# Individual's tendency to medicinal plants for COVID-19 remedy

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In December 2019, coronavirus disease (COVID-19) an outbreak initiated by acute novel respiratory syndrome coronavirus 2 (SARS-CoV-2) as an infectious disease caused by the newly discovered virus, occurred in Wuhan City, China. On the 30th of January, 2020, the World Health Organization announced the epidemic as a Public Health Emergency of Global concern. On May 18, 2020, about 4, 619, 477 laboratory-confirmed cases and 311, 847 in 216 countries deaths have been reported worldwide. The acquiring disease perceived risk has directed several leaderships to establish a different control measure.  Generally, symptoms of COVID -19 diseases are fever and dry cough, experience nasal congestion, cold and sore throat in patients. Some people become infected without showing any symptoms and without feeling ill. Most people (about 80%) recovered from the disease with no need for special treatment. This study aimed to evaluate people's resort to the prevention or treatment of this virus using medicinal plants via questionnaire.

**Keywords: COVID-19; Medicinal plants, CoronaVirus, *Nigella sativa*, *Saussurea lappa,* Frankincense, Ginger, curcuma**

## INTRODUCTION

In December 2019, a new disease emerged in Wuhan city in China caused by a new coronavirus (Yan, Chang et al., 2020). The virus spread from Wuhan to other provinces in China and then affected other countries around the world, thus COVID-19 was qualified as a pandemic disease by the World Health Organization (WHO) on the 11th of March 2020 (Ramphul and Mejias 2020). Infection by the virus leads to flu-like symptoms which may cause a fatal complication such as acute respiratory distress syndrome, and progressive pneumonia (Neurath 2020).

Similar to other coronavirus members, Beta-coronavirus as highly species specific, with some genetic variations that may substantially change their pathogenicity, host range, and tissue tropism. Adaptability pattern of the Severus's is the rise of deadly disorders for human by SARS-CoV (Peiris, Guan et al., 2004) and MERS-CoV (Zaki, Van Boheemen et al., 2012) as causative agents. COVID-19, the extremely serious disease globally that has become an urgent issue for researchers and virologists to find out a solution to overcome such deadly disease. It is could be related to the fact that, such infection was recognized as having high rate of recombination or replication in its positive-strand resulted in quick development of new viral progeny inside the host (Vellingiri, Jayaramayya et al., 2020). SARS-CoV-2 is highly susceptible to mutagenesis and structural changes which could be the main obstacle for investigations on therapeutic agents for disease management (American Society for Microbiology, 2020). On the other hand, for both viruses, bats were the natural reservoir, while humans were known as the terminal host. However, intermediate host for SARS-CoV and MERS-CoV were the palm civet and dromedary camel, respectively (Guan, Zheng et al., 2003).

Obviously, Intermediates have a vital role in cross-species transmission since might increase connection between the virus and the new host which enables for more adaptation that is essential for virus development in the new host (Brennan, Kitzman et al., 2014). It is massively important to monitor the pandemic potential of SARS-CoV-2 future host adaptation, transmissibility, pathogenicity, infectivity, and viral evolution. COVID-19, is a global health pandemic, fast advances in what is known regarding pathogens, how affects cells, and clinical features of the disease. For its quick transmission, people around the world need to increase their concerns in disease investigation, readiness as well as establishing teams and developing the power of the laboratory techniques.

Till now there is no drug or vaccine to treat coronavirus, though there are options of different treatments such as Ritonavir, Remdesivir, and Chinese traditional medicine (e.g. ShuFengjieDu Capsules and Lianhuaqingwen Capsule) (Wang, Wang et al., 2020). The use of medicinal plants for prevention/treatment of coronavirus has also been suggested in Ayurvedic medicine in Indian culture (Maurya and Sharma 2020) such as Tylophora (Yang, Lee et al., 2010), *Aloe vera*, turmeric and Neem (Srivastava, Kumar et al., 2020). However, the safety and efficiency of these treatments have not been approved yet (Wang, Wang et al., 2020).

In China, *qingfei paidu* decoction (QPD) a well-known Chinese traditional medicine was used to treat 701 COVID-19 patients, amazingly 130 of them were cured while the clinical symptoms of the disease in 286 improved, 212 were stabled, and in 51 of the cases the symptoms disappeared (Ren, Zhang et al., 2020).

On the other hand, the use of plants in Indian traditional medicine have been also suggested to cure COVID-19, such as *Justicia adhatoda, Hyoscyamus niger,* and *Verbascum thapsus* which showed an antiviral property against bronchitis (Vellingiri, Jayaramayya et al., 2020). Traditional medicinal plants can be used as a novel therapeutic agents that might be fully affecting SARS-CoV-2 and its pathways as clearly shown in Figure (1) (Vellingiri, Jayaramayya et al., 2020).

In Saudi Arabia, some people began to use medicinal plants based on prophetic and on traditional medicine. For example, *Nigella sativa* is known as black seeds which were mentioned in the hadith of the Prophet peace be upon him,
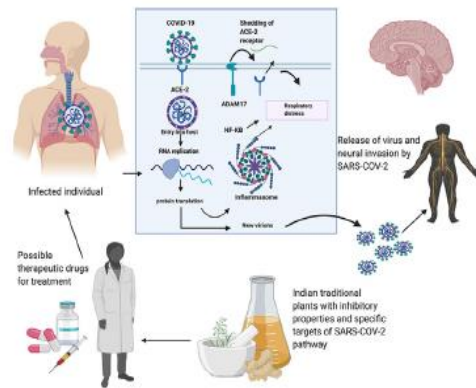


**Figure 1: pathways COVID-19 and medical plant effects on the human body (Vellingiri, Jayaramayya et al., 2020)**

"In black seed, there is a cure for every disease except poison.", has been identified as a possible inhibitor of COVID-19 (Bouchentouf and Missoum 2020). Other medicinal plants that were mentioned against coronavirus include *Saussurea lappa* (Gangarapu, Km et al., 2020), ginger (Rathinavel, Palanisamy et al., 2020), Curcuma (Goswami, Kumar et al., 2020), and Frankincense (Wang, Wang et al., 2020). A recent molecular study (Pitchiah Kumar, Sundaram et al., 2019) has reported an active molecule in *Saussurea lappa* that might inhibit the pathogenesis of the virus. On the other hand, Curcuma known as Turmeric a well-known herb in India with anti-inflammatory, antioxidant, and antiviral properties because of its active component Curcumin that boosts the immune system (Gangal, Nagle et al., 2020). Moreover, Frankincense may help in treating COVID-19 respiratory congestion (Join and Calendar , Wang, Wang et al., 2020).

This study aimed to evaluate individuals resort to medicinal plants for the prevention or treatment of COVID-19 in Saudi Arabia.

**MATERIALS AND METHODS**

A survey consisted of 20 questions was conducted online to evaluate people's belief towards medicinal plants to prevent or treat COVID-19. The participants (N=228) consent was taken before filling the survey form. The survey questionnaire divided into two sections, the first section collected the demographic information (e.g. gender, marital status, age, employment status, place of residence, urbanization, Educational level, and Job-status). The second section collected health status, knowledge, and belief. Finally, at the end of the survey, the

participants were asked to give their opinion on which medicinal plants can be used to prevent or treat coronavirus, and suggestions to increase public awareness of medicinal plants were also considered.

IBM SPSS statistics version 22 was used to analyze the data. Descriptive statistics were used to determine frequencies and percentages.

## RESULTS AND DISCUSSION

Nearly 60,000 plant origin have been applied for medicinal usage, of that around 28,000 have well-recognized applications, and about 3,000 have been traded internationally, with only one-third of them is known to be commercially cultivated (Jenkins, Timoshyna et al., 2018). Research interest towards Antiviral agents from medicinal plants started in Europe after the second World War, and in 1952 a drug company at Nottingham, England, studied 288 plants against flu virus (Jassim and Naji 2003). Available information's on international hazards to species is about 7% of pharmaceutical plant origin; 20% has been subjected to extinction based on the IUCN (Jenkins, Timoshyna et al., 2018).

In China, 80% of traditional Chinese medicine are plants, and were applied as a medication as well as preventive agents for different diseases in the post as respiratory viral infections (Vellingiri, Jayaramayya et al., 2020). An estimation of about 30% of the traditional Chinese medicine are for industrial products amount from wild plant groups. The traditional Chinese industry resource base is a mixture of supplying from China as well as from around the world. China is considered as one of the world's top of medicinal and aromatic plants (MAPs) importers, after Hong Kong, SAR, USA, Germany, and Japan, based on customs trade information registered in 2015. China exported more than 1.3 billion kg of plant items in 2013, with stated customs price across 5 billion USD, to which wild-collected stuff provided as much as 1.8 billion USD (Jenkins, Timoshyna et al., 2018). Since long time, herbs have been used to treat and prevent numerous disorders, involving respiratory viruses. Where these herbs have the beneficial of building immune-stimulating and inflammation-modulating effects of managing the immune system. The holistic approach of AYUSH systems of medicine gives focus on retention through dietary management, lifestyle modification, prophylactic interventions for immunity enhancement and simple treatments based on the appearance of the symptoms (AYUSH, 2020).

The recommended Indian preventive medicinal plants by AYUSH for COVID-19 include *Tinospora cordifolia*, *Zizyphus jujube*, and *Andrograhis paniculata* (Vellingiri, Jayaramayya et al., 2020). Moreover, (Vimalanathan, Ignacimuthu et al., 2009) studied seven medicinal plants in Tamil Nadu as a source of anti-viral activity including *Vertex trifolia, Gymnema sylvestre, Abutilon indicum, Leucas aspera, Cassia alata, Sphaeranthus indicus, Clitoriaternatea, Clerodendruminerme Gaertn, ergulariadaemi and Evolvulus alsinoides*. Amongst them *Vitex trifolia* and *Sphaeranthus indicus* have been found to reduce inflammatory cytokines using the NF-kB pathway, which has been implicated in respiratory distress in SARS-CoV (Srivastava et al.,, 2015). *Clitoria ternatea* was found to inhibit ADAM metallopeptidase domain 17 (ADAM17) that is involved in Angiotension-Converting Enzyme 2 (ACE-2) shredding that is associated with an increased formation of viruses (Ganjhu, Mudgal et al., 2015). While other plants such as *Glycyrrhiza glabra* and *Allium sativum* have been known to target the viral replication, and *Clerodendrum inerme (L) Gaertn*, found to have the potential to inactivate viral ribosome, likewise, *Strobilanthes Cusia* can block viral RNA genome synthesis and induced papain-like protease activity targeting the HCoV (Tsai, Lee et al., 2020). Other plants that have antiviral properties against bronchitis, include *Hyoscyamus niger*, *Justicia adhatoda*, and *Verbascum thapsus* reducing influenza viruses infections. On the other hand, *Hyoscyamus niger* was found to have inhibitory effects on Ca2+ channel, and a bronchodilator (Gilani, Khan et al., 2008). Outstandingly, several medicinal plants have shown inhibitory effects against ACE, these include *Boerhaavia diffusa, Cassia occidentalis, Embelia Ribes, Coscinium fenestratum, Cynara scolymus, Punica granatum, and Coriandrum sativum*(Hussain, Jahan et al., 2018, Vellingiri, Jayaramayya et al., 2020)

Other medicinal plants that have been investigated is *Nigella sativa* known as black seed and black cumin which has been used for centuries, and it's known to work as antiparasitic, antibacterial, antifungal, and antiviral (Forouzanfar, Bazzaz et al., 2014). The active component of *Nigella sativa* is Thymoquinon (TQ) that works in several molecular pathways including Caspase3,8,and 9 bax leading to apoptosis (Khan, Chen et al., 2011). Additionally, the antiviral effect of *Nigella sativa* oil was found to increase numbers of CD4+ helper T cells, and the serum level of interferon-gamma

(Forouzanfar, Bazzaz et al., 2014). Also, (Salem and Hossain 2000) study revealed an outstanding antiviral effect of *Nigella sativa* against murine cytomegalovirus (MCMV) via increasing the innate immunity. In South Asia, *Andrographis paniculata* (kalmegh) has a strong effect on viral respiratory infections in Ayurvedic and other traditional medical systems (Yarnell 2018). As *Andrographis paniculata* was found to inhibit increased NOD-like receptor protein 3 (NLRP3), caspase-1, and interleukin-1β molecules which are broadly involved in the pathogenesis of SARS-COV and likely SARS-CoV-2 as well (Vellingiri, Jayaramayya et al., 2020).

Other medicinal plants like *Eugenia jambolana* (Otake et al.,, 1995), *Euphorbia granulate* (Shanti, 2016), *Ocimum sanctum* (Rege and Chowdhary, 2014), *Ocimum kilim*, can be used to ameliorate the symptoms of COVID-19. Therefore, it is important to explore the effect of these prescribed traditional medicines on COVID-19.

The current COVID-19 epidemic dispersed to Saudi Arabia as the Ministry of Health verified the first case in on March 2, 2020.

As of May 12, the kingdom had 42,925 verified cases, the highest of the states of the Arabian Gulf with 15,257 recoveries, and 264 deaths and the last update for in fiction was 42,925 , death 264 (2020d).

The current survey study divided into two sections; the first section data obtained from respondents were analyzed (Table 1). As seen in (table 1) most of the participants that are 60.1% were female, and 50.9% of the participants were married. And it is well known that medicinal plant culture is widespread among women (Alqethami, Hawkins et al., 2017). Table (1) also shows that 97.4% and 55.3% of the sample lives in a city and holds a bachelor's degree, respectively.

Results of the second section which evaluate participant's beliefs and knowledge are shown in (Table 2).

**Table 1: Respondents' demographic frequencies and percentage**

|  | Number (n) | Percentage (%) |
|---|---|---|
| **Gender** |  |  |
| Male | 91 | 39.9 |
| Female | 137 | 60.1 |
| **Marital status** |  |  |
| Married | 116 | 50.9 |
| Single | 104 | 45.6 |
| Widow/er | 1 | 0.4 |
| Divorced | 7 | 3.1 |
| **Age** |  |  |
| 18-28 | 108 | 47.4 |
| 29-39 | 53 | 23.2 |
| 40-49 | 42 | 18.4 |
| 50-59 | 22 | 9.6 |
| 60+ | 3 | 1.3 |
| **Place of residence** |  |  |
| Central Region | 135 | 59.2 |
| Western Region | 71 | 31.1 |
| Eastern Region | 7 | 3.1 |
| Northern Region | 7 | 3.1 |
| Southern Region | 8 | 3,5 |
| **Urbenization** |  |  |
| City | 222 | 97.4 |
| village | 6 | 2.6 |
| **Educational level** |  |  |
| Elementary school | 3 | 1.3 |
| Middle school | 4 | 1.8 |
| High school | 62 | 27.2 |
| Diploma | 8 | 3.5 |
| Bachelor degree | 126 | 55.3 |
| Master degree | 7 | 3.1 |
| Philosophy degree | 18 | 7.9 |
| **Job status** |  |  |
| Government employee | 24 | 10.5 |
| private sector employee | 57 | 25 |
| free businees | 18 | 7.9 |
| unemployed | 52 | 22.8 |
| Student | 77 | 33.8 |

**Table 2: respondents' frequencies and percentage on health issue, knowledge and beliefs**

| | Number (n) | Percentage (%) |
|---|---|---|
| **Do you suffer from a chronic disease?** | | |
| Yes | 30 | 13.2 |
| No | 198 | 86.8 |
| **Do you take any prescription medications?** | | |
| Yes | 55 | 24.1 |
| No | 173 | 75.9 |
| **How often do you use medicinal plants as a treatment?** | | |
| Always | 15 | 6.6 |
| Sometimes | 110 | 48.2 |
| Rarely | 103 | 45.2 |
| **What will make you use medicinal plants?** | | |
| Cheap | 9 | 3.9 |
| Availability | 44 | 19.3 |
| Saftey | 113 | 49.6 |
| Effective | 62 | 27.2 |
| **Do you believe in the combination of modern medicine and herbal medicine?** | | |
| Yes | 196 | 86 |
| No | 32 | 14 |
| **Do you have knowledge of medicinal plants?** | | |
| Yes | 106 | 46.5 |
| No | 122 | 53.3 |
| **What is the source of your knowledge of medicinal plants?** | | |
| Family | 107 | 46.9 |
| Friends | 17 | 7.5 |
| Books | 14 | 6.1 |
| Websites | 68 | 29.8 |
| Experience | 22 | 9.6 |
| **Do you think prevention / treatment with medicinal plants effective?** | | |
| Agree | 99 | 43.4 |
| Disagree | 13 | 5.7 |
| Maybe | 116 | 50.9 |
| **Have you had any experiences of adverse reactions from the use of medicinal plants?** | | |
| Yes | 26 | 11.4 |
| No | 202 | 88.6 |
| **Do you think Corona virus can be prevented with medicinal plants?** | | |
| Yes | 73 | 32 |
| No | 20 | 8.8 |
| I don't know | 135 | 59.2 |
| **Do you think Corona virus patients can be treated with medicinal plants?** | | |
| Yes | 70 | 30.7 |
| No | 34 | 14.9 |
| I don't know | 124 | 54.4 |
| **In your opinion, what medicinal plants can be used to prevent / treat coronavirus (more than one option can be selected)** | | |
| *Nigella sativa* | 174 | 76.3 |
| *Saussurea lappa* | 56 | 24.6 |
| Frankincense | 60 | 26.3 |
| Ginger | 123 | 53.9 |
| curcuma | 64 | 28.1 |

The table showed that 49.6% beliefs that medicinal plants are safe to be used, and 86% beliefs in combining modern medicine with herb medicine. Also, it can be seen from the data in (table 2) that 46.9% their source of knowledge on medicinal plants was their family. When asked whether they think that medicinal plants could be used to prevent or treat corona virus the majority

of the respondents reported that they don't know, though around 31% respondent that they believe that medicinal plants could be used to prevent or treat coronavirus. When asked about their opinion on which plants could be used for coronavirus, 76.3% beliefs that *Nigella sativa* is the best to prevent and treat coronavirus. Respondents were also asked to suggest other plants that could be used according to their knowledge, Honey, lemon, garlic, olive oil, and dates were suggested. It was clear that respondent's suggestions are based on first their religious belief where 76.3% of the respondents agrees that black seeds can be used to prevent or treat coronavirus. Secondly, using these treatments increases body immunity since it has been well reported that body immunity increases using *Nigella sativa* (Ghasemi, Kasani et al., 2014), olive oil (Puertollano, Puertollano et al., 2007), honey (Majid, Younis et al., 2013), ginger (Ahmadifar, Sheikhzadeh et al., 2019), and lemon (Rafiee, Mazhari et al., 2016).

The results of this study showed that though most of the participants have no experience in medicinal plants, tested group showed their interest to use such materials due to their religious beliefs, as well as, safe consequences since it is a natural resource.

## CONCLUSION

The pandemic by COVID-19 is a live issue affecting people worldwide. Without fundamental therapeutic interventions, current management is to reduce the virus spread and provide supportive care for diseased patients. There is an urgent need to develop targeted therapies. Medicinal plants have been used for many decades, their sources are unlimited, and are affected by culture. The attention regarding these plants' usage in various respiratory conditions treatments are increasing. It highlights that plant-based medications may aim to decrease infections. Therefore, active investments on pharmaceutical plant investigations might help in producing vaccines or drugs to overcome COVID-19 as well as it could also develop a source of natural therapeutic agents to overcome and prevent this lethal infection

## CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

## AUTHOR CONTRIBUTIONS
Najla Ali Alburae designed and prepared the survey questionnaire, analyzed the data, wrote the manuscript, and approved the final version.

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