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REVIEW ARTICLE

Respiratory Infectious Disease and the COVID-19 Pandemic : A Review of Medieval Unani Medical Literature

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Abstract

Coronavirus disease (COVID-19) is a life-threatening disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first identified as an infectious agent in Wuhan, China. COVID-19 gradually spread worldwide and was declared a pandemic by the WHO on March 11, 2020. As of mid-November 2020, the virus has infected over 55.6 million people worldwide and caused more than 1.3 million deaths. In the absence of clinically proven prophylactic and therapeutic strategies, the pandemic has continued its global spread. In this scenario, the role of traditional systems in tackling the challenges of the COVID-19 pandemic by improving the immune system and providing supportive care to patients is being investigated. The Unani system of medicine is one of the traditional medicine systems officially recognized by the World Health Organization to cater to people's healthcare needs. Herein, we reviewed the medieval Unani medical literature regarding respiratory pandemic diseases, symptoms, clinical features, and suggested treatments, especially literature related to the acute catarrh and influenza pandemics. From our review, beside isolation and quarantine, the following measures appear essential: **1.** habitat sanitization and purification using herbal sprays or fumigation, **2.** enhancing the immune system, strengthening the heart, and preventing infections with antidote *Tiryaq Wabai*, and **3.** use of herbal drugs and formulations useful for strengthening the body and gastrointestinal tract, and for the prevention of respiratory distress, pneumonia, pleurisy and other symptoms. The data reviewed here show that the Unani system of medicine can prevent and manage epidemic/pandemic diseases, including conditions similar to the COVID-19 pandemic. Thus, there is scope for the Unani system of medicine to provide supportive and preventive measures for COVID-19 until an effective cure is developed.

Keywords: Acute Catarrh, COVID-19 Pandemic, Influenza Pandemic, Respiratory Infection, Treatment, Tiryaq Wabai, Unani Medicine

1. Introduction

The coronavirus disease (COVID-19) outbreak, caused by severe acute respiratory disease coronavirus 2 (SARS-CoV-2), was first reported in Wuhan, China, where it was identified as an infectious disease. Within one month, it had spread throughout China[1], and <3 months, it had spread to almost 72 countries[2]. On January 30, 2020, the World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern (PHEIC). Despite the novelty of this outbreak, pandemics have a long history dating back even before Hippocrates time (460-370 BC)[3]. According to WHO, infectious viral diseases continue to emerge and imply a serious threat to public health.

In the past 20 years, the world witnessed two other pandemics caused by coronaviruses, namely, SARS-CoV with a fatality rate of 9.6%4, and MERS-CoV with a fatality rate of 35%[5]. The estimated fatality rate of COVID-19 is 0.25%–3.0%[6], which appears to be substantially lower than the fatality rates of previous pandemics. However, the fear of this pandemic is significantly bigger because it is very contagious and more easily transmissible than

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previous pandemics, with estimated R0 values ranging from 2.20 to 3.58[7].

Coronaviruses have become the main pathogens of respiratory disease outbreaks, and the potential for coronavirus infections to grow and become pandemics represents a dangerous public health problem. On February 28, 2020, WHO raised the risk of the COVID-19 to a "very high" level and on March 11, it was declared a pandemic. In response to the increasing number of COVID-19 cases, different countries exercised partial and complete lockdowns, with strict shutdowns estimated to have saved approximately 3 million lives across 11 European countries[8]. The mean incubation period of this disease is 5 days (range, 1-14 days), and its mortality rate differs across countries. As of Mid-November 2020, the virus has infected over 55.6 million people worldwide, and the number of death stotaled >1.3 million, with the death rates in Belgium, Italy, United Kingdom, United States, Saudi Arabia, and India being 6%, 3.75%, 3.74%, 2.19%, 1.61%, and 1.47%, respectively[9].

The symptoms and clinical features of COVID-19 patients can range from very mild to severe. Some patients may show only a few symptoms, while others may have no symptoms at all. Older people or those with concomitant diseases, such as diabetes, lung disease, heart disease, or weak immune systems, may be at a higher risk of infection. The estimated fatality rate is >14% in older people and 8%-10% in patients with diabetes, cardiovascular diseases, and hypertension[6].

According to a report from 11 countries, including 61 studies, the most common symptoms of COVID-19 included sore throat, fever, dry cough, loss of taste and/or smell, nasal congestion, malaise, headache, muscle pain, tachycardia, diarrhea and vomiting, involvement of the upper respiratory tract, cough and shortness of breath, altered mental status, acute progressive renal injury, renal impairment with reduced urine output, cyanosis and tachypnea in children, fever associated with severe dyspnea, respiratory distress, hypoxia (SpO2 <90% in room air), functional organalterations, multi-organ damage, and coagulopathy[10,11].

Some asymptomatic cases do not show clinical features except fever and mild fatigue, although these patients may be coronavirus carriers and transmit the infection to others[12]. The lockdowns enforced in many parts of the world aimed to break the cycle of infection and effectively reduced the growth rate of the pandemic. Unfortunately, some countries have started witnessing a second wave of COVID-19 infections as of mid-October 2020. In fact, countries throughout Europe are witnessing a resurgence of COVID-19 cases after successfully slowing the outbreaks early in the year[13], without clear reasons for the rise in COVID-19 cases.

Scientists around the world are working hard to find a cure for COVID-19. As a part of this process, they are learning more about its transmission mechanisms and searching for preventive and therapeutic strategies. However, in the absence of a clinically proven prophylactic and therapeutic strategy, the pandemic is continuing to spread and affect people[14]. The existing therapeutic strategies to deal with the infection are primarily supportive, which has turned the world's attention toward approaches to strengthen the body's immune system against viruses and other pathogens[15]. From this perspective, the role of traditional medicine in improving the immune system and providing preventive and supportive care to patients is being investigated with respect to the COVID-19 pandemic.

Complementary and Integrative Medicines (CAM) comprises several medical methods, such as homeopathy, naturopathy, Unani system of medicine, Ayurveda, medicinal systems, and products deriving from traditional medicine, according to the National Institutes of Health (NIH), USA[16].

The Unani system of medicine is one of the traditional systems of medicine officially recognized by the WHO. This system places a big emphasis on health preservation and disease prevention along with the treatment, and is practiced to this day in India, Pakistan, and Bangladesh[17].

This system was originally known as Medieval Islamic Medicine, and the word Unani is an Arabic word for Greek[18]. Medieval scholars and physicians such as Razi, Ibn Sina, Tabri, Ibn Hubal, Jurjani, Samarqandi, Arzani, Ibn Nafees, and Ibn Rushd made significant contributions to the field of infectious diseases, and developed plant based formulations.

Unlike medicine systems that aim to treat the patient's symptoms, treatment in the Unani system aims to cure the cause of the disease. Thus, this system considers disease as a natural process and symptoms as the reactions of the body to the pathological factors. It uses the humoral theory, which presumes the presence of four humors (akhlaat) in the body—blood (dam), phlegm (balgham), yellow bile (safra), and black bile (sauda). If the four main humors and the four primary temperaments (hot, cold, dry, moist) are all in a mutual equilibrium, then the person is considered to be healthy. An excess or deficit of ≥1 of these humors causes sickness and forces the body to struggle to return to the equilibrium[19].

The Unani system of medicine includes a complete description of medications employed in many infectious diseases, including respiratory infections[20]. Some of these

drugs show immunomodulatory activity[21], while others have shown specific antiviral activity[22].

Currently, in India, the Unani system of medicine is practiced under the ministry of AYUSH, government of India. Duringthe COVID-19 pandemic, the AYUSH ministry issued guidelines on the requirements to conduct research/clinical trials on Unani medicine, Ayurveda and other traditional medicines,for the treatment of COVID-19. In fact, the ministry of AYUSH gave recommendations for the use of Indian herbal drugs under the Unani system of medicine, and Ayurveda, to combatcoronaviruses[16,23]. A clinical trial on the Unani system of medicine started a few months ago in several hospitals in India, but the research is still ongoing.

In the present study, we reviewed the medieval Unani medical literature for information regarding pandemic/epidemic diseases, symptoms, clinical features, and suggested treatment, especially the literature for acute catarrh and influenza pandemics. The findings of this review demonstrate that the Unani system of medicine has the capability to prevent and manage epidemic/pandemic diseases, including conditions similar to the COVID-19 pandemic, for patients with mild to moderate symptoms.

2. Methodology

The authors relied heavily on the classical Unani medicine books available in print in Urdu language. The original digital manuscripts can be accessed through the world digital library-library of Congress, https://www.wdl.org/en/. Most of these manuscripts are written in Arabic language, while a few are written in Persian. The authors searched manually for information related to epidemic/pandemic diseases, in particular for acute catarrh, influenza pandemics, and respiratory infectious diseases. Some of the most relevant Unani medicine books reviewed include "*Kamil-us-Sana al-tibbiya*" by Majusi, also known as Haly Abbas (930-994 CE); the books "*Kitab-Al-Mansoori,*" "*Kitab-al-Murshid,*" and "*Kitab-al-Hawi Fi-Tib,*" by Razi, also known as Rhazes (852-932 CE); the five-volume work "*Al-Qanun fi -Tib*" (The Canon of Medicine) by Ibn Sina, known as Avicenna (980-1037 CE); "*Zakherah Khawarizm Shahi*" by Jurjan i(1040–1137 CE); "*Kitab-al-Mukhtarat Fi-tib*" by Ibn Hubal Baghdadi (1122-1213 CE); "*Kulliyyat*" by Ibn Rushed (1126-1198 CE); "*Haziq*" by Ajmal Khan (1868-1927 CE); and "*Biyaz-e-Kabeer*" by Kabirudin (1889-1976 CE). As for electronic scientific databases, the authors utilized PubMed, *Science* Direct, and MEDLINE to obtain the most recent information and articles regarding the COVID-19 pandemic. Some of the keywords used were "COVID-19 pandemic," "symptoms," "Unani medicine," "Unani formulations," "*Tiryaq Wabai*," "Immunomodulator," and "Complementary and Integrative Medicines."

3. Infectious and Pandemic Disease in Unani Medical Literatures; Their Symptoms and Treatment

3.1 Concept of Infectious Disease and Pandemic Transmission

In Unani literature, a massive spread of lethal disease with high death rates is called Waba. If confined to a place or city, it is called *Amradh-i-baldiya* (epidemic), and if it spreads to other cities or countries, is called *Amradh-i-wafida* (pandemic)[24]. Majusi, in the chapter on infectious fever, stated that, "an infected state of any one of the four humors causes fever, and infiltration of the infected humors into other organs inflames the organs." He listed the following five main internal causes of infection : undue humors in the body, thick humors,sticky humors, obstruction, and de-oxygenation[25]. Ibn Sina, in his work *Al-Qanun fi al-Tibb*, characterized the types of temperaments and people more vulnerable to infection; thus, elderly people with phlegmatic and cold temperaments are vulnerable to infection, while people with hot temperaments are vulnerable to catch-up pandemic illness due to external reasons[26]. Bodily fluid imbalance due to an overflow of bodily humors is one of the main factors responsible for infections duringan epidemic[24-27]. Majusi, in his book *Kamil-us-Sana al-tibbiya*, explained that the external causes of pandemics activate humors, and the surroundings of an affected person become contaminated; subsequently, the infectious agent enters the body through inhalation or sniffing, and close contact[25]. Furthermore, the surrounding air can become contaminated for various reasons, such as decomposed fruits, slaughter house trash, logged putrid water, and even medical waste, significantly contributing to environmental contamination[28,29]. Razi stated that nearly all epidemics/pandemics spread during the fall, mainly if the previous summer was humid, and there was no wind[27]. The flowchart in Figure 1 presents the causes of epidemics/pandemics.

3.2 Clinical Features of Acute Catarrh and Influenza Pandemics

Unani physicians knew that infectious diseases required more precaution than other diseases. The clinical

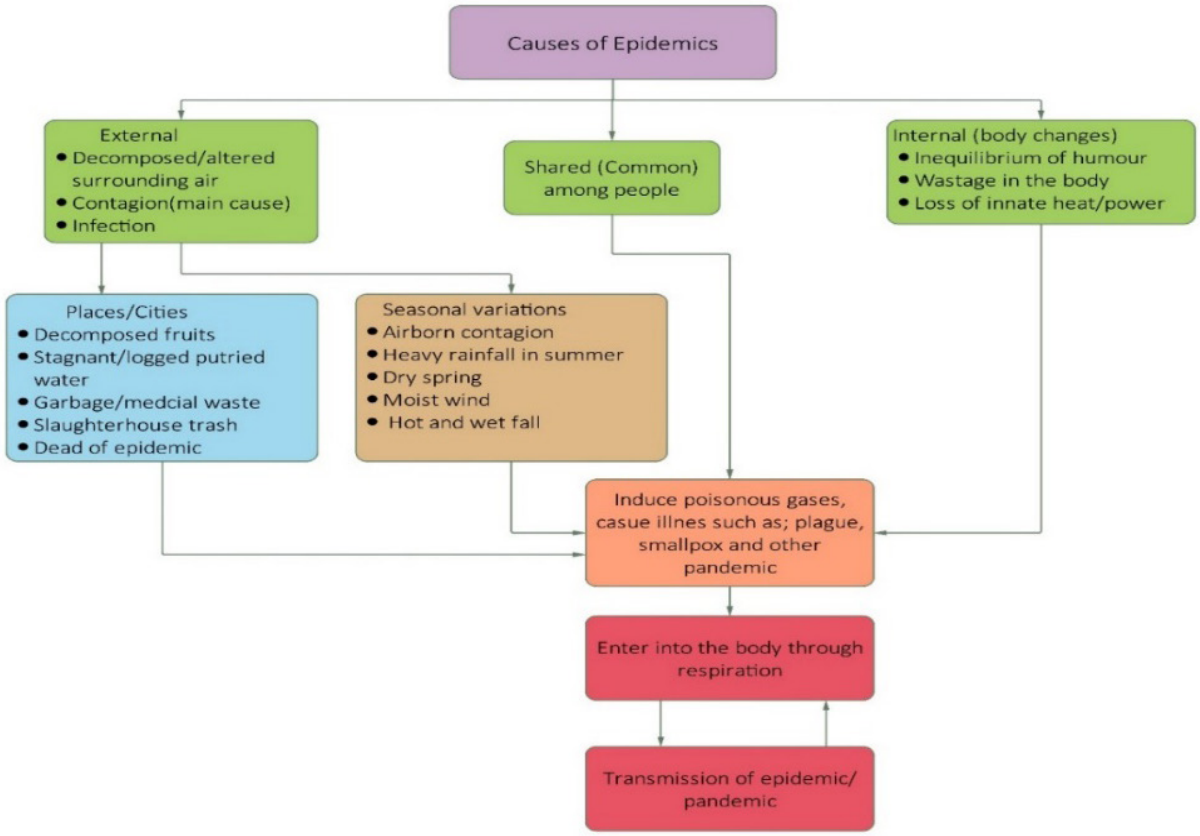

Figure 1. Flowchart showing the causes of epidemics/pandemics.

presentations of epidemics such as those caused by the plague, smallpox, pandemic fever, and influenza were described using two aspects: the signs of the epidemic/ pandemic disease and the individuals' symptoms. Since COVID-19 is a respiratory pandemic, we focused on respiratory pandemics in our review. Two respiratory pandemics were of particular interest: acute catarrh (*Nazla-Haar*) and influenza pandemic (*Nazla-Wabai*), since their symptoms and complications shared some similarities with the COVID-19 pandemic.

Unani physicians observed that structural weaknesses of the head and adjacent organs (eye, nose, and throat) exaggerated by climatic changes caused secretions that ran down due to the loss of stagnant power, leading to acute catarrh (*Nazla Haar*)[25,26,30]. Jurjani described the clinical features of acute catarrh (*Nazla-Haar*) in volume 4 of his book "*Zakherah Khawarizm Shahi*"[31]; and divided the disease into three phases; initial, critical, and complicated[19,32]. Secretion of cold or hot acute catarrh moving from the head to the lungs causes severe lung inflammation, known as pneumonia (*Zat-Al-Riya*), which is the primary reason for complications and could result in fatality[27,31]. Jurjani's prescribed line of treatment for acute catarrh (*Nazla-Haar*) included a very authentic and useful technique to minimize the disease early without any complications: he observed that lying face down was better for the patient's lungs[31]. Concurrently, research published in the American Thoracic Society's American Journal of Respiratory and Critical Care Medicine[33] suggested that for patients with severe COVID-19 receiving mechanical ventilation, lying face down improved breathing.

Samarqandi, in the chapter on Anaf-al-anza in Al-asbab-wa-Alamat[24], mentioned that the influenza pandemic (*Nazla-Wabai*) erupts in large populations[24,34] and rapidly spreads, with older people and children being at a higher risk. Hakim Ajmal[35], and Kabirudin[19], suggested that both acute catarrh (*Nazla-Haar*) and influenza (*Nazla-Wabai*) are the same disease, exhibiting the same causes, presentations, complications, and requiring the same management. Furthermore, Kabirudin added that influenza is in fact acute catarrh associated with a high fever, and that it might erupt among the population, causing the body's general condition to decline[19,35,36]. The clinical features of acute catarrh and the influenza pandemic and their complications are summarized in Table 1.

Table 1. Clinical presentation of acute catarrh/influenza pandemic/pandemic fever.

Epidemic/pandemic diseases	Clinical features and symptoms	References
Acute catarrh/influenza pandemic and pandemic fever	Catarrh/runny nose, severe nasal discharge, severe pain in the throat, husky voice, severe dry cough, headache, and backache followed by fever,	37
	mild to high fever, irritation, and burning in the throat	26
	fever with possible chills and rigors, pain in eyes and body, loose motion, fatigue	19
	involvement of other organs, severe inflammation of the larynx and pharynx progressively reach down to the lung and resulting in pneumonia	25
	chest pain/congestion and tightness in the chest, shortness of breath, pneumonic lungs, heaviness in the chest, choking throat, pneumonia, pleurisy	19,37
	nausea/vomiting, debilitation of general health. Patients with mild infection recover within a week	19,35,36
Severe common complications of pandemic diseases	Mental confusion, profuse sweating, dragging pain in the edge of the lower ribs, bilious vomiting	24,26-28
	cold extremities, dry tongue, bad mouth taste, heat in the chest, generalized pain, loss of strength and appetite, heat sensation in the heart, massive infiltration (inflammation) in weak organs	25,26,38
	production of catarrh, loss of energy (possibly because of ruptured red blood cells), and diffusible blood	25,26
	severe effects on the throat and trachea	26
	bilious diarrhea, turbid urine, or blood clots in urine, black/yellow-colored urine	25,27
	loose joints	39
	tachypnea	27
	excessive thirst	25,26,29
	poor general body condition	25-27
	weakened cartilaginous structure	25

3.2 Preventive Measures and Pandemic Treatment in Unani Medicine

From the Unani literature review, we learned that prevention is the prime step in managing the spread of any pandemic, which starts with social distancing, isolation, and quarantine. Since air is one of the media facilitating the spread of the pandemic, purification of atmospheric air is essential for preservation of health. Thus, sanitization and cleansing of the surroundings during an epidemic/pandemic is crucial. This can be achieved by spraying or fumigation to freshen the surrounding air and free it from contamination. Fumigation with camphor –an essential oil– or herbs like *oud* (eaglewood), *kundur (Boswellia serrata* Roxb.), mur (resin of myrrh tree), and *qust* (Indian costus) is advisable[24-26,38]. Freshening the home using *gulab (Rosa damascene* Mill) or *bed sadah (Salix alba* Linn), or spreading sandalwood (heartwood) over windows, doors, and passages, and camphor can be used to scent the surroundings and clothes. The literature also recommends regular inhalation of rose petals dipped in vinegar and sandalwood along with camphor and vinegar as a preventive measure during epidemics[31].

Dietary advice during pandemics: Red meat and sweets should be avoided. Fruit consumption should be increased, especially citrus fruits such as grapes, oranges, pineapple, pomegranate, and lemon. Consumption of citrus fruit juices is recommended, and barley water should be consumed to boost immunity[27]. Modes of transmission of pandemic, preventive and curative measures during Pandemic is mentioned in Figure 2.

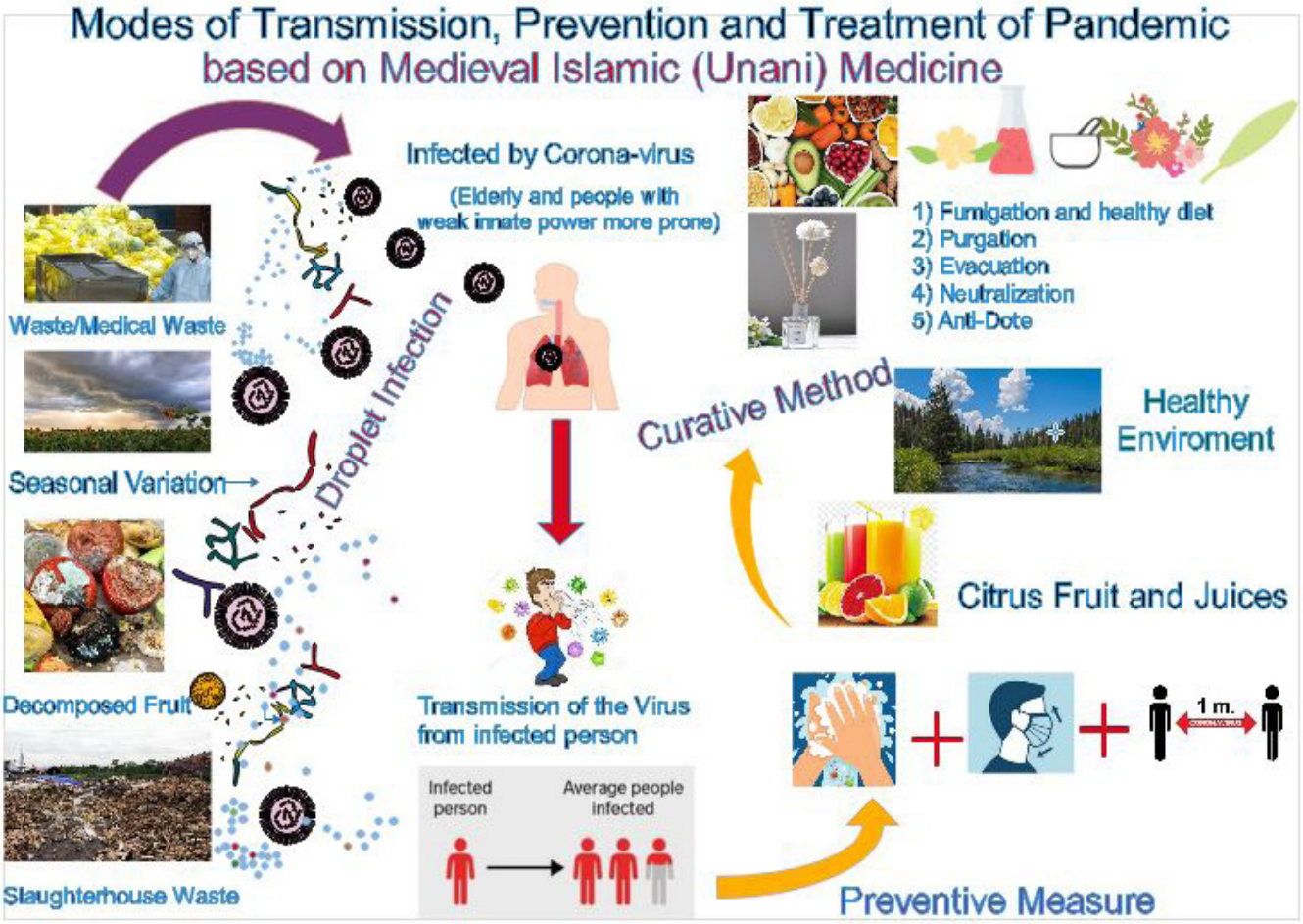

Figure 2. Modes of transmission of pandemic, preventive and curative measures during Pandemic.

Treatment and remedies: The first step is to isolate the affected person. The treatment principles can be outlined as follows: purgation using suitable laxatives[25,26] and evacuation[40] are advised. Elimination of waste matter from the body either by venesection (conditional) or cupping (conditional) is also recommended[38]. Restoration and rebalancing of temperament and body strengthening may have curative effects[25,26,38]. Regular monitoring of the strength of vital organs and general health is important. To control dribbling over the throat and lungs, *Banafsha* (Viola), *Unnab* (Jujube), *Spistan* (Assyrian plum), *Khatmi* (marsh-mallow) and other sedative, antitussive, and concoctive medicines are recommended[19,37]. If the patient has a fever, then *gule nilofer* (Nymphaea alba), *gule Banafsha* (Viola odorata), or *khaksi* (hedge mustard) could be added to the prescription above, and the patient is advised to take this combination frequently at intervals of 2-4 hours[19,34,36]. Patients with a severely congested, inflamed, and painful throat are advised to gargle with a decoction of red lentils or mulberry leaves, and poppy seeds are beneficial for such patients. Furthermore, the *Diyaqoozah* formulation or *Sharbat Zoofa Murakkab* is useful for prevention of respiratory distress. Pashowya (a feet bath) using warm water with a few drops of rose oil is also beneficial[34]. To strengthen the body and gastrointestinal tract in particular, 5 g of *Khamira Gaozaban/Khamira Gaozaban Jawahar Wala* (compound formulations) may be administered twice a day. If pneumonia, pleurisy, breathlessness or tightness in the chest occurs, then *Qairooti'ard karsana* (a particular type of paste), after being slightly warmed, can be applied over the chest, which is then covered with a cotton bandage[19,24,35,36,41]. If the infection is mild, patients may recover within a week. In addition to strengthening the patient's vital organs, the most important step is evacuation of the lethal effects of the disease using *Tiryaq Wabai*, a compound formulation (Table 2) useful in epidemics as a preventive treatment when taken once or twice a week[19,26, 31,41,42].

Table 2. Formulation of *Tiryaq Wabai* (antidote for pandemics)

Sl.No	Drug formulation	Dose	Mode of Administration
1.	*Elwa (Aloe barbadensis)*	Two parts	3.5 gm of the mixture of these drugs is advised to be taken once or twice a week for prophylactic purposes
2.	*Mur-makki (Commiphora myrrh)*	One part	
3.	Saffron *(Crocus sativus)*	Two parts	

Tiryaq Wabai is composed of three ingredients: *Elwa*, the dried juice of the leaves of *Aloe barbadensis*; *Mur-makki*, thegum resin of *Commiphora myrrha*, a small tree found in the African coast of the Red sea and in Arabia; and Saffron, the dried style and stigma of *Crocus sativus* Linn.

A study was carried out on elderly people[21], which demonstrated the immune-stimulating activity of *Tiryaq Wabai* as an antidote, thus supporting its use in situations where an immunostimulant is required. In case of pneumonia or tightness in the chest, then the recommended ointments for chest diseases are called *Qairooti* and *Qairooti'ard karsana*, a polyherbal Unani formulation based on the following ingredients: Karsana(*Pisum sativum*, flour) 60 mg, Hulba (*Trigonella foenum-graecum* flour) 60 mg, shuneez (*Nigella sativa*) 24 mg, Aslussoos (*Glycyrrhizia glabra*) 24 mg, Aqarqarha (*Anacyclus pyrethrum*) 18 mg, wax 72 mg melted in sausan oil (*Rudbeckia hirta*), all the ingredient are crushed and then mixed to form a paste which is applied warm over the chest[19,43]. The pharmacological properties of some of the drugs used for the treatment for acute catarrh/influenza pandemics are listed in Table 3.

Table 2. The pharmacological properties of drugs used for acute catarrh and influenza pandemics

Drug	Part Used	Mode of action	References
Elwa (*Aloe barbadensis*)	Leaf sap	Antiviral, Anti-inflammatory Antioxidant, Immunomodulatory activity	39,44 45 46 47
Saffron (*Crocus sativa*)	Stamen	Anti-inflammatory	48
Murrmuki (Commiphora myrrh)	Oleo gum resin	Antimicrobial, Anti-inflammatory Antioxidant	49, 50, 51
Unnab (Ziziphus jujube Mill)	Fruit	Anti-inflammatory, Antiproliferative activity against a few influenza viruses	24,52
Sapistan (Cordia dichotoma G. Forst, Boraginaceae)	Fruit	Antioxidant Antiulcer activity on the gastric mucosa Anti-microbial	39,53
Banafsha (Viola odorata L., Violaceae)	Flowers	Antifungal, Antimicrobial	34,54
Khaksi (Sisymbrium adenophorum (Wooton & Standl.) Tidestr)	Seeds	Antibacterial	39,55

4. Results & Discussion

Our review of the literature suggests that Unani physicians were aware of the concepts underlying an infection's invasion of the body and its causes. Susceptible groups, such as elderly individuals, people with pre-existing illnesses, and those with a cold temperament, fell ill easily because of their reduced innate protection against infections. Thus, individual characteristics and temperaments played a significant role in the infection progress. Prevention, social distancing, isolation and quarantine is a prime step. Remedies such as purging by medicines, venesection, and cupping play a significant role in preventing epidemic infections by evacuating the infective fluids from the body and rebalancing the humoral equilibrium. Many formulations have been recommended for the treatment of pandemic disease according to the patients' symptoms. In "*Kitab-al-*

Murshid"[40], Razi mentioned that the most important thing is to increase the body's natural resistance to diseases and pathogens, and the resultant self-preservation would restore natural health. However, the most crucial aspect of the treatment is the use of *Tiryaq Wabai*. Razi, claimed that whoever used the *Tiryaq Wabai* formulation during the epidemic remained healthy[27,40,56], while, Jurjani Mohammad mentioned that the use of *Tiryaq Wabai* during epidemics strengthens the heart and prevents infections[31].

The COVID-19 pandemic is considered this century's most significant health problem, and finding a curehas become a major challenge for researchers and doctors. However, at this point, no antiviral treatment or passive immunization arrangements for this disease are available.

A study in Iceland[57], showed that 43% of PCR-positive cases of COVID-19 had no symptoms, although some individuals showed symptoms later. In another study, early deaths were observed in older people, probably because of their weak immune system, which accelerates the progress of COVID-19[58]. Therefore, preventive measures are essential due to the increasing evidence of COVID-19's transmission from asymptomatic people[59]. However, in addition to prevention and management, the therapeutic means in Unani medicine able to reduce the impact of the disease and cure affected people with mild to moderate symptoms will be extremely useful. Moreover, strengthening the immune system is essential to counteract the infection, not only in the elderly. The reviewed literature indicated that symptoms and clinical features of the COVID-19 pandemic resemble those of acute catarrh and influenza pandemics. Therefore, based on the literature review, similar preventive and therapeutic measures could be adopted as supportive treatment for COVID-19 patients with mild to moderate symptoms.

5. Conclusion

The primary purpose of this literature review was to search for possible supportive treatments for the COVID-19 pandemic in the medieval Unani medical literature, while acquainting the reader with the concepts of epidemic disease in Unani medicine. These concepts are largely based on reflection and clinical experiences, and suitably provide a thorough explanation of preventive and protective methods for infectious diseases and epidemics. The isolation concept, quarantine, sanitation, air purification, fumigation, and immune modulation described in Unani medicine remain the basic principles of infection control in today's preventive medicine[2]. In the absence of a clinically proven prophylactic and therapeutic strategy or treatment, COVID-19 pandemic is continuing to spread[14], whichmakes, relying on traditional medicine for providing the necessary protection from the pandemic, reasonable[60].

This literature review validates that the Unani system of medicine has the ability to prevent and manage epidemic/pandemic diseases, including conditions similar to the COVID-19 pandemic. As the likelihood of future pandemics remains high, it is necessary to find a new operative method for infection control globally accessible. Our review suggests that a greater emphasis on research in Unani medicines can produce reliable evidence regarding the role of these medicines in disease prevention and health advancement.

6. Data Availability

The data used for this review article are all listed in the references.

7. Conflict of Interest

The authors declare no conflict of interest regarding the publication of this article.

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10. References

1. Wu Z, McGoogan JM. Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. JAMA. 2020;323(13):1239.
2. Chinazzi M, Davis JT, Ajelli M, *et al.* The effect of travel restrictions on the spread of the 2019

novel coronavirus (COVID-19) outbreak. Science. 2020;368(6489):395-400.

3. Ibn Abi-Usaiba. Uyunul-Amba-Fi Tabqatul Atibba. CCRUM, Ministry of Health and Family Welfare, Government of India. 1990; 1:8-62. Urdu.
4. Hui DSC, Zumla A. Severe Acute Respiratory Syndrome. Infect Dis Clin North Am. 2019; 33(4):869-889.
5. Azhar EI, Hui DSC, Memish ZA, Drosten C, Zumla A. The Middle East Respiratory Syndrome (MERS). Infect Dis Clin North Am. 2019; 33(4):891-905.
6. Wu C, Chen X, Cai Y, *et al.* Risk Factors Associated with Acute Respiratory Distress Syndrome and Death in Patients With Coronavirus Disease 2019 Pneumonia in Wuhan, China. JAMA Intern Med. 2020; 180(7):934.
7. He F, Deng Y, Li W. Coronavirus disease 2019: What we know? *J Med Virol*. 2020; 92(7):719-725.
8. Imperial College COVID-19 Response Team, Flaxman S, Mishra S, *et al.* Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe. Nature. 2020; 584(7820):257-261.
9. Statistica. Coronavirus (COVID-19) death rates worldwide as of October 28, 2020, by country. Avail able at: https://www.statista.com/statistics/1105914/coronavirus-death-rates-worldwide. 2020.
10. Borges do Nascimento IJ, Cacic N, Abdulazeem HM, *et al.* Novel Coronavirus Infection (COVID-19) in Humans: A Scoping Review and Meta-Analysis. JCM. 2020; 9(4):941.
11. Cascella M, Rajnik M, Cuomo A, Dulebohn SC, Napoli RD. Features, Evaluation and Treatment Coronavirus (COVID-19). StatPearls Publishing. 2020. https://www.ncbi.nlm.nih.gov/books/NBK554776/.
12. Li H, Liu S-M, Yu X-H, Tang S-L, Tang C-K. Coronavirus disease 2019 (COVID-19): current status and future perspectives. Int J Antimicrob Agents. 2020;55(5):105951.
13. Europe's Second Wave of COVID-19 is Being Driven by Two Countries. Here's Why. Available at https://time.com/5902172/europe-coronavirus-second-wave-belgium-czech-republic/. October 27, 2020.
14. Tillu G, Chaturvedi S, Chopra A, Patwardhan B. Public Health Approach of Ayurveda and Yoga for COVID-19 Prophylaxis. J Altern Complement Med. 2020; 26(5):360-364.
15. Rajkumar RP. Ayurveda and COVID-19: Where psychoneuroimmunology and the meaning response meet. Brain Behav Immun. 2020; 87:8-9.
16. Maurya V.K., Kumar S., Bhatt M.L.B., Saxena S.K. (2020) Therapeutic Development and Drugs for the Treatment of COVID-19. In: Saxena S. (eds) Coronavirus Disease 2019 (COVID-19). Medical Virology: From Pathogenesis to Disease Control. Springer, Singapore. https://doi.org/10.1007/978-981-15-4814-7_10
17. A. Husain, GD. Sofi, Tajuddin, R. Dang, N. Kumar, Unani system of medicine-Introduction and challenges. Medical J Islamic World Acad Sci. 2010; 18(1):27-30.
18. Nagamia HF. Islamic Medicine History and Current Practice. JISHM. 2003;2:19-30. https://www.ishim.net/ishimj/4/04.pdf
19. Kabirudin Hakim Mohammad. *Biyaz-e-Kabeer*. Hikmat Book Depot Hyderabad Dakin. 2: 53,61, 81-85, 110, 123, 1938 Urdu.
20. Vohora SB. Unani Joshandah drugs for common cold, catarrh, cough and associated fevers. J EthnoPharmacol. 1986; 16(2-3):201-211.
21. Nigar Z, Itrat M. Evaluation of a Unani polyherbal formulation (*Tiryaqe wabai*) as an immunostimulator in elderly persons. Ancient Sci Life. 2013; 33(2):117.
22. Cagno V, Civra A, Kumar R, *et al. Ficus religiosa* L. bark extracts inhibit human rhinovirus and respiratory syncytial virus infection in vitro. J EthnoPharmacol. 2015; 176:252-257.
23. PIB Delhi (2020). Advisory for corona virus. Homoeopathy for prevention of corona virus Infections. Unani medicines useful in symptomatic management of corona virus infection. Posted on: 29 Jan 2020 10:29 AM by PIB Delhi. https://pib.gov.in/PressReleasePage.aspx?PRID=1600895
24. Samarqandi Najibuddin. Mualijat Sharah Asbab-O-Alamat. Darya Ganj New Delhi. 2009. Urdu.
25. Majusi A. Ibn Abbas. *Kamil-us-Sana al-tibbiya*. Naval Kishore Lucknow. 1889. Urdu.
26. Ibn Sina. Al-Qanun Fi-Tib. Munshi Naval Kishore Lucknow. 1899. Urdu.
27. Razi AZ. Kitab-al-Mansuri. CCRUM, Ministry of Health and Family Welfare Government of India, New Delhi. 1991; p. 175-176, 422. Urdu.

28. Zambrano-Monserrate MA, Ruano MA, Sanchez-Alcalde L. Indirect effects of COVID-19 on the environment. Sci Total Environ. 2020; 728:138813.
29. Calma J. The COVID-19 Pandemic is generating tons of medical waste. 2020. https://www.theverge.com/2020/3/26/21194647/.
30. Azam- khan, Akseer-e-Azam, Kitab Ush-shifa. 2009. Urdu
31. Jurjani Mohammad Ismail. Tarjuma Zakheera-e-Khwarzam Shahi. Munshi Neel Kishore. Lucknow. 1889. Urdu.
32. Azam-khan Mohammad. Rumuz-e-Azam. CCRUM, Ministry of Health and Family Welfare, Government of India. 2005; 2:308-309. Urdu
33. Pan C, Chen L, Lu C, *et al.* Lung Recruitability in COVID-19–associated Acute Respiratory Distress Syndrome: A Single-Center Observational Study. *Am* J Respir Crit Care Med. 2020; 201(10):1294-1297.
34. Ibn Rushd AW. *Kulliyyat*. CCRUM Ministry of Health and Family Welfare Government of India, New Delhi. 1980; p. 163. Urdu.
35. Ajmal-Khan Hakim. *Haziq*. Urdu Bazar, Lahore. 1987; p. 52-53. Urdu.
36. Nafees Burhanuddin. Kulliyat Nafisi. Bazaar Nurul-Umra, Hyderabad Dakin. 1934; p. 196-197, 213. Urdu
37. Ibn Zuhr Abu-Marwan. Kitab-Al-taiseer fi-Madawa wl-Tadbeer. CCRUM, Ministry of Health and Family Welfare, Government of India. 1986; p.13-14. Urdu.
38. Ibn Hubal Baghdadi. Kitab-Al-Mukhtaratfil Tib. CCRUM Ministry of Health and Family Welfare Government of India, New Delhi. 2005. Urdu.
39. Ibn Sina. Al-Qanun Fi-Tib. Munshi Naval Kishore Lucknow. 1929; 4:89-91. Urdu.
40. Razi AZ. *Kitab-al-Murshid*. CCRUM Ministry of Health and Family Welfare Government of India, New Delhi. 1991; p. 37. Urdu.
41. Anonymous. National Formulary of Unani Medicine. Part I. CCRUM, Ministry of Health andFamily Welfare, Government of India
42. Arzani Hakim Akbar. Qarabadin Qadri, Urdu Bazar, Lahore. 2009; p. 16,298,422,511-512. Urdu.
43. Hifzul Kabir. Morakkabat (Unani Formulations), Shamsher Publisher and Distributors, Aligarh, India. 2003; p. 35, 38, 93, 113. Urdu
44. Chatterjee P, Chakraborty B, NANDY S. Aloe vera Plant: Review with significant Pharmacological Activities. Mintage J Pharm Med Sci. 2013; 2(3):21-24.
45. Bautista-Pérez R, Segura-Cobos D, Vázquez-Cruz B. In vitro antibradykinin activity of *Aloe barbadensis* gel. J EthnoPharmacol. 2004; 93(1):89-92.
46. Nwajo H. Antioxidant activity of the exudate from *Aloe barbadensis* leaves in diabetic rats. *Biokemistri.* 2010; 18(2).
47. Ognik K, Sembratowicz I. Effect of Aloe-plus preparation supplement on hematological and immunological blood parameters and performance of turkey hens. Turk J Vet Anim Sci. 2012; 36(5):491-498.
48. Hosseinzadeh H, Younesi HM. Antinociceptive and anti-inflammatory effects of *Crocus sativus* L. stigma and petal extracts in mice. BMC Pharmacol. 2002; 2:7.
49. Alhussaini MS, Saadabi AM, Alghonaim MI, Ibrahim KE. An Evaluation of the Antimicrobial Activity of *Commiphora myrrha* Nees (Engl.) Oleo-gum Resins from Saudi Arabia. J Med Sci. 2015; 15(4):198-203.
50. Mahboubi M, Mohammad Taghizadeh Kashani L. The anti-dermatophyte activity of *Commiphora molmol.Pharm Biol*. 2016; 54(4):720-725.
51. Hanus LO, Rezanka T, Dembitsky VM, Moussaieff A. Myrrh - Commiphora chemistry. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2005; 149(1):3-28.
52. Hong E-H, Song JH, Kang KB, Sung SH, Ko H-J, Yang H. Anti-Influenza Activity of Betulinic Acid from *Zizyphus jujuba* on Influenza A/PR/8 Virus. Biomol Ther. 2015; 23(4):345-349.
53. Oza MJ, Kulkarni YA. Traditional uses, phytochemistry and pharmacology of the medicinal species of the genus *Cordia* (Boraginaceae). J Pharm Pharmacol. 2017; 69(7):755-789.
54. Parsley NC, Kirkpatrick CL, Crittenden CM, *et al.* PepSAVI-MS reveals anticancer and antifungal cycloviolacins in *Viola odorata*. Phytochemistry. 2018; 152:61-70.
55. Al-Massarani SM, El Gamal AA, Alam P, Al-Sheddi ES, Al-Oqail MM, Farshori NN. Isolation, biological evaluation and validated HPTLC-quantification of the marker constituent of the edible Saudi plant *Sisymbrium irio* L. Saudi Pharm J. 2017; 25(5):750-759.

56. Razi AZ. Kitab-al- Hawi Fi-Tib. Dar Al-Kotob Al-ilamiyah, Beirut-Lebanon. 2000; 6: 10-15. Arabic.
57. Gudbjartsson DF, Helgason A, Jonsson H, *et al.* Spread of SARS-CoV-2 in the Icelandic Population. N Engl J Med. 2020; 382(24):2302-2315.
58. Wang, M., Cao, R., Zhang, L., *et al.*, 2020. Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) in vitro. Cell Res; p. 30, 269–271.
59. Petersen E, Koopmans M, Go U, *et al.* Comparing SARS-CoV-2 with SARS-CoV and influenza pandemics. Lancet Infect Dis. 2020; 20(9):e238-e244.
60. Vellingiri, B., Jayaramayya, K., Iyer, M., Narayanasamy, A., Govindasamy, V., Giridharan, B., Ganesan, S., Venugopal, A., Venkatesan, D., Ganesan, H., Rajagopalan, K., Rahman, P.K.S.M., Cho, S.G., Kumar, N.S., Subramaniam, M.D., 2020. COVID-19: a promising cure for the global panic. Sci. Total Environ; p. 725, 138277. https://doi.org/10.1016/j.scitotenv.2020.138277