



# Harnessing the Power of Indian Medicinal Plants: Traditional Knowledge and Modern Applications in Herbal Medicine

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## KEYWORDS

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## ABSTRACT:

In light of ongoing global health challenges, the focus has shifted beyond the initial COVID-19 context to explore sustainable and effective solutions. Respiratory infections transmitted through respiratory droplets remain a persistent concern, even with widespread vaccination efforts. Masks continue to be vital in reducing pathogen transmission, but the surge in demand has led to shortages and increased prices, prompting many to turn to homemade cloth masks. Researchers worldwide have been investigating innovative ways to enhance the efficacy of these homemade masks, with one promising approach involving the infusion of medicinal herbs into cloth mask materials, imparting them with anti-bacterial and anti-viral properties. This concept not only addresses the need for effective protection but also aligns with environmentally conscious practices, offering a sustainable alternative to non-biodegradable masks. By synthesizing herbal-infused cloth masks, we can bridge the gap between traditional wisdom and modern science, promoting both public health and ecological responsibility. This paper explores the synthesis, properties and applications of these herbal-infused cloth masks, shedding light on their potential to provide multifaceted solutions for personal protection and environmental preservation.

## Introduction

In recent years, the world has witnessed the emergence of a novel coronavirus, SARS-COV-2, which originated in Wuhan, China, in December 2019 and subsequently led to a global pandemic declaration by the WHO in March 2020. This infectious disease has posed significant challenges to public health, with its ability to spread efficiently between humans and from humans to animals, making it a pervasive threat. The global impact of the COVID-19 pandemic has been profoundly affecting daily life across the world. The pandemic has presented itself in waves, each with the potential to disrupt regularity and exact a toll in lives lost [1]. The importance of responsible human behavior in curbing the

virus's spread has become evident, with infection rates remaining a concern, particularly in the absence of comprehensive precautions. Beyond the realm of infectious disease control, the use of masks hold significance in various other fields. They play a crucial role in occupational safety, particularly in industries where exposure to hazardous particles or chemicals is a concern. Additionally, masks find applications in dust control, air quality improvement, and protection against environmental allergens. Furthermore, masks have been instrumental in preserving cultural traditions and customs, such as in artistic performances, and they serve as a form of self-expression and identity. Consequently, the importance of adhering to fundamental preventive



measures and COVID-19 protocols, such as mask-wearing, hand hygiene, and social distancing, remains crucial not only for pandemic control but also for addressing a spectrum of health and cultural needs [2].

Masks have emerged as pivotal tools in halting the transmission of respiratory pathogens, such as the coronavirus, which primarily spreads through respiratory droplets. These facial coverings serve as effective shields, covering the nose and mouth to prevent the entry of foreign droplets into the body. Consequently, the demand for masks has surged significantly, with a plethora of options available in the market, each claiming varying degrees of efficiency. However, the global shortage of raw materials required for manufacturing N-95 masks, considered among the most effective available, has led to exorbitant pricing, rendering them unaffordable for a large portion of the population [3]. In light of these challenges, the most practical recourse for individuals is to create their masks using cloth at home. Studies have demonstrated the efficacy of homemade cloth masks to a certain extent, and ongoing scientific efforts are focused on revolutionizing their design and materials to enhance their potential as barriers against viral transmission [4].

In addition to the contemporary emphasis on mask utilization, traditional Indian medicinal practices dating back to ancient times have gathered global recognition for their efficacy in treating various diseases. These medicinal plants have demonstrated their ability to mitigate the effects of respiratory ailments including the flu with scientific evidence supporting their role in bolstering the body's immune response. This paper explores the integration of traditional Indian medicinal herbs into cloth masks, combining ancient wisdom with modern science to enhance not only personal protection but also overall well-being. Various studies show that medicinal plants have been utilized in the production of antimicrobial drugs. Plants like *Azadirachta indica*, *Ocimumtenui florum*, etc have an anti-viral property which stops replication of viruses. Herbs like *Curcuma longa*, *Zingiber officinale*, *Allium sativum*, etc have anti-microbial properties and are immuno-modulator plants. Covid-19 is also a flu-like disease and there are speculations that Indian medicinal plants might prove to be one of the novel treatment options. No medicine can kill this virus but a person's antibody can fight against the virus and overcome its effect. Therefore, building

immunity is the most important requirement of the human body in this pandemic situation [5]. In this research proposal, we aim to investigate the impact of incorporating an additional layer of medicinal herb extracts into masks, thereby endowing them with potent anti-viral and anti-bacterial properties [6].

## Discussion: Significance of medicinal plants

In the realm of public health and preventive measures, the utilization of face masks has emerged as a critical strategy in reducing the transmission of respiratory pathogens. The primary focus of these measures is not limited to COVID-19 but extends to the broader context of infectious diseases [7]. Face masks, serving as protective coverings for the mouth and nose, are crafted from various materials, including cloth and synthetic fibers, and are designed to mitigate the spread of infectious agents. Their significance in disease control is well-established, as they serve a dual preventive role by safeguarding both the wearer and those in close proximity from potential infection [8]. By reducing respiratory emissions from an infected individual, these masks play a pivotal role in limiting the spread of acute respiratory infections, extending beyond the scope of the COVID-19 pandemic [9].

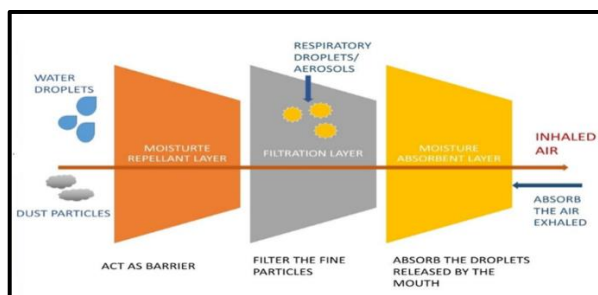
A wide array of face mask varieties is available in the market, each with its unique characteristics and levels of effectiveness. These include bandanas, homemade cloth masks, T-shirt masks, neck gaiters, balaclavas, disposable surgical masks, cone-style masks, N95 respirators, and KN95 masks, among others. The diversity of options can make the selection of an appropriate mask challenging. For instance, bandanas, despite their convenience, exhibit relatively low filtration efficiency, approximately 11.3% [10]. Neck gaiters and balaclavas, while allowing for layering, still offer limited protection due to their lower filtration efficiency [11]. Homemade cloth masks, on the other hand, vary in effectiveness depending on factors such as construction, fabric type, number of layers, and maintenance. Densely woven cotton fabrics have been identified as the most suitable material for effective homemade masks, with a three-layered design comprising hydrophobic, filter, and hydrophilic layers demonstrating superior performance [12].

However, it is essential to note that cloth masks have moisture retention properties, and their filtration



efficiency may decrease with extended use. Consequently, they are not recommended for healthcare workers due to the risk of reduced filtration and increased infection risk [13]. In contrast, surgical face masks, or medical masks, offer excellent protection by filtering approximately 60% of microorganisms from the air. They are particularly crucial for healthcare professionals who encounter infected individuals regularly [14]. N95 respirators stand out as highly effective masks, capable of filtering up to 95% of smaller particles and providing superior protection. Nevertheless, they are primarily reserved for healthcare workers due to their limited supply and single-use nature. It is imperative to emphasize that any mask usage is better than none, as advocated by global health authorities such as WHO and CDC, for the safety and well-being of all individuals [15]. While concerns regarding elevated carbon dioxide levels with mask usage exist, scientific evidence supporting such claims remains elusive. Masks are designed to be breathable, and while there may be some CO<sub>2</sub> retention in specific cases, proper hygiene and mask usage are essential to mitigate any potential issues.

In light of the ongoing pandemic, vaccine development has been instrumental in reducing the severity of COVID-19; however, full efficacy remains elusive. Thus, enhancing immunity through various means has become paramount. The Ministry of AYUSH, Government of India, has recommended guidelines to boost immunity, drawing from the principles of Ayurveda [16]. Traditional systems like Ayurveda offer insights into epidemic management and the potential for curative phytoconstituents as long-term solutions to pandemics [17]. It is therefore possible to characterize some curable phytoconstituents against this novel virus as a long term solution [18].



**Figure 1:** Diagrammatic representation of a three-layered face mask.

### Anti-viral aspects of numerous Medicinal Plants and Herbs

Various plants and herbs have effective antiviral, antifungal and antimicrobial properties (Fig 2)

#### . *Curcuma longa* (Turmeric):

*Curcuma longa* contains curcumin and it has been reported that by inhibiting hemagglutination activity curcumin nullified influenza virus infectivity. Turmeric inhibits the virus infection at the first step as the virus incubated with curcumin loses its infectivity. In a study it was found that curcumin prevented the growth of all DENV serotypes, but showed the highest anti-viral activities against DENV-4 against other DEVN serotypes [19]. The derivatives of curcumin which are found in the rhizome of this plant have been proved to show tremendous anti-viral property against HSV-1 *in-vitro*. Curcumin has also been found anti-viral against several other viruses such as HIV, Herpes simplex virus 2 (HSV-2), Chikungunya virus (CHIKV), Zika virus (ZIKV), Human Papillomavirus (HPV), and hepatitis virus [20]. It has been found that curcumin prevents the replication of SARS-CoV and restrained 3CI protease enzymes [21]. As curcumin has proved to be a massive component in prevention of multiple viruses so it can also be useful against coronavirus.

#### *Zingiber officinale* (Ginger):

*Zingiber officinale* has a high concentration of potent plant compounds which makes it an impressive anti-viral herb. In test tube research it was reported that ginger extract has anti-viral properties against RSV, Feline Calicivirus (FCV), and Avian Influenza. The rhizome of ginger has been proven to show tremendous anti-viral effect against Human Respiratory Syncytial Virus (HRSV) as it lowers the plaque formation by HRSV in respiratory mucosal cells. Ginger in high concentration stimulates mucosal cells which then secrete IFN- $\beta$  that is responsible for preventing viral infections by reducing viral attachment and internalization. Lyophilized juice extract of ginger has been proven to have an anti-viral effect against Hepatitis C viral infection. The aqueous extract has an anti-viral effect against FCV [22]. Ginger is considered as a standard drug and has a broad range of medicinal activity. One of the symptoms caused by coronavirus is cold, taking ginger extract is considered as one of the effective herbal medicines for protection



against COVID-19. It also helps in speeding up recovery in covid positive patients. Adding to these properties there are specific compounds in ginger such as Zingerone and Gingerols which prevent viral replication and prevent the virus from entering host cells as well.

#### ***Azadirachta indica* (Neem):**

*Azadirachta indica* has an anti-fungal, antimicrobial, and anti-viral effect. It has an immune modulatory and pro-inflammatory cytokine inhibitor effect. Neem conjointly has ACE inhibitor action that has high inhibition against COVID-19 main protease [23]. The extract of neem has been found to show an inhibitory effect against Polio Virus, Coxsackie B group virus, HIV, and Dengue virus as neem extract acts as a virucidal agent. The NBE (Neem Bark Extract) blocks the HSV-1 virus attachment and its entry process. During the formation of cell polykaryocytes and cell to cell fusion assay NBE blocks the viral spread [24].

#### ***Allium sativum* (Garlic):**

Flavonoids that are present in *Allium sativum* have very high inhibitory action against viral replication. Phytochemicals present in it block the formation of protein and genetic material of viruses. Compounds that contain sulfur in garlic like quercetin, allicin, diallyl disulfide, diallyl trisulfide, and others react with thiol groups of various enzymes e.g. alcohol dehydrogenase, thioredoxin reductase, and even disulfide bonds which are critical for microorganism's survival [25]. These chemicals allicin and quercetin inhibit the virus attachment to the host cell, alter transcription and translation of viral genome in the host cell and affect viral assembly. The formation of hydrogen bonds between serine-type protease and garlic bio-activates the active site regions that inhibit COVID-19 outbreak in the body. In a research study, it was found that 23 adults were affected with warts that are caused by the human papillomavirus. After the application of garlic paste on affected areas, exterminated warts in all of them within 3 weeks [26]. Garlic has also been found effective against rhinovirus, HIV, herpes simplex, virus 2, rotavirus, cytomegalovirus, and viral pneumonia [25].

#### ***Ocimum tenuiflorum* (Tulsi):**

Tulsi is also known as "Queen of Herbs". Besides having anti-viral properties, the holy basil has antioxidant, anti-inflammatory, anti-bacterial, hepatoprotective,

cardioprotective, and immunomodulatory properties. Tulsi is an anti-viral agent which includes secondary metabolites (such as Eugenol, Apigenin, Ursolic acid, Linalool, etc.) and act against many viruses. The aqueous extract and essential oil of Tulsi were assessed for patients affected by viral encephalitis. The essential oil and aqueous extract of Tulsi possesses an inhibitory effect against the growth of viruses like Polio Virus type-3, Infectious Pancreatic Necrosis Virus (IPNV), Hepatitis B Virus, White Spot Syndrome Virus (WSSV) in shrimp and RNA virus viz. Coxsackie Virus B1 (CVB1), Herpes Virus (HSVP), Adenoviruses (ADV), and Enterovirus 71 (EV71). It is recommended that if we daily chew tulsi leaves or add them in soup, food, etc it can help in fighting against viral infections and boost our immunity [27].

#### ***Piper nigrum* (Black pepper):**

Black pepper contains piperine which helps in killing bacteria, fungi, and parasites. On binding with the SARS-COV-2 virus it can also inhibit its effect. It has also been reported that piperine could inhibit the Methyltransferase of Dengue and VP35 interferon inhibitory domain of the Ebola virus. Piperine, which is present in black pepper, has a high affinity towards viral proteins. Piperine shows high anti-viral properties in chloroform extract than in methanolic extract [28].



**Figure 2:** Picture of some medicinal plants.

#### **Ayurvedic Anti-viral herbs**

#### ***Phyllanthus niruri* (Bhumiamalaki):**

*Phyllanthus niruri* has been in use for over 2000 years. It is a great anti-viral, immuno-modulator herb and shows some anti-bacterial properties as well. The research



conducted on “*P. nirurias* an immunomodulator against Covid-19” resulted that it can act as an immunomodulator for Covid-19 and can improve the functioning of some nonspecific as well as specific immune system components [29]. Neruiside present is an active component that has an anti-viral activity that extends to Human ImmunoDeficiency Virus by inhibiting the reverse transcriptase enzyme. It is extensively used to treat Jaundice, Hepadna Virus, and Hepatitis-B Virus [30]. It is also used in Liver disorders, Kidney disorders, Diabetes, Hypertension, Dyslipidemias, Gout, and Cancer.

#### ***Semecarpus anacardium* (Bhallatak):**

*Semecarpus anacardium* is Rasayana and has been used in kapharogas. Bhallatak is a thyroid and metabolic stimulant and inhibits replication of the virus, has anti-inflammatory and anti-viral properties. The presence of flavonoid in *S. anacardium* at a concentration of 400 mg/mL shows anti-fungal activity. Studies have been shown that alcoholic extract of dry nuts of *Semecarpus anacardium* shows important antimicrobial activity against some Gram-Negative (*Proteus vulgaris*, *Escherichia coli*) and Gram-Positive bacteria (*Bacillus subtilis*, *Staphylococcus aureus*) [31].

#### ***Andrographis paniculata* (Kalmegh):**

*Andrographis paniculata* has been in use for the past 200-300 years as it possess anti-viral, immuno-modulator, and anti-bacterial properties. A research study investigated that paniculata ethanol extract inhibited SRV virus that is similar to positive control Lamivudine, which is a class of medications called nucleoside reverse transcriptase inhibitors (NRTIs) and is used to treat different viral infections such as Hepatitis-B and HIV [32]. The compound Andrographolide which is a diterpenoid present in stems and leaves of this plant has been proved to be anti-viral against Influenza A Virus (H9N2, H5N1, H1N1), Hepatitis B and C virus, Herpes Virus, Human papillomavirus, HIV, Epstein-Barr virus, and Chikungunya virus. Considering its anti-viral properties against a variety of viruses, its efficacy can be tested against the Coronavirus. Kalmegh is also an appetizer and liver stimulant [17].

#### ***Swertia chirata* (Chirayata):**

*Swertia chirata* has been in use for over 2000 years and cures many infections. It has properties like anti-

inflammatory, anti-bacterial, immuno-modulator, and anti-viral. Tests performed both at the cellular and molecular level showed its anti-viral effect against Herpes simplex virus type-1. *S.chirata* inhibited more than 70% of plaque formation [33]. Even after wearing the masks, there is a risk of coronavirus entering our body but as this plant inhibits the formation of plaque (when the induced virus replicates and spread it forms an area of cell destruction) so it can also be used to prevent the cell destruction and plaque formation by Corona Virus after it enters our cells.

#### ***Euphorbia thymifolia* (Dughdhika):**

Besides being anti-viral and immuno-modulator it's also used in treating skin diseases, cough and asthma. The ethyl acetate (extract and 3-Ogalloyl-4,6-(S)-hexahydroxydiphenoyl-d-glucose (3OG46HG) of this plant was used to study in vitro anti-HSV-2 activity and it has been proved to reduce the Herpes Simplex Virus (HSV-2) infectivity. The study demonstrated ethyl acetate extracts at a concentration of 4.0 u/ml reduced virus infectivity and 3OG46HG at a concentration of 0.5  $\mu$ /ml diminished the virus [34]. This extract can also be used in treating covid-19 cases.



**Figure 3:** Some medicinal plants that have anti-viral properties.

#### **Case Studies**

A patient aged 43 years, living in New York, United States of America (USA), was diagnosed with COVID-19 and was treated with some available ayurvedic tablets. He had previously consulted doctors for many conditions



and has taken ayurvedic treatment for skin issues, disturbed sleep, intermittent cough, skin itching, dryness, and hypothyroidism. He was under ayurvedic treatment for the past 7 years. As soon as he developed fever he stopped taking his ayurvedic medications: 1 Tab Bid, *Ekavi shatika Guggulu* - 2 Tab Bid, *Khadirarishta* – 45 mL after food, Bid, *Duruvidi Taila/Nalpamaradi Thailam* for external use, *Anu Taila*– Nasal drops once a day, which he was prescribed from 27.1.2020 for a period of 1 month. Also, the patient was not a known cause for any other comorbidities. On the onset of COVID-19, he has prescribed three very classical medicines *Sudarshan Churna* which help in reducing all the three doshas and cures all types of fevers: *Agntujajwara*, *Sannipatajwara* etc. *Dhanvanatara Gutika* which helps to cure *Svasa*, *Kasa*; *Vaataalunomana* (aiding the normal flow of *vayu*), *Talisadi Churna* which cures *Jwara Svasakasa*, *aruchi* (loss of taste); *Deepanam* (stimulates digestion). These medicines resulted in subsidizing the symptoms except smell and taste when his fever reached a peak temperature of 103°F. Resolution of fever (*Jawara Multi Lakshanas*), body ache, the cough was seen on Day 7 with the return of appetite. And the last symptom, his sense of taste was observed on Day 16. It had been seen that management of COVID-19 with Ayurvedic medicines did not deteriorate his health nor he face breathlessness despite having a serious cough and fever. This patient recovered in just 7 days. Though his case was considered mild to moderate, taking Ayurvedic medicines and proper diet rescued him turning critically ill [35]. Another case study is about a 56-year-old healthy male of average height and 76 Kg weight. He is an Ayurvedic physician by profession and practices principles of Ayurveda in his lifestyle. He does not have any history of addiction. Ever since the coronavirus pandemic broke, he had been taking special care of his body by doing few activities daily to keep the body active and as precautionary measures to prevent the disease. Some of these are drinking hot water every morning and in between the day, drinking golden milk (5 g Turmeric), taking Giloy (*Tinosporacordifolia*), and Ashwagandha (*Withaniasomnifera*) in 500 mg tablets once a day. He also took Sanjeevani Vati (125 mg) once a day with healthy and nutritious food rich in phytonutrients. He used to have a sleep of 7 to eight hours every night. Suddenly one day he woke with severe upper backache and malaise. He also felt mild fever which increased the next day to a maximum of 103°F. Also experienced an

increase in backache Intensity, loss of appetite, loss of taste, and dry cough. The next day the oxygen saturation came down to 94% however there were no respiratory symptoms. Rapid COVID 19 antigen test was done and results were positive. After the symptoms were shown his medication course was changed as per the need and recommendation of the monitoring team like cold kal (500 mg), *Tatvishamrut* (500 mg) once a day were added to the course.

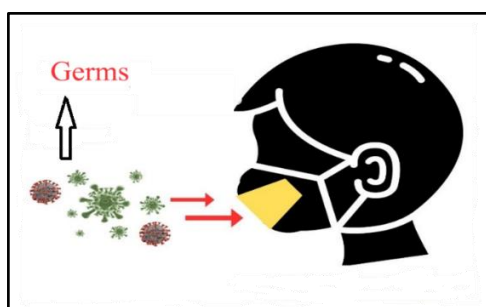
Also, there was the use of paracetamol (650 mg) thrice a day to reduce fever during the initial three days of illness, a single tablet of supplement composed of Vitamin D (1000 IU), Vitamin C (500 mg), Zinc (36 mg) and Nano curcumin (50 mg) was taken during the course. After the initial three days, there was no requirement for analgesic and antipyretic medicines. The whole treatment was executed as home-based care in isolation and monitored by a team of physicians. RT-PCR was done after 10 days of initial identification and results were negative. After 15 days, he was completely recovered from all the symptoms except mild dry cough and rapid pulse [36]. From these case studies, we conclude that these prophylactic measures of Ayurveda can mild the illness of an individual and can make it less painful by curing people in a shorter period.

### **Synergy of Indian and Chinese Herbal Medicines: A Holistic Approach to Respiratory Health**

The integration of traditional medicinal practices from both Indian and Chinese cultures presents a formidable synergy in the pursuit of respiratory health and the development of herbal masks. Indian and Chinese herbal medicines have long held a revered status in their respective societies, encompassing a wealth of botanical knowledge passed down through generations. These rich traditions offer a diverse array of medicinal plants renowned for their therapeutic properties, particularly in bolstering respiratory well-being [37-38]. In Indian traditional medicine, Ayurveda, the emphasis on respiratory health is unmistakable. Herbs such as Tulsi (*Ocimum tenuiflorum*), *Adhatoda* (*Adhatoda vasica*), and Licorice (*Glycyrrhiza glabra*) have been historically revered for their efficacy in managing respiratory ailments. These herbs, often employed in formulations like *Chyawanprash* and *Kashayams*, have demonstrated notable anti-viral properties, making them invaluable allies in the fight against respiratory infections [37].



Apart from Indian traditional Ayurvedic medicines, Chinese Herbal medicines can also be used to inhibit SARS-COV-2 infection and helps to improve treatment outcomes in COVID-19 cases [39]. Chinese Herbal medicines are consist of large group of secondary metabolites including Flavonoids that are present in wide structural diversity and mediate a wide range of valuable bioactivities eg. anti-microbial, anti-oxidants, anti-cancer effects etc. [40]. They boast a rich tapestry of botanical treasures aimed at enhancing respiratory health. Herbs like Ephedra (*Ephedra sinica*), Chinese Skullcap (*Scutellaria baicalensis*), and Astragalus (*Astragalus membranaceus*) have been fundamental in traditional prescriptions targeting respiratory disorders. The synergy of these herbs, often utilized in decoctions and herbal formulas, harnesses their collective potency to fortify respiratory function. In the context of mask development, the amalgamation of Indian and Chinese herbal medicines represents a pioneering approach. Infusing masks with extracts from these revered herbs offers a dual benefit: augmenting the protective capacity of the mask (Fig 4) and incorporating the therapeutic essence of traditional medicine. This integration not only enhances the mask's anti-viral and anti-bacterial properties but also introduces an element of holistic well-being, aligning with the principles of both Ayurveda and Chinese herbal medicine. The cooperative spirit between Indian and Chinese herbal traditions in the realm of respiratory health stands as a testament to the universal wisdom inherent in botanical medicine. By harnessing the collective power of these revered practices, we embark on a holistic journey towards fortifying respiratory health, offering a potential pathway to a safer and more resilient future [37-38].



**Figure 4:** Picture depicting proposed idea of mask with anti-viral properties that can prevent the entry of small organisms by killing them on the surface and can purify the air for breathing.

### Future Perspective

The integration of medicinally important herbs and their phytoconstituents in the battle against viral infections represents a promising avenue for future research. Beyond their traditional use, these botanical resources hold potential for enhancing protective measures, including the development of masks fortified with herbal extracts. This innovative approach could offer an additional layer of defense to mask-wearers, bolstering their resilience against respiratory pathogens. Furthermore, the realm of nanotechnology opens doors to novel strategies for countering infectious agents, including nanoparticles composed of materials such as gold, silver, and copper.

These metallic nanoparticles, along with their oxides, possess noteworthy anti-viral and anti-bacterial properties, capable of inhibiting the survival and spread of viruses and bacteria on surfaces. Leveraging nanotechnology in conjunction with medicinal herbs offers a unique opportunity to enhance mask efficiency, particularly in safeguarding frontline workers who tirelessly serve to protect their communities [41].

Through collaborative research and innovation, the intersection of traditional herbal knowledge and cutting-edge nanotechnology may pave the way for more effective and resilient protective measures against infectious diseases, ensuring the safety and well-being of our dedicated frontline workers and the broader population.

### Conclusion

In an era marked by evolving respiratory viruses and emerging variants, preventive measures remain vital. While vaccines have offered substantial progress in combating infectious diseases, their full effectiveness remains uncertain, particularly against new strains. Hence, adopting preventive strategies is imperative. The COVID-19 pandemic has transformed daily life, with mask-wearing becoming a fundamental practice. Face masks not only curb virus spread but also shield against environmental pollutants. This critical role has spurred research in mask development, including nanofiber-based masks infused with medicinal properties. Our review covers various mask types and ongoing efforts to enhance cloth masks with anti-bacterial and anti-viral coatings, offering cost-effective and eco-friendly



protection. Coated cloth masks provide an environmentally conscious alternative, mitigating pollution concerns arising from non-biodegradable mask accumulation. The surge in demand for medicinal plants, rooted in Indian and Chinese traditions, has been driven by their immunity-boosting qualities, minimal side effects, and herbal nature, catering to individuals seeking safe treatments. Common herbs like *Zingiber officinale*, *Allium sativum*, *Piper nigrum*, *Azadirachta indica*, among others, exhibit immune-boosting and anti-viral potential, particularly against coronaviruses. Amid evolving challenges, the interplay of traditional wisdom and modern innovations will shape our response to infectious diseases. To address environmental concerns, the use of biodegradable and coated cloth masks is crucial, given the escalating pollution caused by non-biodegradable masks in land and water ecosystems. Proactive measures are essential for a healthier, sustainable future.

#### Abbreviations:

1. SARS-CoV-2 = Severe Acute Respiratory Syndrome Corona Virus 2
2. WHO = World Health Organization
3. CDC = Centre of Disease Control and Prevention
4. Govt- Government
5. DENV- Dengue Virus
6. FCV- Feline Calicivirus
7. HRSV- Human Respiratory Syncytial Virus
8. IFN-  $\beta$ - Interferon beta
9. ACE- Angiotensin Converting Enzyme
10. NBE- Neem bark extract
11. HIV-Human Immunodeficiency Virus
12. IPNV-Infectious Pancreatic Necrosis Virus
13. CVBI- Coxsackie Virus B1
14. ADV- Adenosine Virus
15. EV71- Enterovirus 71
16. HSV- Herpes Simplex Virus

#### Conflicts of Interest

There are no conflicts to declare.

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