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Abstract — Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory coronavirus-2 (SARS-CoV-2), is an extremely infectious disease and has already infected nearly seven million people and caused more than 402,852 deaths in the world. Based on our current knowledge of this virus and in the absence of a vaccine, this article is an attempt to propose ways to prevent, treat and control the COVID-19 virus, using medicinal plants such as Eucalyptus globulus Labill, Cymbopogon citratus, Mentha, citrus, Zingiber officinale, Syzygium aromaticum which have been shown to be effective.

Index Terms — Apis mellifera, Cymbopogon citratus, Eucalyptus globulus Labill, Mentha, citrus, Syzygium aromaticum, Zingiber officinale, Covid-19.

I. INTRODUCTION

The new Coronavirus epidemic (SARS-CoV-2) (COVID-19) started in the city of Wuhan in Hubei Province in China on December 8, 2019. It was spreading quickly in China, causing deaths by ten circles and then exported to other Asian countries (South Korea etc.). It will ravage the old continent in turn by Italy, Spain, the United Kingdom, France, Belgium etc. infecting the environment of individuals and causing more than 100,000 deaths in the space of two months. The United States will not be spared with more than 100,000 dead in record time. The virus has managed to thwart the prognoses even of those who wrongly said that Covid-19 would be a disease affecting only the white race. Ironically, we too are paying the cost today (Africa) [1].

The COVID-19 (SARS-CoV-2) pandemic is spreading as rapidly as uncontrolled bushfires. It can infect the respiratory, gastrointestinal, hepatic and central nervous systems of humans, livestock, birds, bats, mice and many other wildlife [1]-[3]. It has been declared as a pandemic by the World Health Organization (WHO) since March 11, 2020 [4]. The most common mode of transmission of Covid-19 encountered is inhalation of infectious aerosols and contact with saliva droplets or nasal secretions from a positive person [5]. Its incubation period remains in the range of 3 to 14 days, but researchers have been able to demonstrate that its median incubation period was 5 days, as was the case with SARS [6]-[8].

The Covid-19 can cause illness ranging from asymptomatic to life-threatening. In elderly patients, COVID-19 infects the lower respiratory tract and can lead to fatal pneumonia [6], even children are not spared from this pandemic [9]. Other non-specific symptoms include fever, cough, myalgia, dyspnea with or without diarrhea [10], [11]; but usually patients have gastrointestinal symptoms (nausea, vomiting, diarrhea, abdominal pain), shortness of breath, headache, sore throat, colds, breathing problems, myalgia, nasal congestion and inflammation of the mucous membranes that cover the inside of the sinuses and a runny nose [3], [12]-[15]. It can also affect the central nervous system in some cases [16].

According to Trisha Greenhalgh et al. [17], the best clinical signs to predict acquired pneumonia in an adult are a temperature higher than 38 °C, a respiratory rate higher than 20 breaths/minute and a heart rate higher than 100 beats/minute; low urine flow is also a worrying symptom.

Two of the major symptoms of Covid-19 include anosmia (loss of smell) and ageusia (loss of taste) [18]. Chemosensory dysfunction is necessarily associated with Covid-19 infection and should be considered when screening for symptoms. Understanding the timing and association of odor/ taste loss in Covid-19 can help facilitate early detection and isolation of cases [18]. There is a strong association between an olfactory and gustatory deficiency with a Covid-19 infection. Loss of odor / taste can be used as a symptom of increased screening for Covid-19 infections to reduce the risk of disease transmission from mildly symptomatic cases [18].

Transmission occurs between people via droplets or waste products from coughing, sneezing and other respiratory systems at about 1.5 m [5], [16], [19]. As the disease is understood, the guidelines show that droplets and close contact transmission are the primary routes of transmission, and aerosol transmission is possible with long exposure to high concentrations aerosols in a relatively closed environment [16].

To date, no vaccine or adequate treatment has been found to fight the pandemic. Some researchers encourage the use of traditional herbal medicine [20], [21] to slow the spread while waiting for a vaccine to be introduced, especially in developing countries [22]; but it must be done following the guidelines of modern medicine in patient care.

Integrating traditional medicine into conventional treatment may be an alternative approach [23]-[25]. Clinical studies are needed to assess the efficacy and safety of traditional medicines and to provide clinical evidence [26]-[28]. The synthesis of these molecules and the evaluation of their activity in vitro and in vivo against the main protease SARS-CoV-2 could be interesting, before clinical trials [29]. In Nigeria, for example, the use of herbs for the treatment and management of infections and diseases is one of their customs [30].
The work of Kampf et al. [31] showed that the virus was sensitive to temperature and that exposure of the virus for 10 minutes at 55 °C denatured the central protein of SARS-CoV. Since there is no effective therapy or vaccine, the best measures now are to control the source of infection, early diagnosis, reporting, isolation, supportive therapy, and timely publication. Information on the epidemic to avoid unnecessary panic. For individuals, good personal hygiene, a properly fitted mask, ventilation, and avoiding crowded places will help prevent Covid-19 infection [2].

At the time of writing, the Democratic Republic of the Congo has 5,477 confirmed cases of Covid-19. Thanks to the dedication of the Ministry of Health and the response team, the DRC has successfully treated 719 individual cases, the country has 4,636 patients in care, 122 deaths since March 10, 2020 date of the appearance of the first case of Covid-19. The challenges of the Covid-19 pandemic are significant in the Democratic Republic of Congo given the vastness of the country and the difficulty of controlling internal borders. The government of the Republic learned important and life-saving measures to stop the spread of the virus and stem it. And the DRC is part of a club of countries with a low fatality rate due to Covid-19.

While advanced countries like the United States, China, Russia and Europe are struggling with insufficient equipment and testing space, Congolese should turn to nature and explore the benefits of plants Medicines as immune boosters and anti-infectives to reduce the spread of Covid-19 infection.

It is with this in mind that the Ministry of Scientific Research and Technological Innovation of the Democratic Republic of Congo, has multiplied initiatives and contacts with premium researchers on board the Congolese, in order to set up a protocol with such naturopathic characters Covid-19. This in part to slow the spread of Covid-19 i.e. prevention and, on the other hand, to propose a treatment regimen for positive cases nationwide. This while waiting for the development of a vaccine. It is in this context that we make available a plant-based protocol to fight against the Covid-19 pandemic.

II. MATERIALS AND METHODS

A. Drug

With the approval of a medical practitioner, we used azithromycin 500 mg, a broad-spectrum antibiotic prescribed following the underlying diseases in this specific case; the ineffectiveness of antibiotics against viruses is known.

B. Botanical material

We used different plants namely Eucalyptus flowers (Eucalyptus globulus Labill) or its essential oil, lemongrass leaves or its essential oil (Cymbopogon citratus), mint leaves (Mentha) or its essential oil, lemon (Citrus), ginger (Zingiber officinale), cloves (Syzygium aromaticum), wild honey (Apis mellifera). The leaves of Eucalyptus are traditionally used for the treatment of asthma, bronchitis, as a herbal tea but recently its antimicrobial, antifungal, anesthetic and anti-diabetic properties have been demonstrated [32]; but also for its antioxidant properties [33]. Lemongrass is used in the manufacture of certain drugs, it is commonly taken orally, applied directly to the skin, or inhaled as aromatherapy; its essential oil has antifungal properties. Mint leaves and ginger are used for their antioxidant properties [34], [35]. Lemon is used as a powerful antioxidant, it contains biologically active compounds such as mono- and triterpenoids, coumarins, alkaloids, phytosterols, pectin and polymethoxy flavones [36]. The clove is used as a spice in many culinary preparations but contains several properties such as antibacterial, antimicrobial, anti-inflammatory, antifungal and antioxidant, its knowledge to treat diarrhea, digestive problems, cough, anticaner, anti-ammesiac and diabetes [37]. Traditionally honey is used in the treatment of wounds as antimicrobial, pharyngitis, cough, insect bites, burns, skin problems and boils. In pediatrics, it is used in the control of skin lesions near stomas. It relieves gastrointestinal disorder, gastroenteritis, gastroesophageal reflux and in oral it is used to treat periodontal diseases, stomatitis, and halitosis. He treats dyspepsia, gastritis, peptic ulcer, constipation, diarrhea. It is also effective against liver and pancreatic diseases. Natural wild honey exerts cardioprotective and therapeutic effects against cardiac disorders and vasomotor dysfunctions induced by epinephrine [38].

C. Figures

Fig. 1. Different medicinal plants: A. Mint, B. Clove, C. Eucalyptus, D. Lemongrass, E. Lemon, F. Ginger.

D. Patients

Our study focused on 10 black patients including 2 women and 8 men who tested positive for Covid-19 symptomatic and asymptomatic. Some with a medical history such as diabetes mellitus (insulin dependent), heart disease, acute hypoxia and high blood pressure. Geographically, we have had two cases in Brazil, 2 in the Democratic Republic of Congo and 5 in Belgium. The age of the patients varied between 24 and 52 years, the treatment covered the period going from April 5 to May 30, 2020. For the patients in Belgium the test was carried out in the clinics Saint Luc (Bouge), Saint-Elisabeth (Namur) and Saint-Pierre (Brussels).

Protocol operating mode (Covalyse®)

The infusions are made in the morning and in the evening, even for taking the herbal tea.

Protocol 1

Prepare a decoction, in which the plant materials (5 cloves, crushed ginger, eucalyptus, mint, lemongrass leaves) are thoroughly washed and boiled in potable water for 15 minutes in a well-covered pot. Then cover yourself with a
cloth such as a tablecloth, a sheet for 5 minutes minimum to let infuse without the water cooling. The heat will release essential oils, precious for their concentration of active principles which with this heat will interrupt the cycle of the virus. The temperature of the infusion is around 75 °C.

**Protocol 2 (with essential oils)**

Boil the water for 15 minutes at 100 °C with the ground ginger and 5 cloves, then put a drop of each essential oil. Cover yourself with a cloth such as a tablecloth, a sheet 5 minutes minimum to let infuse without the water cooling. The heat will release essential oils, precious for their concentration of active principles which with this heat interrupts the cycle of the virus. The temperature of the infusion is around 75 °C.

**Protocol 3 (herbal tea)**

Prepare a decoction with 3 cloves, a few mint leaves, lemongrass and crushed ginger boil for 15 minutes. Pour a portion into a cup and add 1 tablespoon of honey and lemon juice. Drink the herbal tea hot.

### III. RESULTS AND DISCUSSION

Azithromycin was taken for 5 days because of two tablets per day. Four out of ten patients used azithromycin during their treatment and the other six used the azithromycin-free protocol. Eight of ten patients were symptomatic with fevers, headache, colds, coughs, asthenia, anosmia and ageusia and the other two were asymptomatic, tested positive because they had been in contact with one of the people of COVID-19.

The treatment scheme recommended in this protocol is as follows: make two infusions a day, one in the morning and another in the evening at an interval of 8 hours.

All the patients made the same observation on the first day of the infusions, they testify to a surprising and immediate effect of the disappearance of the headaches just after the infusion. One of the patients (a 38-year-old man) testified to having experienced a positive development regarding his asthenia on his third day of treatment while another on his fourth day. On the fourth day of treatment, all the patients who were symptomatic testified to having recovered all their olfactory and gustatory faculties. Four out of ten patients were cured on the fifth day of treatment and were able to resume some of their activities while remaining in quarantine as recommended by the health authorities. The other six were on the sixth day. They were able to see a full recovery and their next COVID-19 test was negative. One patient complained of an upset stomach which in our opinion was due to excessive use of lemon juice (which contains citric acid), but we were able to correct this by advising him to replace the lemon with lemongrass and also take wild honey and consult the doctor if the stomach pain persisted.

These plants, as we pointed out in the introduction, as a whole strengthen the body's immune system by providing it with the antioxidants necessary for its defense on the one hand, but also their antibacterial, antifungal and even antiviral activities, somewhere else. Although there is a dearth of information on the scientific validation of the antiviral activity of different medicinal plants, information on the antiviral activity of some of the above-mentioned substances is available in the literature. The plants are prepared under decoction and or infusion for therapeutic purposes [30].

### IV. CONCLUSION

Our research has made it possible to propose a basic treatment on the management of people infected with Covid-19 while waiting for the establishment of a vaccine in the coming days. Thanks to the results collected, we are convinced that medicinal plants have a proven effect on Covid-19 provided that the treatment is carried out in time. These plants have the advantage of being inexpensive and available around the world. We would advise that the application of our protocol be done with the assistance of a doctor, who will ensure the care of the clinic as well as the paraclinical if necessary. We request the support of the government of the Democratic Republic of Congo to the ministries of health as well as scientific research in order to support and deepen research on the various plants which could fight against the spread of COVID-19 and could thus also contribute to the curative treatment of positive cases already registered. To be able to identify the different active ingredients and phytomarkers to standardize the protocol and thus reach many interested parties.

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