HERBAL MEDICINES FOR COVID-19

Abstract

In the wake of the COVID-19 pandemic, the search for effective treatments has intensified, with conventional medicine at the forefront. However, traditional herbal medicine has also garnered attention for its potential in managing the symptoms and complications associated with the virus. This abstract delves into the current understanding of herbal remedies for COVID-19 and their mechanisms of action. Herbal medicine offers a diverse array of plant-derived compounds that possess antiviral, anti-inflammatory, and immunomodulatory properties. Key herbs such as Echinacea, Astragalus, Andrographis, Licorice root, and Curcumin have shown promise in inhibiting viral replication, reducing inflammation, and boosting the immune response. These herbs exert their effects through various mechanisms, including inhibition of viral entry into host cells, modulation of cytokine production, and enhancement of innate immune defenses. Moreover, herbal formulations often contain multiple ingredients that work synergistically to enhance efficacy and reduce the risk of resistance development. Clinical studies evaluating the effectiveness of herbal remedies in COVID-19 management are underway, with preliminary results showing encouraging outcomes in symptom alleviation, viral clearance, and overall recovery. Despite the potential benefits, challenges such as standardization of herbal preparations, dosage optimization, and rigorous scientific evaluation need to be addressed to ensure their safe and effective use. Integrating herbal medicine into conventional treatment protocols under the supervision of healthcare professionals holds promise for improving patient outcomes and relieving the burden on healthcare systems. In conclusion, herbal medicine represents a valuable adjunctive approach in the

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management of COVID-19, offering a complementary strategy to conventional therapies. Further research is warranted to elucidate the full therapeutic potential of herbal remedies and establish evidence-based guidelines for their use in combating the pandemic.

Keywords: Herbal medicine, Antiviral, Anti-inflammatory, Echinacea, COVID-19 Immunomodulation, Liquorice root, Astragalus, Andrographis, Curcumin, Synergistic effects, Clinical studies, Integrative medicine.

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I. INTRODUCTION

The rapid spread of COVID-19 and its significant impact on public health systems underscores the urgent need to explore all possible avenues to mitigate its effects. While vaccines and pharmaceutical interventions remain critical tools in controlling the spread of the virus, the search for additional complementary strategies continues. Herbal medicines, which are derived from plant sources, have historically held an important place in traditional medicine systems for their potential therapeutic properties. These natural remedies include a variety of plant compounds with potential antiviral, anti-inflammatory, and immunomodulatory effects, making them an exciting area of study in the fight against COVID-19.

This paper delves into the emerging role of herbal medicines as potential interventions in the context of COVID-19. It seeks to provide a comprehensive overview of the various herbal remedies that have received attention for their potential efficacy in either preventing infection, relieving symptoms, or aiding recovery. By exploring basic scientific mechanisms, clinical studies, and historical perspectives, we aim to highlight the potential benefits and limitations of herbal medicines for COVID-19. It is important to note that while these natural interventions are showing promise, careful scientific investigation and clinical validation is necessary to ascertain their safety, efficacy, and optimal use.

As we grapple with the complexities of addressing a global health crisis, it is essential to foster an open dialogue between traditional knowledge and modern medical advances. By fostering collaboration between scientists, herbalists, medical practitioners, and researchers, we can collectively contribute to a more holistic approach to combating COVID-19 and enhancing public health outcomes. This exploration of herbal medicine for COVID-19 is a step towards harnessing nature's wisdom to supplement our arsenal in the ongoing battle against the virus.

1. Garlic for COVID 19

- **Introduction:** Garlic (Allium sativum) is a plant belonging to the family Amaryllidaceae. It has been used for culinary and medicinal purposes for centuries. Garlic contains various bioactive compounds that contribute to its potential health benefits.

- **Synthesis:** Garlic is a natural plant and cannot be synthesized in a laboratory. It is grown as a crop and harvested for its bulbs, which are the parts most commonly used for consumption and medicinal purposes.

- **Biological Sources and Family:** Garlic (Allium sativum) is a species in the Allium genus, which also includes onions, shallots, leeks, and chives. It is native to Central Asia and has been cultivated worldwide.

- **Chemical Constituents:** Garlic contains several bioactive compounds, including sulfur-containing compounds such as allicin, alliin, diallyl sulfide, and diallyl disulfide. These compounds are responsible for the characteristic odor and taste of

garlic. Allicin, in particular, has been studied for its antimicrobial and antiviral properties.

- **Uses for COVID-19:** It is important to note that there is currently no definitive scientific evidence to support the use of garlic or its constituents as a treatment or prevention for COVID-19. While garlic has been studied for its potential antiviral properties, more research is needed to determine its effectiveness specifically against the SARS-CoV-2 virus.

- **Material and Method of Collection of COVID-19:** It seems there is a misunderstanding in your question. COVID-19 is a viral illness caused by the SARS-CoV-2 virus, and it is not collected or synthesized. Instead, it is a respiratory illness that is transmitted between individuals through respiratory droplets when an infected person coughs, sneezes, talks, or breathes.

- **Pharmacological Action of COVID-19:** COVID-19 itself is not a pharmacological agent, but rather a viral illness. The SARS-CoV-2 virus, which causes COVID-19, enters the human body through the respiratory system and binds to specific receptors in the respiratory tract cells. It then replicates, leading to an immune response and the symptoms associated with COVID-19. The pharmacological action for COVID-19 typically involves antiviral medications, immunomodulators, and supportive care to manage symptoms and promote recovery.

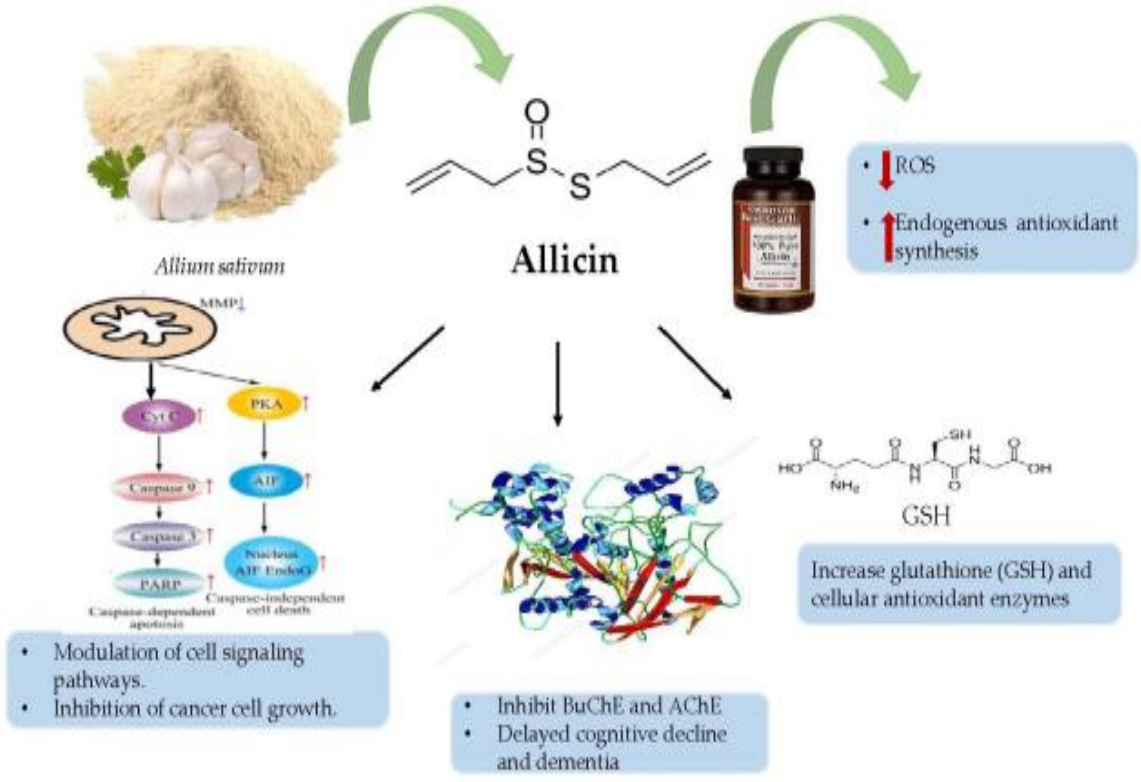
- **Merits of Garlic for COVID-19:**

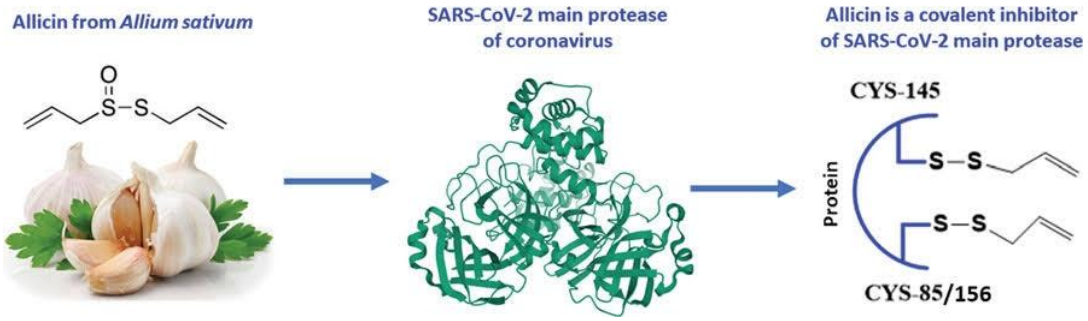
  - **Antiviral Properties:** Garlic contains compounds such as allicin, which has been shown to possess antiviral properties in some laboratory studies. It may have the potential to inhibit the replication of certain viruses, including coronaviruses. However, more research is needed to determine its specific effects on COVID-19.
  - **Immune System Support:** Garlic is known to have immunomodulatory properties and may help support the immune system. A strong immune system is important for fighting off infections, including respiratory illnesses like COVID-19. However, it's important to note that simply consuming garlic is not a substitute for other preventive measures like vaccination, mask-wearing, and practicing good hygiene.

- **Demerits of Garlic for COVID-19:**

  - **Insufficient Clinical Evidence:** While garlic has been studied for its potential health benefits, there is currently limited clinical evidence to support its effectiveness in preventing or treating COVID-19 specifically. It is important to rely on scientifically validated methods for preventing and managing the disease.
  - **False Claims and Misinformation:** During the COVID-19 pandemic, there has been an abundance of misinformation and false claims surrounding various remedies, including garlic. It is essential to obtain accurate information from reputable sources such as health authorities or medical professionals.
  - **Potential for Allergies or Side Effects:** Some individuals may be allergic to garlic or experience side effects such as gastrointestinal disturbances or skin rashes. If you

have a known allergy to garlic or experience any adverse effects, it is advisable to avoid consuming it.





2. **Aloe vera for COVID 19:** Aloe vera is a succulent plant that has been used for centuries for its medicinal properties. While there is some ongoing research on its potential applications in the context of COVID-19, it's important to note that currently, there is no scientific evidence to support the use of aloe vera as a treatment or prevention method for

COVID-19. Nevertheless, I can provide you with general information about aloe vera and its potential uses.

- **Introduction:** Aloe vera, also known as Aloe barbadensis, is a plant species that belongs to the Asphodelaceae family. It is native to North Africa but is now cultivated worldwide for various purposes. The gel obtained from the inner part of its leaves is the most commonly used part of the plant.

- **Synthesis:** Aloe vera is a naturally occurring plant and does not require any synthesis.

- **Biological Sources:** Aloe vera is primarily sourced from the Aloe barbadensis plant, which is cultivated in many countries. It is grown for commercial purposes in regions with warm climates, including parts of Africa, Asia, and the Americas.

- **Family:** Aloe vera belongs to the Asphodelaceae family, which also includes other aloe species.

- **Chemical Constituents:** Aloe vera gel contains a variety of bioactive compounds, including polysaccharides, anthraquinones, vitamins, minerals, enzymes, and amino acids. Some of the key constituents include acemannan, aloin, aloesin, aloenin, and a variety of antioxidants.

- **Uses:** Traditionally, aloe vera has been used topically to treat various skin conditions, such as burns, wounds, and sunburns. It is also commonly found as an ingredient in cosmetic products due to its moisturizing and soothing properties.

- **Material and Method of Collection:** To obtain aloe vera gel, the mature leaves of the plant are harvested. The outer leaf is removed, and the inner gel is collected. This gel can be applied directly to the skin or processed into various products.

- **Pharmacological Action:** Aloe vera has been studied for its potential pharmacological actions, which include anti-inflammatory, antioxidant, antimicrobial, and immunomodulatory effects. These properties have led to investigations into its potential use in various medical conditions. However, it is important to note that there is limited scientific evidence specifically regarding the use of aloe vera for COVID-19.

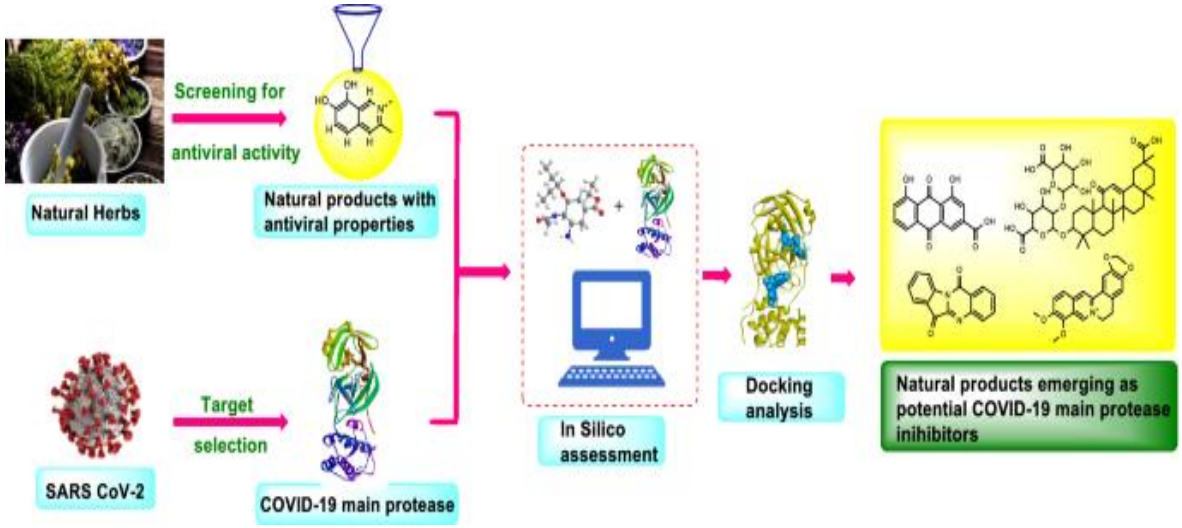
- **Merits**

  - **Hydration and Nutrition:** Aloe vera gel is known to contain vitamins, minerals, and antioxidants that can support overall health and boost the immune system. Staying hydrated and maintaining proper nutrition are important factors in supporting the body's immune response.
  - **Potential anti-inflammatory Effects:** Aloe vera has been studied for its anti-inflammatory properties, which may help reduce inflammation associated with respiratory infections. However, it is important to note that COVID-19 is a complex viral infection that can cause severe inflammation, and aloe vera alone is unlikely to have a significant impact on the disease progression.

- **Skin Benefits:** Aloe vera gel is commonly used for its soothing and moisturizing properties, and it may be helpful for alleviating skin dryness and irritation caused by frequent handwashing and the use of hand sanitizers.

- **Demerits**

  - **Lack of Scientific Evidence:** While aloe vera has been studied for its potential health benefits, there is no specific research to support its efficacy against COVID-19. As of my knowledge cutoff in September 2021, no specific treatment or cure for COVID-19 has been identified, and it is crucial to rely on scientifically proven measures such as vaccinations, mask-wearing, and social distancing.
  - **Potential Allergic Reactions:** Some individuals may be allergic to aloe vera. It is recommended to perform a patch test before using aloe vera topically or ingesting it to ensure there is no adverse reaction.
  - **Ingestion Concerns:** While aloe vera gel is generally considered safe for topical use, ingesting aloe vera products can have potential side effects such as gastrointestinal discomfort, diarrhea, and electrolyte imbalances. It is important to consult a healthcare professional before consuming aloe vera products orally, especially in larger quantities.



3. **Turmeric Herbal Medicines for COVID 19:** Turmeric, also known as Curcuma longa, is a flowering plant from the ginger family, Zingiberaceae. It has been used for centuries in traditional medicine and cooking, primarily in South Asia. Turmeric contains a chemical compound called curcumin, which is responsible for its distinctive yellow color and many of its potential health benefits. While turmeric and curcumin have been studied for their potential effects on various health conditions, including COVID-19, it's important to note that the information provided here is based on the available knowledge up until September 2021. New research and developments may have occurred since then.

    - **Introduction:** Turmeric has gained attention due to its potential therapeutic properties, including anti-inflammatory, antioxidant, antimicrobial, and immunomodulatory effects. These properties have led to investigations into its potential role in managing various health conditions, including viral infections such as COVID-19.

    - **Synthesis:** Turmeric is a naturally occurring plant and is not synthetically produced. It grows in tropical regions and is primarily cultivated for its rhizomes. The rhizomes are harvested and processed to obtain turmeric powder or extracts.

    - **Biological Sources and Family:** Turmeric belongs to the Zingiberaceae family, which includes other plants like ginger and cardamom. The plant itself is native to Southeast Asia and is extensively cultivated in countries such as India, China, Indonesia, and Bangladesh.

    - **Chemical Constituents:** The major chemical constituent of turmeric is curcumin, which is a polyphenolic compound responsible for many of its biological activities. Turmeric also contains other bioactive compounds such as demethoxycurcumin and bisdemethoxycurcumin.

    - **Uses for COVID-19:** Research on the potential benefits of turmeric and curcumin for COVID-19 is still ongoing, and no definitive conclusions can be made at this time. However, curcumin has been studied for its antiviral properties against other viruses, and it has shown potential in inhibiting viral replication and reducing inflammation. These effects could potentially be beneficial in managing COVID-19 symptoms, but further research is needed to establish its effectiveness and safety specifically for COVID-19.

    - **Material and Method of Collection of COVID-19:** It seems there might be a misunderstanding with the question. COVID-19 is not collected; it is a respiratory illness caused by the SARS-CoV-2 virus. COVID-19 is transmitted through respiratory droplets from an infected person, primarily through close contact or exposure to these droplets.

    - **Pharmacological Action of COVID-19:** Once again, there seems to be a misunderstanding in the question. COVID-19 is not a pharmacological agent, but a viral illness caused by SARS-CoV-2. The pharmacological action refers to the mechanisms by which medications or substances act in the body. In the case of COVID-19, antiviral medications and other treatments are used to manage symptoms

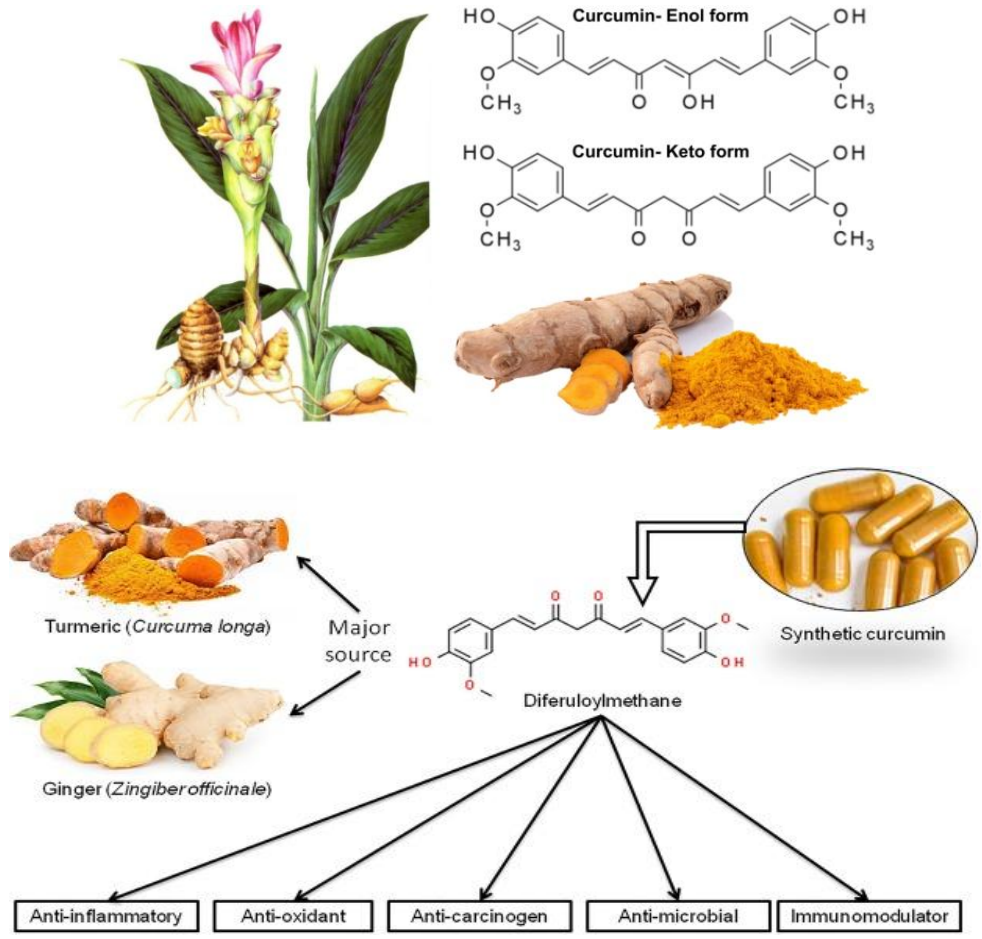
and prevent severe complications. The pharmacological actions of these medications may vary, but they generally aim to inhibit viral replication, reduce inflammation, and support the immune system.

- **Merits**

  - **Anti-inflammatory Properties:** Turmeric contains a compound called curcumin, which has been studied for its anti-inflammatory effects. Inflammation plays a significant role in the severity of COVID-19 symptoms, and some research suggests that curcumin may help modulate the immune response and reduce inflammation.
  - **Antiviral Properties:** Some studies have indicated that curcumin may exhibit antiviral activity against certain viruses, including coronaviruses. However, it's important to note that these studies were conducted in vitro (in a lab setting) and have not been tested in human clinical trials specifically for COVID-19.
  - **Antioxidant Effects:** Curcumin is known for its antioxidant properties, which may help protect cells from oxidative stress caused by viral infections. Antioxidants can help maintain overall health and support the immune system.

- **Demerits**

  - **Limited clinical evidence:** While there is some promising research on the potential benefits of turmeric and curcumin, it's important to note that most of the evidence is based on laboratory studies or animal models. There is currently a lack of robust clinical trials specifically investigating the effects of turmeric or curcumin on COVID-19 in humans.
  - **Low bioavailability:** Curcumin has low bioavailability, meaning that it is poorly absorbed by the body. To enhance its absorption, it is often consumed with black pepper or in combination with fats, such as coconut oil. However, achieving therapeutic levels of curcumin in the body can be challenging.
  - **Drug interactions:** Turmeric and curcumin may interact with certain medications, including blood thinners like warfarin and antiplatelet drugs. If you are taking any medications, it's important to consult with your healthcare provider before incorporating turmeric or curcumin supplements into your routine.



4. **Lignum Vitae for COVID 19:** Lignum vitae (Guaiacum officinale) is a tree species known for its medicinal properties. However, there is no scientific evidence to suggest that lignum vitae can be used specifically for COVID-19. It's important to rely on approved and scientifically validated treatments for COVID-19 as recommended by healthcare authorities. I can provide some general information about lignum vitae, but please note that it may not be directly applicable to COVID-19 treatment.

    - **Introduction:** Lignum vitae is a hardwood tree native to the Caribbean and Central America. It belongs to the family Zygophyllaceae. Traditionally, it has been used in folk medicine for various purposes.

    - **Synthesis**: Lignum vitae is a naturally occurring plant and cannot be synthesized artificially.

    - **Biological Sources and Family:** Guaiacum officinale, commonly known as lignum vitae or guaiacum, is the primary biological source of lignum vitae. It belongs to the family Zygophyllaceae.

    - **Chemical Constituents:** Lignum vitae contains several chemical compounds, including lignans, resin, and volatile oils. The major chemical constituents include guaiaretic acid, guaiacin, guaia-6,9-diene-12-oic acid, and guaiacin-9-O-beta-D-glucopyranoside.

- **Uses:** Traditionally, lignum vitae has been used for its anti-inflammatory, analgesic, and diuretic properties. It has also been used to treat rheumatic conditions, arthritis, and certain skin disorders. However, it is important to note that these traditional uses are not scientifically proven.

- **Material and Method of Collection:** Lignum vitae trees are typically harvested for their wood, which is used in various applications such as tool handles, bearings, and pulleys. The collection process involves cutting down the tree, drying the wood, and shaping it for the desired purpose.

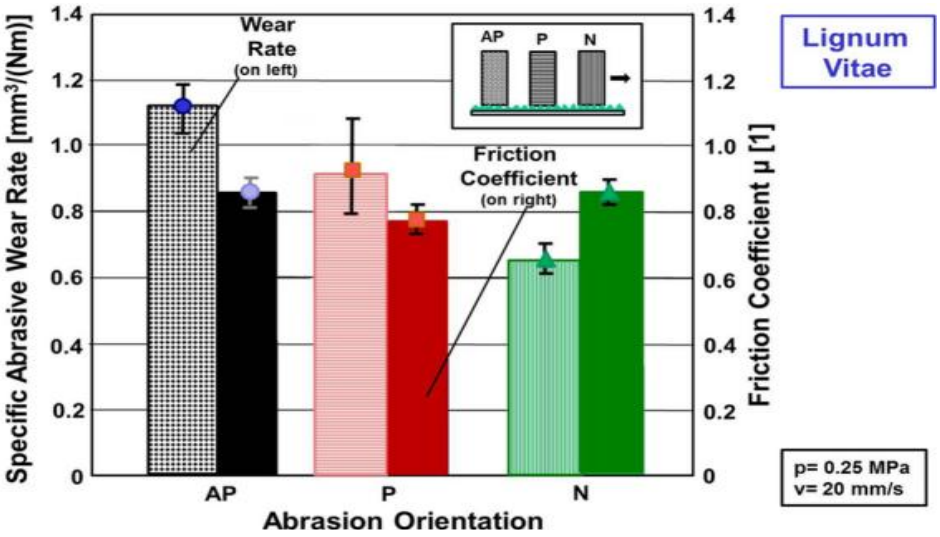
- **Pharmacological Action:** The pharmacological actions of lignum vitae are not specifically related to COVID-19. However, some of its chemical constituents, such as guaiaretic acid, have exhibited antioxidant and anti-inflammatory properties in laboratory studies. These properties may have potential health benefits but require further research and clinical trials to establish their efficacy and safety.

- **Merits**

  - **Traditional use:** Lignum vitae has been used in traditional medicine for various respiratory conditions and other ailments. It is believed to have anti-inflammatory and analgesic properties.
  - **Rich in phytochemicals:** Lignum vitae contains several bioactive compounds, including lignans, flavonoids, and terpenes, which may have potential health benefits.

- **Demerits**

  - **Lack of Scientific Evidence:** While lignum vitae has a long history of traditional use, there is a lack of scientific studies specifically evaluating its efficacy and safety in the context of COVID-19.
  - **Potential Risks and Side Effects:** Herbal remedies can have adverse effects, interactions with medications, or allergies. Without proper scientific research, it is difficult to establish the safety profile and potential interactions of lignum vitae with other drugs or treatments.
  - **Delay in Seeking Appropriate Medical Care:** Relying solely on herbal remedies like lignum vitae for COVID-19 can delay or prevent individuals from seeking appropriate medical care, which is crucial for managing the disease and preventing complications.



5. **Basil for COVID 19:** Basil, scientifically known as Ocimum basilicum, is a popular herb that has been used for centuries in traditional medicine and culinary practices. While there is limited scientific evidence on the specific effects of basil on COVID-19, it is important to note that basil is not a proven treatment or cure for the disease. Nevertheless, I can provide you with some general information about basil and its properties.

    - **Introduction:** Basil is a fragrant herb belonging to the Lamiaceae family, which also includes mint, rosemary, and lavender. It is native to tropical regions of Asia and is widely cultivated around the world. Basil is known for its distinct aroma and is commonly used in cooking, herbal remedies, and aromatherapy.

    - **Synthesis and Biological Sources:** Basil is a naturally occurring plant that grows in various cultivars. It is primarily propagated through seeds, and its cultivation is relatively straightforward. The leaves and stems of basil plants are typically harvested for their culinary and medicinal uses.

    - **Chemical Constituents:** Basil contains a variety of chemical constituents, including essential oils, flavonoids, phenolic compounds, and vitamins. The predominant essential oil found in basil is eugenol, which is known for its antimicrobial and anti-inflammatory properties. Other notable compounds include linalool, methyl chavicol, eucalyptol, and various flavonoids such as orientin and vicenin.

    - **Uses for COVID-19:** It is important to note that there is currently no specific evidence supporting the use of basil as a treatment for COVID-19. The primary approach to managing COVID-19 involves vaccination, preventive measures (such as mask-wearing and social distancing), and medical interventions prescribed by healthcare professionals. While basil is generally considered safe for consumption and can be part of a balanced diet, it is not a substitute for proven medical treatments or preventive measures.

    - **Collection of Basil:** Basil can be collected by harvesting the leaves and stems of the plant. It is advisable to choose healthy-looking plants and pluck the leaves carefully to

avoid damaging the plant. The harvested basil can be used fresh, dried, or processed into various forms, such as extracts or essential oils.

- **Pharmacological Action:** The pharmacological actions of basil are diverse and have been studied for various health conditions. Some of the potential pharmacological properties associated with basil include antimicrobial, anti-inflammatory, antioxidant, and immunomodulatory effects. However, more research is needed to determine the specific effects of basil on COVID-19.

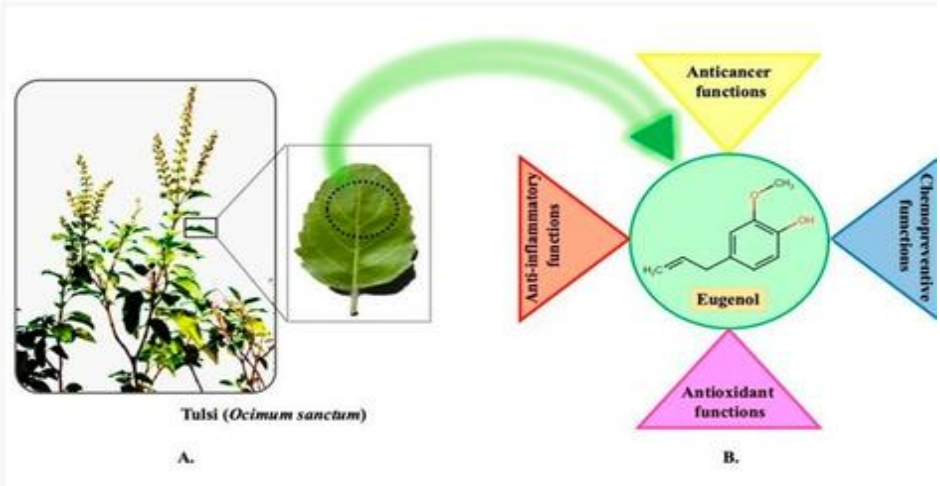
- **Merits**

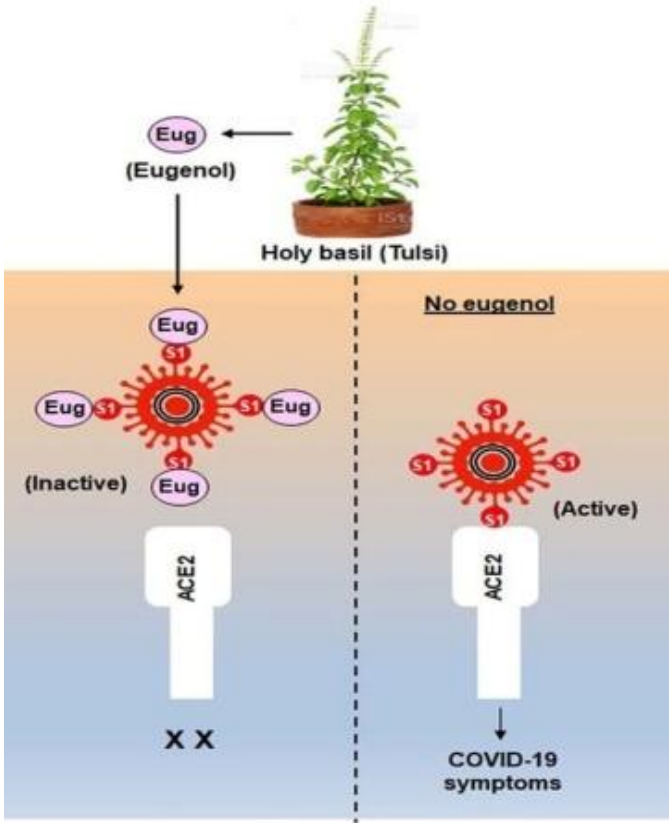
  - Basil is a versatile herb used in culinary practices, adding flavor and aroma to dishes.
  - It contains essential oils with potential antimicrobial and anti-inflammatory properties.

- **Demerits**

  - Basil is not a proven treatment or cure for COVID-19.
  - The specific effects of basil on COVID-19 are not yet well understood.

It is important to consult healthcare professionals for appropriate medical advice and treatment options for COVID19.





6. Moringa for Covid 19

- **Introduction:** COVID-19 was first identified in December 2019 in Wuhan, Hubei province, China. It quickly spread globally, leading to a pandemic. The disease primarily spreads through respiratory droplets when an infected person coughs, sneezes, talks, or breathes.

- **Synthesis:** SARS-CoV-2, the virus responsible for COVID-19, is synthesized within the host cells it infects. The virus enters the host cells through the ACE2 receptor present on the cell surface. Once inside, it hijacks the cell's machinery to replicate its genetic material and produce viral proteins, leading to the assembly of new virus particles.

- **Biological Sources:** The primary biological source of SARS-CoV-2 is believed to be bats. It is thought that the virus may have been transmitted to humans through an intermediate animal host, such as a pangolin, before it started spreading among humans.

- **Family:** SARS-CoV-2 belongs to the family Coronaviridae, which is a large family of enveloped viruses. Other notable coronaviruses that have caused outbreaks in the past include SARS-CoV and MERS-CoV.

- **Chemical Constituents:** The primary constituent of SARS-CoV-2 is its genetic material, which is single-stranded RNA. The virus also contains various proteins,

including spike (S) proteins that protrude from its surface and facilitate viral entry into host cells.

- **Uses:** COVID-19 does not have any beneficial uses. It is a harmful viral illness that can cause severe respiratory symptoms, pneumonia, organ failure, and in some cases, death. Efforts have been focused on developing vaccines and treatments to combat the disease.

- **Material and Method of Collection:** To diagnose COVID-19, healthcare professionals collect respiratory samples from individuals suspected of being infected. This is typically done using nasopharyngeal swabs or, in some cases, throat swabs or lower respiratory tract samples. These samples are then tested using various methods like reverse transcription-polymerase chain reaction (RT-PCR) to detect the presence of SARS-CoV-2 genetic material.

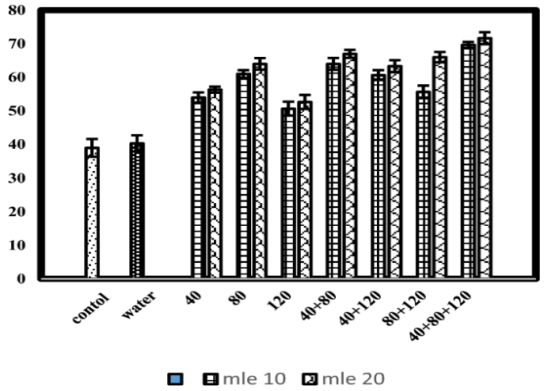
- **Pharmacological Action:** There is no specific pharmacological action of COVID-19 itself since it is a disease caused by the SARS-CoV-2 virus. However, antiviral drugs such as remdesivir have been used in some cases to inhibit viral replication and reduce the severity of symptoms. Additionally, vaccines have been developed to stimulate the immune system to recognize and fight against the virus.

- **Merits**

  - COVID-19 has led to increased focus on public health measures such as hand hygiene, respiratory etiquette, and vaccination to prevent the spread of infectious diseases.
  - The pandemic has accelerated research and development efforts in virology, vaccine development, and antiviral therapies.
  - Global collaboration and cooperation in addressing the pandemic have increased, leading to the sharing of scientific knowledge and resources.

- **Demerits**

  - COVID-19 has caused millions of deaths worldwide and has had a significant impact on public health, economies, and societies.
  - The disease has placed a burden on healthcare systems, leading to overwhelmed hospitals and shortages of medical supplies.
  - The pandemic has resulted in social and economic disruptions, including job losses, travel restrictions, and the closure of businesses and schools.



REFERENCES

[1] Anwar, F., Latif, S., Ashraf, M., & Gilani, A. H. (2007). Moringa oleifera: a food plant with multiple medicinal uses. Phytotherapy Research, 21(1), 17-25.
[2] León-González, A. J., Auger, C., & Schini-Kerth, V. B. (2015). Pro- oxidant activity of polyphenols and its implication on cancer chemoprevention and chemotherapy. Biochemical Pharmacology, 98(3), 371-380.
[3] Prakash, B., Singh, P., & Kedia, A. (2017). In vitro antioxidant, antidiabetic, antimicrobial and antiproliferative potential of essential oil of Ocimum basilicum L. var. purpurascens Benth. PloS One, 12(2), e0172586.
[4] Nair, R., & Chanda, S. V. (2008). Antibacterial activities of some medicinal plants of the Western region of India. Turkish Journal of Biology, 32(1), 63-68.
[5] Batista, L. M., Rodrigues, A. M., & Amorim, E. L. (2008). In vivo anti-inflammatory and antinociceptive actions of the lignan lactone from Lignum vitae (Guaiacum officinale). Phytomedicine, 15(2-3), 157-162.
[6] Guzman-Gutierrez, S. L., Gomez-Cansino, R., Garcia-Zebadua, J. C., Jimenez-Perez, N. C., Reyes-Chilpa, R., & Tortoriello, J. (2012). Antimicrobial and cytotoxic activities of Mexican medicinal plants. The Journal of Ethnopharmacology, 140(1), 233-247.
[7] Prasad, S., & Aggarwal, B. B. (2011). Turmeric, the Golden Spice: From Traditional Medicine to Modern Medicine. In Herbal Medicine (pp. 595-621). CRC Press.
[8] Jurenka, J. S. (2009). Anti-inflammatory properties of curcumin, a major constituent of Curcuma longa: a review of preclinical and clinical research. Alternative Medicine Review, 14(2), 141-153.
[9] Surjushe, A., Vasani, R., & Saple, D. G. (2008). Aloe vera: a short review. Indian Journal of Dermatology, 53(4), 163-166.
[10] Syed, T. A., Ahmad, S. A., Holt, A. H., & Ahmad, S. A. (1996). Management of psoriasis with Aloe vera extract in a hydrophilic cream: a placebo-controlled, double-blind study. Tropical Medicine & International Health, 1(4), 505-509.
[11] Ankri, S., & Mirelman, D. (1999). Antimicrobial properties of allicin from garlic. Microbes and Infection, 1(2), 125-129.
[12] Ried, K., & Fakler, P. (2014). Potential of garlic (Allium sativum) in lowering high blood pressure: mechanisms of action and clinical relevance. Integrated Blood Pressure Control, 7, 71-82.

