapeutic value and then kept in a jar away from light. The patient then takes a tablespoon 2 times a day; morning and evening before meals until healing.

### For fever

- **Medicinal plant used:** *Chenopodium ambrosioids* L.; M'khinza in Arabic
- **Preparation protocol:** A fresh aerial part plant (stems, leaves and flowers) were rinsed; drained and ground in a mortar. This plant used with two methods: The first method is to mix a quantity of the ground plant with the red onion (ground in a mortar); then place this preparation on the patient's head or temples, covering it with a cloth: Cataplasm. This operation is repeated until patient temperature drops. In the second method, a fresh orange juice is prepared and a pinch of the ground plant is added, and then is given to the patient three times a day.

### For runny nose

- **Medicinal plant used:** Thym, Zaâitra in Arabic.

• **Preparation protocol:** Make a ballotin with fresh thyme branches and let steep in boiling water for about 3 minutes. Remove the thyme ballotin and drink the still smoking infusion. If it found too bitter; add a teaspoon of natural honey. The same plant can be burned alone or with other species such as rosemary (*Rosmarinus officinalis*) for air disinfection and respiratory tract hygiene.

### 3. Discussion

In Morocco, traditional medicine has always occupied an important place in the traditions of medication especially at the level of rural areas in the absence of a modern medical system. It is millenary and existed long before the arrival of the Arabs and reached its peak at the time of Avenzoar, Averroes, Ibn Toufail, etc. It was taught at the University of El Quarouyne in Fez from the 8th to the 13th century. Moroccan traditional medicine is of course organically Arab-Amazigh in its constitution. The two ethnic groups contributed equally to the emergence of Maghrebian therapeutic knowledge, with also an African, Jewish and Andalusian contribution.

This medicine has the right to exist as an heir to ancient Arab medicine; as a result, this medicine still provides benefits. Indeed, there is a true traditional therapeutic arsenal of recipes and practices within our country, derived from traditions and beliefs, transmitted through generations and/or collected from herbalists, enriched by personal experiences or those of loved ones.

Several surveys have been carried out in Morocco with a view to identify and inventory the most frequently used aromatic medicinal plants and collecting information on the therapeutic uses practised by the local population according to different regions of the country and the pathologies to be treated [7-13].

Faced with the spread of diseases with a high level of support, the World Health Organization WHO, encouraged studies ethnobotany and research pharmaceutical companies to innovate herbal medicines medicinal products to promote their optimal uses, in treatment some pathologies [14-15]. To date, no approved vaccine or treatment are available for SARS-CoV-2. COVID19 is therefore a big challenge for scientists to find an antiviral agent to treat it. Many researchers are working to find natural antiviral agents that have shown preliminary efficacy against SARS-CoV based on traditional medicine as in China where preliminary efficacy of traditional Chinese medicines against SARS-CoV has been demonstrated [16]. The secondary metabolites of many recent plant species have been identified as natural antivirals for the management of COVID-19 [17]. On the other hand, essential oils have shown promising antiviral activity against several pathogenic viruses, including those of influenza and other viral respiratory infections [18]. Other studies based on molecular docking analysis performed on several components of essential oils to look for possible drugs capable of blocking the activity of the receptor for the angiotensin converting enzyme 2 (ACE2) of SARS -COV-2 have shown that the constituents of some essential oils can potentiate conventional antiviral agents and thus relieve the symptoms of COVID-19 as is the case for limonene, p-cymene and  $\gamma$ -terpinene, while other constituents even inhibited the ACE2 receptor for SARS-COV -2 [19].

The plants described in this review are well known for their therapeutic effects:

***Fenugreek:*** *Trigonella foenum graecum*, is one of the oldest medicinal and culinary plants. Fenugreek seeds contain tannins, essential oils, alkaloids, phenols, proteins and vitamins [20-22]. Seeds also contain, iron, sulphur, copper, magnesium, calcium, potassium, chromium, cobalt, zinc, manganese, selenium, silicon and sodium [23-24].

Because of its chemical composition, fenugreek is therefore of great nutritional value. Its use is highly recommended, especially in cases of lack of appetite and weight loss, as well as in the relief of a whole range of ailments [25]. Fenugreek stimulates appetite and acts as a natural anabolic by allowing a better use of nutrient intakes. In addition, clinical trials in diabetic patients and histopathological studies in rats [26-27] using powdered fenugreek seeds showed no evidence of cytotoxicity. It has been shown that the aqueous extract of seeds of fenugreek exhibits an anti-inflammatory activity better than that caused by the essential oil. The results showed that the aqueous seed extract at a dose of 120 mg / kg exhibited considerable antiinflammatory activity compared to Diclofenac and the essential oil. In addition, the administration of the aqueous extract at a dose of 120 mg / kg causes the same antipyretic effect induced by paracetamol [28].

***Chenopodium . Ambrosioids (L.):*** (M'khinza in Arabic and anserin vermifuge in French) is a tropical American wild species naturalized in the Old World (1). *C. ambrosioids (L.)* is used as antirheumatic, analgesic [29], sedative and antipyretic [30]. It is also used in herbal tea, used in Mexico to produce milk in women and to improve blood flow. The use of this plant in the treatment of digestive disorders is very old and widespread [31]. Several authors described the antioxidant properties of this plant [32], antileishmaniasis [33], antitumour [34], anthelmintic [35], moliscidale [36], nematocide [37], antimalarial [38], anti-inflammatory [39] and insecticide [40-42].

In Morocco, the whole plant is used as an infusion or fresh juice in gastrointestinal conditions, typhoid, child and adult dysentery, and galactogen. It is also used against oral abscesses, ulcers and purulent sores, in local application of the fresh plant. Often, the aerial part of M'khinza is used against poultice fever on the forehead and temples of the patient. It can also be ingested as an infusion or decoction. A maceration of leafy stalk with vinegar is used to decrease fever.

The anti-inflammatory effects of *C. ambrosioides* have been demonstrated in different experimental models. The ascaridole, a bicyclic monoterpene, is one of the most abundant terpenoid in *Chenopodium* genus [43]. Recent studies have suggested that ascaridole found in ethanolic extracts of *C.ambrosioides* leaves, may be primarily responsible for its antinociceptive, sedative and antiinflammatory effects [44] [45-46]. These findings led some scientists to use molecular docking tests [47] to investigate whether there is an association between ascaridole and specific pain receptors, such as N-methyl-D-aspartate (NMDA). This receptor has been thought responsible for the processes of central sensitization and chronic pain [48]. Some glutamate receptor, N-methyl-D-aspartate (NMDA) receptor antagonists have demonstrated the capacities to reduce chronic pain and to prevent hyperalgesic phenomena.

***Onion*** is not just a dish raiser in the kitchen, but it's also an incredible partner that our grandmothers used for many miracle cures. Onion is a pain reliever and decongestant during bronchitis. It is an excellent remedy for lowering fever while applying it alone or mixed with *C. ambrosioids (L.)* (M'khinza) in poultice. This bulb of the family Amaryllidaceae contains many sulfur compounds [49], this gives it its characteristic smell. It also explains its effect on the pulmonary sphere for any clutter. Onions contain several antioxidant compounds. Among them, quercetin, which has an important nutritional role and represents the aglycone form of several other flavonoid glycosides such as rutin and quercitrine found in citrus fruits, buckwheat and onions [50]. Functional benefits of quercetin include anti-inflammatory activity, antihistamine effect, allergy medication, and anticancer and antiviral activities. It has also been claimed to regulate blood pressure in hypertensive subjects [51].

***Citrus reshni*:** The essential oils extracted from *Citrus reshni* leaves and peel (unripe and ripe fruits) were tested against H5N1 virus by plaque reduction assay. The oils showed moderate inhibition of the H5N1 virus at a concentration of 2.5  $\mu\text{L/mL}$ . Sabinene (40.5%), linalool (23.3%), and terpinen-4-ol (8.3%) were the main constituents in the leaf oil while limonene (82.4%, 91.6%) was the main compound in the fruit peel essential oils (unripe and ripe, respectively) [52].

***Thyme*:** It is the star plant par excellence. Miraculously medicinal plant to prepare to face the winter. In Morocco, rare are the homes where thyme is not found among cooking spices. It is the main ingredient used in cooking snails...

Species of perennial sub-shrubs of the genus *Thymus*, of the family Lamiaceae of which some such as *Thymus maroccanus*, *Thymus pallidus subsp. pallidus* and *Thymus broussonnetii subsp. Broussonnetii* are endemic to Morocco. The common thyme, *Thymus vulgaris* is the most commonly cultivated species. It is the enemy of the toxin because it contains thymol, a powerful antiseptic. The concentrated thymol odour of thyme can destroy viruses and bacteria circulating in the atmosphere as well as infectious diseases that affect the body. Used in infusion, fumigation, gargle, compress and even powder, thyme has a great therapeutic reputation. To clear the airway in case of bronchitis, cold, flu, asthma or simple cooling, an infusion before sleep is excellent. It speeds up sweating and eliminates toxins. A decoction of thyme disinfects wounds, alleviates sore throat, fights bad breath.

A teaspoon full of thyme washed and dried and mixed very finely, swallowed with a cup of water immediately solves some gastric problems of flatulence, frequent bloating. An infusion per day is recommended against anemia, against fatigue, to promote good blood circulation. Today, the recognized properties of thyme and its essential oil are based on the multiplication of scientific studies confirming its traditional uses. The most important activity of thyme is its powerful, broad-spectrum antibacterial activity. It is mainly due to the presence of phenols (thymol, carvacrol), essential oils with phenolic chemotypes were very effective, even on strains resistant to traditional antibiotics [53].

In the literature, there have been at least 20 different chemotypes identified for thyme essential oil. The "typical" thyme essential oil presents a thymol content of 45% (range 31–50%), with significant concentrations of p-cymene (0.1–26.6%, average = 15.6%) and  $\gamma$ -terpinene (up to 22.8%, average = 9.3%). In addition, there are several other chemotypes of *T. vulgaris* rich in thymol and/or carvacrol [54]. Thymol has been identified as an anti-influenza agent against influenza type A and parainfluenza type 3 virus [55] [56].

***Rosemary*:** *Rosmarinus officinalis L.* is an evergreen shrub belonging like thyme to the family Lamiaceae. It has long been known for its medicinal virtues, especially among Greeks and Romans. The latter made them crowns from which the Arabic name *iklil al-jabal* (mountain crowns) translated from Latin. Rosemary essential oil is used in aromatherapy for different properties. It is known for its stimulating properties on locomotor activity. This activity is due to the stimulation of the organ of smell but also the direct pharmacological activation of the central nervous system. This essential oil also has antifungal and antiseptic properties. It also has antispasmodic action on the sphincter of Oddi, but 7 to 8 times less important than that of mint essential oil [57].

It is very polymorphic species, presents several varieties. But, at this very random morphological differentiation, many botanists prefer to rely on the chemical composition of the essential oil to list four chemotypes, according to the dominant compound: rosemary with cineole, rosemary with verbenone, rosemary with camphor, borneol and, Sometimes, rosemary with myrcene. *Rosmarinus officinalis L.*



includes different chemical compounds Recognized y their therapeutic effects: 1,8-cineole (45,9%),  $\alpha$ -pinene (12.0%), camphor (10.9%), ad  $\beta$ - pinene (6.3) (19). It was also tested for antiviral activity against Herpes simplex virus-1(HSV-1) and results showed more effective inhibitory effect even at lower concentrations [58].

Synergistic effects have also been observed between essential oils and synthetic antiviral agents. Aside from their antiviral activity, essential oils can relieve symptoms of COVID-19. For example, linalool [59] [60],  $\beta$ -caryophyllene [61] [62] and 1,8-cineole [63] [64] have anti-inflammatory and antinociceptive activity, camphor [65] [66] and thymol [67] have anti-tussive activity. Also noting that synergistic effects have also been observed between essential oils and synthetic antiviral agents and that essential oils are lipophilic and can therefore also be used to disintegrate viral membranes [68]. So automatically, the essential oils, one or all of its constituents could be potential antiviral agents against SARS-COV-2. Also, it could then be used as an antiviral drug alone, as a potentiator of another conventional antiviral drug or at least as a dietary supplement to relieve symptoms or strengthen the immune system of affected patients, or even its use as an adjuvant in solutions hydro-alcoholic or hydro-alcoholic gels to increase their effectiveness in the external fight against COVID-19.

Indeed, the integration of traditional medicine into conventional treatment could be an alternative approach to the treatment of COVID19 in the future. Clinical studies are required to assess efficacy and safety and to provide clinical evidence for traditional medicine.

### Conclusion

Indeed, the plants described in this mini-review have a composition rich in metabolites that have demonstrated in previous studies their antifungal, antibacterial and antiviral properties. According to Moroccan herbal medicine, these herbs are used to treat fever and flu symptoms, which are similar to coronavirus symptoms. However, toxicological and clinical studies are required to prove the safety of the oil as a drug. Hence the idea of proposing those plants for scientific purposes as a potential source of antiviral molecules against COVID-19.

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