

Decontamination of the respiratory system, propitious COVID-19 countermeasure

Abstract

The COVID-19 pandemic has caused many crises, losses, and damages to people's livelihoods. Around 648 million confirmed corona cases resulted in 6642000 direct deaths globally as reported by Dec 16, 2023. COVID-19 is caused by a single-stranded RNA virus with dynamic nature as evolving, producing virulent mutants. The virus is airborne and highly contagious, and the principal transmission and penetration routes are through the respiratory system. Over 13 billion doses of vaccines have been administered by this time. Most countries have experienced a few surges by now. In spite of implementing healthcare protocols, restrictions, and vaccination the pandemic is ongoing even with the decline. Although vaccination is the most essential and urgent solution this alone may not resolve the issue in long term. None of the approved vaccines confer absolute immunity or zero transmission. Besides, there are concerns about their longevity and efficacy of them as the new variants may evade current vaccines. Moreover, there are people with allergic reactions to the vaccines, and their long-term side effects are not yet known. Nevertheless, vaccination is a unilateral preventive measure and supplementary countermeasures are needed. Thus, a multilateral approach is required to contain the pandemic. COVID-19 is primarily a respiratory disease. The establishment of reliable procedures for regular disinfection of the respiratory system may help restrain the pandemic. In this proposal piece, a condensed description of traditional approaches to respiratory infectious illnesses is provided. These may inspire the development of preventive packages to protect people fairly against this contagious disease.

Keywords: Respiratory • Diseases • Disinfection • Inhalation • Prevention • Herbal • Medicine

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Introduction

Viruses are the most plentiful and prolific biological entities as intracellular parasites on the globe. They have had an inconceivable role in the evolution of species including mankind. About 20% of human cancers are attributed to viruses. In general, viruses have short life cycles, large population sizes, and high mutation rates, particularly so in RNA viruses. These factors help them to evolve swiftly and adapt to the new host conditions.

Corona viridae family viruses cause respiratory illnesses such as common colds, SARS, MERS, and COVID-19. The common colds also known as nasopharyngitis, rhinopharyngitis, and coryza are mainly upper respiratory infectious diseases. Over 200 types of cold viruses have been identified half of them are rhinoviruses. These illnesses (common colds) may last from a few days to three weeks and resolve by the immunity system. The coronavirus disease (COVID-19) started in late 2019 in China

and was declared a pandemic by WHO in March 2020. Since its outbreak, has been ravaging the world causing a large number of morbidity and mortality. The behavior of COVID-19 is different and deceptive indeed. COVID-19 is airborne and highly contagious, and principal transmission and penetration routes are through the respiratory system. It is transmitted through polluted air by infected people coughing or breathing, even by asymptomatic people, regardless of the concentration or population, and particle size of the viruses (moistened in groups of so-called droplets.) in the air. The particles range from larger respiratory droplets to smaller aerosols. The majority of infected people have no symptoms or mild symptoms, but others could get worse and show symptoms of pneumonia. The infection is often underrated as it may show no signs or mild symptoms at early stages. Subsequently, besides fever and coughs, more serious symptoms such as difficulty in breathing, chest pain or pressure, low blood pressure, loss of speech and

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movement, damage to kidneys, brain, and heart, and death occur. After the initial stages of the disease, damages, and costs of treatments rise exponentially. When it reaches the pneumonia-like stage it paralyzes and colonizes the lungs' own immune cells, macrophages, and T cells [1]. The problem is it is highly contagious, and the asymptomatic majority are transmitters, unconsciously it has dynamic nature as a single-stranded RNA virus with a high capacity for mutations and evolving, and even recombination. Hence, the behavior of emerging variants and sub-variants has been inconsistent, and unprecedented.

Most countries have experienced a few surges of the pandemic by now. Alpha, Beta, Gama, Delta, and Omicron variants have been circulating around the globe. Omicron with over 500 sub-variants is currently the dominant variant disseminating globally. The sub-variants BQ.1, BQ1.1, XBB, XBB.1, October 22 Singapore, BF.1, October 22 China, are the most turbulent Omicron sub-variants in the USA, Europe, and Asia. These are resistant to neutralizing monoclonal antibodies with a high capability to evade the immune system and medical treatments.

In old-world countries, there has been a tropism in packs or traditional communities in the utilization of folk medicines with a long history of well over thousand-year antiquity. Various combinations of dried herbs are administrated orally by infusions, decoctions, inhaling evaporated steams from diluted distillates, and drinking the extracts. These medicines are superannuated as not getting enough attention deservedly. In old culture countries, like Persia, natural dried herbs and conventional distillates are commonly widespread rather than commercial products. For instance, steam inhalation deep-rooted, using herbal extracts, had long been regarded as a principal constituent for the prevention and early treatment of respiratory diseases up to mid twenty century. Clearly, venerable practitioners in earlier times had no knowledge of viruses, bacteria, and so on but had the perception of causative pathogens infecting the respiratory system. Some of the plant species commonly recommended by traditional practitioners for respiratory-related illnesses are presented below:

Thymus vulgaris, *Glycyrrhiza glabra*, *Perilla frutescens*, *Salvia officinalis*, *Adiantum capillus veneris*, *Zataria multiflora*, *Zingiber officinalis*, *Malva sylvestris*, *Salvia rosmarinus*, *Viola odorata*, *Astragalus membranaceus roots*, *Astragalus gummifer tracaganth*, *Salix alba*, *Origanum marjorana*, *Origanum vulgare*, *Mentha piperata*, *Hyssopus officinalis*, *Nigella sativa*, *Foeniculum vulgare*, *Myrthus communis*, *Allium sativum*, *Allium cepa*, *cimamomum verum*, *Elettaria cardamomum*, *Echinaceae angustifolia*, *Ziziphus jujube*, *Syzygium aromaticum*, *Anthemis hyaline*, *Mentha pulegium*, *Lavendula angostifolia*, *Chamaemelum nobile*, *Althea*

officinalis, *Papaver somniferum opioids*, *Eucalyptus globulus essence*, *Crocus sativus*, *Boswellia sarrata resins*, *Dorema ammoniacum resins*, *Malus orientalis vinager*, *Acorus calamus*, *Echinops cephalotes echinope*, *Trigonella foenum graecuom*, *Matricaria chamomilla*, *Linum usitatissimum*, *Curcuma longa*, *Taraxacum officinale*, *Salvia mitiorrhiza*, *Plantago major*, *Plantago lanceolata*, *Ziziphora sp*, *Trachyspemum sp*, *Piper nigrum*. *Stachys lavendulfolia*, *Camelia sinensis*.

Most of these plant species are now well known for their anti-inflammatory, antioxidant, antimicrobial, and antiseptic effects. Many of these plant extracts are lung cleansers and anti-coagulants such as thyme, garlic, green tea, cinnamon, chamomile, licorice, and turmeric which are widely used. For example, lavender hydrosol is used to treat sore throat, cough, runny or stuffy nose, and prevent blood clot formation administrated orally or through inhalation. Marjoram is used to treat anosmia. A few of them are discussed briefly here. Their main use of these remedies is boosting the immune system and the therapeutic effect comes next.

Thymus vulgaris– Thyme, with the highest antioxidant concentration in any plant, has been acclaimed as a general health enhancer for thousands of years. Thyme is one of the best disinfectant herbs known to mankind. It contains essential oils Thymol and Carvacrol. Due to its antiseptic and antibiotic properties has been used for the treatment of respiratory ailments, anemia, infection symptoms fever, sore throat, and discomfort. It enhances the immunity system, and cerebral circulation and has digestive, carminative, anti-cancer, and anti-putrid properties. It helps relieve inflammation and as an expectorant help eliminate sputum and mucus in the respiratory tract. Recently, the initial report of a clinical trial revealed that COVID-19 patients showed significantly reduced fever, dizziness, cough, dyspnea, muscular pain, anorexia, and chest pain after a week of taking thyme syrup three times per day [2]. Prior to that, a clinical trial conducted in 2016 showed inhaling thyme at 1% concentration effectively reduced wheezing and respiratory rate in patients with AECOPD (Acute Exacerbation of Chronic Obstructive Pulmonary Disease) [3].

Despite all its medicinal value, it is not recommended for all, and overdose may result in serious health problems. People allergic to the mint family including thyme must stop using it as they may suffer from mucous membrane stimulation, skin irritation, and so on. Avoid thyme during pregnancy and lactation. It is not suitable for children under 10 years of age. Thyme oils may endanger heart health including discomfort, rapid breathing, seizures, and cardiac arrest, due to allergic reactions or high doses. People with coagulation disorders or using blood thinners, hypothyroidism, and chemotherapy must avoid thyme. Steam inhalation with diluted herbal distillates is more conveniently effectuated. The

concentration of essential oils in herbal hydrosols is normally less than 1%. People trying thyme inhalation for the first time better to start with a lower dose of 10% that is 10% of thyme distillate mixed with 90% water example 10 cc distillate with 90 cc water. If there are no allergic signs the concentration in subsequent inhalations may be increased up to 50% which is half thyme distillate and half water. Avoid excessive use. Once a day a few minutes inhalation is enough. Commercial products such as thyme oil are highly concentrated and are not recommended for inhalation purposes.

Glycyrrhiza glabra-licorice roots, an old traditional Chinese herb widely used as medicine. It has been prescribed for cleaning of the respiratory tract, cough, dyspnea, hoarseness, and ulcers [4-6]. However, prolonged and excessive use of this plant's roots was discouraged [4-6]. At present time, it is renowned for its immunomodulatory, anti-inflammatory, and antiviral effects [7]. Brewed licorice roots are recommended traditionally for relieving inflammation of the bronchial mucosa and removing sputum. Earlier studies confirmed its effectiveness for treating SARS-CoV disease and now its potential as prophylactic and therapeutic uses for COVID-19 is advocated [8, 9].

Astragalus membranaceus/ Huang-Qi Mangolian milkvetch roots, one of the most popular herbal remedies in Chinese traditional medicine. Its regular consumption is believed to prevent and treat diseases including respiratory infections from colds to flu. Accumulating research evidence suggests the immune boosting and immune regulating effects of this herb. It induces T-cell activation leading to the inhibition of pro-inflammatory cytokine [10, 11]. In China, *Astragalus* roots extract through decoction/infusion often taken with ginseng. This herb is also advocated for a variety of other ailments.

Viola odorata, Sweet Violet oil is useful for relieving some of the painful symptoms of colds such as sore throat and sinus obstruction. This oil also has expectorant properties and helps to relax the mucus and sputum of the nose and respiratory system, which is useful for relieving congestion, and obstruction and allows the airflow to move freely in the airways [12]. Violet's extract has been found effective to treat asthma and tuberculosis and is a good remedy for inflammation of the respiratory tract [13, 14]. Steam inhalation of violet has long been used to treat cough, runny nose, and inflammation of the respiratory system. As for COVID-19 infection, some authors advocate its use as a prophylactic measure and its relative therapeutic effectiveness at the early stage of the disease [15].

Elettaria cardamom- cardamom has been used in Ayurvedic medicine in India, Southeast Asia, and the Middle East since the primeval times. Its anti-inflammatory, antioxidant and antiseptic values are well recognized today [16, 17]. It has a bronchodilatory effect hence used for the treatment

of asthma [16]. A natural expectorant helps soothe the mucus membrane. It is regarded as a powerful aphrodisiac and anti-depressant. It is recommended for treating sore throat, blood clots, colds, dyspnea, oral health, blood pressure, hiccups, and kidney disorders. It promotes Oxygen uptake by enhancing blood circulation [18].

Allium sativum-garlic, native to India, has been used primarily for its medicinal values in old world major civilizations. Hippocrates, the ancient Greek physician used to prescribe it to cure a variety of health problems. Garlic has been used to treat respiratory diseases such as colds, flu, tuberculosis, and bronchitis. Modern science has recently confirmed many of its health benefits. A large number of studies support the anti-inflammatory, antiviral and antibiotic effects of garlic. Notable, the variety and the region of cultivation affect its quality and medicinal values. Allicin, an organosulfur compound in garlic acts as a natural expectorant breaking down the phlegm. This can help to cure respiratory infections causing breathlessness and congestion, relieve asthma, and reduce the risk of lung cancer. The antiviral properties of garlic along with clinical data for a wide range of viruses have thoroughly been reviewed also being proposed as a prophylactic remedy against the invasion of COVID-19 into the human body [19, 20].

A promising research report by German scientists at the University of Dussenberg has shown that *Salvia officinalis* and *Perilla frutescens* aqueous infusions had antiviral effects for the treatment of COVID-19. The research team found that the aqueous infusion of sage and perilla elicited potent inhibitory activity against the COVID-19 virus after just half an hour of treatment on different human cell lines. Although the results are *in vitro* condition they are encouraged to perform clinical trials to find out the *in vivo* efficacy [21, 22].

Having mentioned all these herbal medicines and their benefits, self-medication is never recommended. It must be under the supervision of health experts or qualified practitioners as there may be contraindications, medical background interactions, allergies, and other complications. The FDA and other national health organizations do not approve herbal medicines that is understandable, logical, and reasonable. That is because it may lead to unsupervised self-medication complications due to inappropriate use, or overdose. For instance, garlic may cause headaches, raise body temperature, and skin irritations in some people [23].

Sum up

As yet, there is no specific terminative drug nor efficient treatment for the COVID-19 pandemic widely available. Currently, a large number of *in vitro* and *in vivo* research programs are being carried out for the pandemic all around the world. Undoubtedly, vaccination is the most essential and urgent solution,

but this alone may not resolve the issue in long term as the more aggressive variants and sub-variants such as BQ.1, BQ.1.1, XBB, XBB.1, BF.1, and BF.7 have been emerging to-date. Meanwhile, healthcare workers are at least seven times more at risk under such circumstances and need additional protective support.

Overall, the Uneven and partial distribution of authentic vaccines further complicates the issue. Furthermore, none of the present vaccines confer absolute immunity or zero transmission. In other words, vaccines are the only available defensive tool available which are partially effective. Besides, there are a minority of people with allergic reactions to the vaccines. In low-income countries, reliable statistics are not available. In spite of implementing healthcare protocols and restrictions, the virus is spreading at an amazing rate due to poor healthcare systems and insufficient vaccination.

International organization WHO, national health care authorities and pharmaceutical firms should also consider alternative strategies besides vaccination as preventive measures. In fact, a multilateral approach is required to degrade the virus population on a global scale and restrain the pandemic. The protective packages/countermeasures must be developed to act as deterrents precluding disease development. The desired objective should be decontamination/disinfection of the respiratory system on regular basis. Herbal distillates inhalations, as described before, may be considered a proposition in this context to scientific communities. There are a good number of medicinal plants to be considered including thyme, marjoram, mint, oregano, cardamom, rosemary, chamomile, hyssop, and eucalyptus (just a few drops of essence in 100 cc of water) which are widely available. Both simple and composite types of inhalations with a variety of herbal distillates/extracts may be used, further details are beyond the scope of this paper piece. Apart from COVID-19, there are other respiratory illnesses including types of pneumonia (viral, bacterial, fungal), tuberculosis, flu and so on which are preventable upon regular disinfection of the respiratory system. Death toll annual estimation for pneumonia, tuberculosis, and flu are 2.5 million, 1.6 million, and 0.5 million respectively.

In addition to infectious respiratory diseases inhalation of thyme, chamomile, mint, rose, marjoram, and hyssop may be used in times of high air pollution to help reduce respiratory damage.

Indeed, traditional medicines are not in contrast nor incompatible with modern medicine. Clearly, old medicines are not as precise and organized as modern medicines. But they can be regarded as a basic approach and merged into modern medicine as these are the heritage of hundreds of generations. At present time, all sorts of vaporizers, atomizers, nebulizers, steam inhalers, and so on are widely available. New technologies along with advances

in modern sciences can help develop protective packages. The folk medicines should be verified and optimized to meet the present needs. They can be used as templates for use in modern medicine. This approach may inspire the development of a preventive package to protect people fairly against this transmissible hazardous disease and other respiratory illnesses. Innovative procedures to decontaminate the respiratory system will satisfy a long-felt need.

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