

Prophylactic and Therapeutic Approach in Unani Medicine to Counter the COVID-19: A review

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Abstract

Corona virus disease is a Novel infection which is caused by SARS CoV-2 with serious clinical manifestation. Immune response is essential to eliminate virus and to preclude disease progression to severe stages. As per classical Unani medical wisdom, improving immunity with immune boosters is one of the key approaches for prevention of disease and maintenance of health.

The exact term or disease for this pandemic case is not mentioned in Unani literature but it can be explained under the heading of Humma-e-Wabaiya (Epidemic fever) and Nazla-e-Wabaiya (Epidemic influenza), as described by Persian scholar Najeebuddin Samarqandi. The symptoms of Nazla-e-Wabaiya and Humma-e-Wabaiya mimic with the symptoms of COVID-19, which reinforce the fact that Unani medicine can play a significant role in combating current health problems.

The objectives of this paper are to highlight the description of diseases stated in classical Unani books having symptomatic similarities with COVID-19, to focus view of Unani scholars specially Najeebuddin Samarqandi an Iranian physician, about the diseases mimic with the symptoms of COVID-19, to explain applicability of Unani medicine in context of infectious diseases and epidemics/pandemics (Waba) and its perception, prevention and management. In this paper the role of Unani medicine is described for possible prevention and management.

The Unani books, literatures, articles, different journals was taken in to account, available in personal and third party collection and in the library of GUAMCH and HHRUMCH. Scientific databases like PubMed, Springer and Google Scholar, Scencedirect were also searched for latest information and also search was done by herbs name and their action. In this paper the role of Unani medicine is described for possible prevention and management.

Keywords: Coronavirus; Covid-19; Unani; Amraz-e-Waba; Nazla Wabaiya; Humma Wabaiya; History; Influenza; Immunomodulatory herbs; Air purification; Antiviral; Prevention; Immunity enhancer; Epidemic; Pandemic

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Introduction

The ongoing pandemic Corona virus disease (Covid-19) is a public health emergency of international concern and has posed a major challenge to global health issue. It's a Novel infection which is caused by SARS CoV-2 with serious clinical manifestation i.e. fever, cough, cold, malaise, respiratory distress, organ failure further may result into death. Environmental factors such as air pollution, smoking and other systemic illness (DM, HTN, CKD, Asthma) likely

increase the severity of Covid-19. Immune response is essential to eliminate virus and to preclude disease progression to severe stages. Therefore, strategies claim to boost immune response are certainly important [1].

The incubation period of Covid-19 ranges from 1 to 14 days, averaging 5-6 days in most patients, though an incubation period of up to 24 days has been reported in some cases [2]. The disease affects males and females equally, although a slight male predominance has been observed [3].

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Most patients have a good prognosis, with mild flu-like symptoms [4]. However, a small percentage, particularly the elderly and those with underlying diseases may develop complications such as arrhythmia, shock, acute renal failure, acute cardiac injury, acute respiratory distress syndrome, etc.[3]. Overall, the case fatality rate is estimated to be 2-3% [5], while it is as high as 8-15% in older adults [4].

The disease is thought to be mainly transmitted through infected droplet, fomites and oro-fecal transmission, touching and shaking hand with infected individual are also speculated for the infection[6]. Researchers have also believed that virus may transmit via fluids. i.e. mucus. Symptoms appear after an incubation period of two weeks. During this period virus replicates in the upper and lower Respiratory tracts. Common symptoms in infected individual include fever, cough, sore throat, running nose, breathlessness and the lesion in the lungs [6-12].

China's first case of Covid-19 has been traced back to November 17 last year, reports South China Morning Post quoting government data [13]. On 12 March 2020 Covid-19 was declared a pandemic by World Health Organization WHO. Bangladesh reported its first confirmed COVID-19 case on 08 March 2020. It reached 100 cases on 09 April, and exceeded 200 cases within the next 2 days [14]. Bangladesh reported its first confirmed COVID-19 death on 18 March 2020, just after 10 days of reporting the first COVID-19 confirmed case [15]. Till yet no specific drugs verified for SARS-CoV-2, so emphasis is given on preventive measures and symptomatic treatment [2]. In this context, traditional systems of medicine are being explored for providing preventive, supportive and rehabilitative care to the patients. Although no direct evidence is available, some uncontrolled studies on traditional medicines suggest that they have a number of pharmacologically active substances and thus may have a direct therapeutic effect against the virus [16]. Unani medicine is one of the officially recognized traditional medicine system here in Bangladesh.

About Unani Medicine

Unani system of medicine has its roots in ancient Greece, in the teachings of Hippocrates (460-377 BCE). The name Unani reflects its Hellenistic origin and is derived from the Yunan, the ancient name of Greece [17]. Unani medicine flourished to its zenith during medieval ages (500-1500 CE) in the Muslim world, mostly in the Arabian Peninsula, Persia, Egypt, Syria, ancient Mesopotamia and in and around. It is also referred to as Greco-Arabian medicine and Persian medicine in different parts of the world [18]. Unani medicine is based on the Hippocratic concepts of Mizaj (temperament) and Akhlat (humors) [17]. Famous scholars of Unani medicine include IbnSina (Latinized as Avicenna, 980-1035 CE), ZakariyaRazi (Latinized as Rhazes, 865-925 CE), IbnRushd (Latinized as Averroes, 1126-1198 CE), NajeebuddinSamerqandi (d 1222 CE) and many others [18].

Unani Medicine recognizes the influence of surroundings and ecological conditions on the state of health of human beings. Apart from treating disease conditions, Unani Medicine lays down great emphasis on the prevention of disease and promotion of existing health through principles of six essential factors (Asbab-e-Sitta Zarooriyah) of life. It also lays down great emphasis on the

maintenance of a proper ecological balance and on keeping air, water and food free from all possible pollution and pathogens. An eminent Unani physician Galen (129-200 CE) postulated that certain diseases caused by pollutants tend to be carried by wind and hence, do disseminate faster; these enter into human body through respiratory route. As per Unani classical wisdom, improving immunity with immune boosters is one of the key approaches for prevention of disease and maintenance of health [19].

Unani Medicine in Context of Infectious Diseases and Epidemics or Pandemics Situation (Waba)

The 'germ theory of disease' was established as late as 1683 CE with the development of the first microscope [20]. For obvious reasons, the concept of microbes as disease-causing agents does not find a direct reference in Unani medicine. However, there is an adequate understanding that certain *ajsam-i-khabitha* (literally translated as 'bad substances') can migrate from the diseased to healthy persons, and may cause diseases [21]. This theory of contagion is advocated by a number of Unani scholars. According to Jalinoos (Latinized as Galen, 131-199 CE), 'a physician should always keep an eye on changes of weather and air [22]. A treatise of ZakariyaRazi (865-925 CE), *Kitab fi al-jadari wa-al-hasbah* (Book on Smallpox and Measles) describes the modes of spread of the two diseases and their differential diagnosis. In May 1970, it was regarded as "the first scientific treatise on the subject" by WHO[18]. According to IbnSina (980-1035 CE), air and water are contaminated only after admixture of *ajsam-i-khabitha*, which does not happen otherwise. He further states, such contamination can also be brought about if the dead bodies of people dying due to an epidemic are not disposed off properly [21]. It indicates that, he had knowledge of microbes being present in the body even after death, which could potentially infect others. During the 14th-century plague pandemic, Spanish scholar IbnKhatima (1364-1369 CE) mentioned in his treatise '*Tahsilgarad-al-qasid fitafsil al-maraḍ al wafid* (succeeding in clarifying pest disease) that 'I have observed that a person who comes in close contact with a patient of plague will start suffering from the same symptoms [23,24].

It is proved that ancient scholars of Unani medicine had excellent knowledge about disease transmission. A comprehensive literature search indicates that the term 'Waba' is used in Unani literature to describe epidemics and pandemics collectively for diseases which spread in a large geographical area. Avicenna already mention that epidemics supposed to occur when *Ajsam-i-khabisa* (contagion), find a place in air and water [25].

ZakariyaRazi (865-925 CE) stated in his book *Kitab al-Mansoori* (Book dedicated to Caliph Mansoor), most epidemics spread in the autumn season, especially if the preceding summer season was humid, and the wind is still. In this context, the direction of winds is given utmost significance.

Razi had absolute idea of quarantine; he stated transportation of public must be stopped during epidemic of plague and also advised the people should not together in crowding places when

somebody has leprosy or epidemic fever because infection can be transferred to others. The fourth chapter of Al-Mansoori discuss about infectious diseases which are more common in rainy season and advised the public to take fruits particularly apple, grapes, pomegranate, barley water and lemon frequently for prevention of infectious diseases. The tenth chapter shortly described the management of smallpox and measles.

As IbnHubal Baghdadi(1121-1213 CE) mentioned in his treatise Kitab al-Mukhtarat-fil-Tib (The Book on Choice of Medicine), if southern winds are replaced by northern winds, then catarrhal illnesses will occur in abundance. Because, as stated by Razi in the 15th volume of his treatise Kitab al-Hawi (The Comprehensive Book of Medicine), southern winds are warmer while the northern winds are colder, and this change of temperature makes people more susceptible to respiratory infections.

Furthering the view, IbnSina (980-1035 CE) stated that epidemics spread from one person to other and one city to another 'like a message'. ZakariyaRazi (865-925 CE) stressed this fact and stated that there will always be something common in patients of epidemics, whether a place, food, drink or travel history. During the 14th-century plague pandemic, Arabian scholar IbnKhatib (1313-1374 CE) stressed that 'most of the people who come in contact with a plague victim will die. In the same context, he stated the disease spreads through clothes, utensils and jewellery- thus stressing on transmission through fomites. In the same vein, this statement stresses on social distancing and isolation, two important aspects of prevention in the current pandemic [16]. The 13th-century's Persian scholar Najeebuddin Samarqandi mentioned about a type of Nazla-e-Wabaiya(epidemic influenza) in his treatise Al-Asbab wa-Alamat (the book of causes and symptoms). In the translated version of the book, published by the name of Sharah Asbab, the disease is mentioned by the name of Nazla-e-Wabaiya(epidemic influenza) in the chapter on Anaf al-Anza (Influenza)and Humma Wabaiya (epidemic fever) characterized by fever, sneezing, sore throat, nasal irritation and malaise and may also suffer from cough, diarrhea, and delirium. Pleurisy and pneumonia, if present, worsens the prognosis [25]. Specifically, weakness sets in early in the disease [16].

It is worthy important to mention here that Unani medicine does not mention epidemics and pandemics as separate entities, and a common term 'Waba' is used for those diseases which affect a large geographical area. This is probably for two reasons, first and foremost, global communication was not possible in medieval ages like today; and second, travel over very long distances would have rarely occurred, hence the occurrence of a pandemic would have been a remote possibility, practically unlikely [26].

Perception of Unani Medicine

As per Unani medicine exact term or disease for this pandemic case is not mentioned in Unani literature but it can be explained under the broad head of Humma-e-Wabaiya(Epidemic fever) andNazla-e-Wabaiya (epidemic influenza). The symptoms of Nazla Wabaiya and Humma Wabaiya mimic with the symptoms of COVID-19 [25].

Humma-e-Wabaiya is adevastating type of fever which occurs due

to unavoidable changes in the Air (qualitatively or quantitatively). As a result Air becomes impure and finally it gives rise to abnormal temperament of Rooh (Sprit)which subsequently results into morbidity and mortality. As fresh and pure Air is essential for health, any contamination in the Air may affect the health of any person and it depends on the intensity of contamination. Mainly those people are susceptible who have a weak immune system i.e. older and children, accumulation of waste humours and widening of skin pores. Rabban Tabari (838-870 CE)stated that people who have excess waste material in their body are usually affected with Humma wabaiya [1]. The dominance of temperature exists in Humma-e-Wabaiya and in Nazla-e-wabaiya the influence of catarrh symptoms present much than it.

Persons with a comorbid state or a weak constitution have been described by IbnSina as being more susceptible to epidemic diseases and having a poor prognosis [27]. Moreover, the importance of air purification, modes of transmission of infection and significance of quarantine/isolation has also been defined by Ibn Rushed in his book Kitab al-Kulliyat (Treatise on Principles of Unani Medicine) [28].

It is evident that despite the inability to observe microbes, Unanischolars could envision and comprehend their sources and reservoirs, modes of transmission of infections, and potential causes of infections turning into epidemics. The theories and observations closely resemble the contemporary knowledge of infections, which reinforce the fact that Unani medicine can play a significant role in combating current health problems [16].

Promising Measures to Prevent and Manage Covid-19 According to Unani Medicine

The above information let us indicates that the symptoms of Humma-e-Wabaiya and Nazla-e-Wabaiya are closely similar to Covid-19. And as per evidence of Unani medical manuscripts we can recommend the following possible measures to prevent and manage Covid-19. On the other hand in Unani system of Medicine there are a detailed description of drugs which shown antiviral and immuno-modulatory properties supported by scientific studies [19,29,30].

Prevention

Unani Medicine recognizes the influence of surroundings and ecological conditions on the state of health of human beings. Apart from treating disease conditions, Unani Medicine lays down great emphasis on the prevention of disease and promotion of existing health through principles of six essential factors (Asbab-e-SittaZarooriyah) of life. It lays down great emphasis on the maintenance of a proper ecological balance and on keeping air, water and food free from all possible pollution and pathogens [31]. An eminent Unani physician Galen (129-200 CE) postulated that certain diseases caused by pollutants tend to be carried by wind and hence, do disseminate faster; these enter human body through respiratory route [32].

General measures of isolation, quarantine, and distancing must be followed for prevention of epidemic infection. Transmission

through fomites is highly likely, so care should be taken in handling and disposing of the same. Health care workers, family members and caretakers of the patients should take due precautions.

Stay in well-ventilated places reduces the chances of contracting the infection. Razi's advice of avoiding airflow from the patient to a healthy person is remarkable. For this purpose, the patient should face away from healthy people while coughing, sneezing or talking, as the virus may also be excreted through saliva. Sanitization of the environment should always be given special importance as it serves as the medium for lodging and dissemination of the virus. Several drugs have been prescribed for spray, for application on curtains, as sanitizers on the body, and for fumigation. These drugs are mostly aromatic [16].

In context to protect the health during the Waba (epidemics/pandemics) situation, Unani scholars also emphasized on immuno-modulation, they were aware about the effect of the citrus fruits. They also suggested healthy diet, avoiding starvation, avoiding meat and fish, staying hydrated and certain drugs have also been prescribed for the promotion of health.

Management

Najeebuddin Samarqandi described in his treatise "Al-asbab wa-Alamat" (The book of causes and symptoms), translated version

named as "Sharah Asbab" to manage this situation by anti-inflammatory, immuno-modulatory and antipyretic drugs.

Here is the list of few unani drugs/herbs or medication described in classical text that are scientifically evaluated for its therapeutical properties that we can recommend for this epidemic scenario. Antiviral activity of the mentioned drugs against COVID-19 is not being claimed (Tables 1-3)[16,33-55].

Below mentioned Unani herbs have shown few leads to possess certain antiviral and Immunity Enhancing activities on scientific study. Antiviral activity of the above-mentioned drugs against COVID-19 is not being claimed.

Antivirals

Kalonji(Nigella sativa) [56], Seer(Allium sativum) [57-61], Zanjabeel(Zingiberofficinale) [61-63], Aslassus(Glycyrrhizaglabra) [64-69], Afsanteen(Artemisia absinthium) [70,71], Tukhm-e-Kasoos(Cuscutareflexa) [72], Khayarshamber(Cassia fistula) [73,74], Gilo(Tinosporacordifolia) [75,76].

Immunity Enhancers

Khameera Marwareed [77] but Not recommended for diabetics, Asgandh (Safoof) [78-84].

Table 1 Drugs prescribed for sanitization of environment during epidemics.

Sl.no	Unani name	Botanical name & family	Part used	Method of use in Unani medicine	Mode of Action/rationale for use
1.	Kafoor	Cinnamommcamphora (L.) J. Presl., <i>Lauraceae</i>	Essential oil	Fumigation	Insecticidal, acaricidal
2.	Kundur	BoswelliaserrataRoxb. ex Colebr., <i>Styracaceae</i>	Oleogum resin	Fumigation	Reduction of airborne bacteria
3.	Loban	Styraxbenzoides W. G. Craib, <i>Styracaceae</i>	Resin	Fumigation	Reduction of air borne bacteria
4.	Sandal safaid	Santalum album L., <i>Santalaceae</i>	Heart wood	Fumigation	Insecticidal
5.	Sirka	Acetic acid (vinegar)	Whole	Spray	Anti-microbial
6.	Za'fran	Crocus sativus L., <i>Iridaceae</i>	Stamen	Fumigation	Contains volatile oils with anti-microbial Activity ^a

^aStudies about these drugs as fumigants were not found on any of the search engines. However, researches have shown that they contain volatile oils with biologically active substances such as alcohols, terpenes, etc. (mentioned in the table) which may provide air-purifying effects on fumigation. Hence, these findings provide a rationale for future research.

Table 2 Drugs prescribed for the protection of health during epidemics.

Sl.no	Unani name	Botanical name and family	Part used	Method of use in Unani medicine	Mode of Action/ rationale for use
1	Amaltas	Cassia fistula L., <i>Leguminosae</i>	Pulp	Oral	Immunomodulatory, antioxidant, hepato-protective
2	Arq-e-Gulab	Rosa damascenaHerrm., <i>Rosaceae</i>	Distillate of petals	Gargle	Antioxidant; contains alcohols
3	Anar	Punicagranatum L., <i>Lythraceae</i>	Fruit juice	Oral	Anti-microbial, anti-fungal, anti-viral, antioxidant
4	Sirka	Acetic acid (vinegar)	Whole	Spray	Anti-microbial, antioxidant, anti-obesity
5	Toot	Morusnigra L., <i>Moraceae</i>	Jam made of fruits	Gargle	Anti-inflammatory, antimicrobial
6	Turanjabeen	Alhagipseudalhagi (M. Bieb.) Desv. ex B. Keller&Shap., <i>Leguminosae</i>	Resinous exudates from fruit and stem	Oral	Anti-microbial, anti-oxidant,
7	Za'fran	Crocus sativus L., <i>Iridaceae</i>	Stamen	Oral	Immuno-regulatory, anti-inflammatory

Table 3 Drugs prescribed in Unani medicine for Nazla-e-wabaiya (epidemic influenza) /Humma -e-Wabaiya (epidemic fever).

Sl.no.	Unani name	Botanical name & family	Part used	Method of use in Unani medicine	Active ingredients	Mode of action
1	Behidana	Cydoniaoblonga Mill., Rosaceae	Berry	Decoction for oral use	Hydroxycinnamic derivatives	Anti-oxidant
2	Elwa	Aloe vera (L.) Burm.f., Xanthorrhoeaceae	Leaf sap	For local application on the chest wall	Anthrones, anthraquinones, mannans	Anti-inflammatory
3	Khaksi	Sisymbriumadenophorum (Wooton&Standl.) Tidestr., Brassicaceae	Seeds	To be mixed after preparing decoction	β -Sitosterol, stigmasterol, β -sitosterol- β -d-glucoside	Anti-bacterial
4	Sapistana	Cordiadichotoma G. Forst., Boraginaceae	Fruit	Decoction for oral use	Hydroquinones, terpenoids, steroids, flavonoids	Anti-microbial, antioxidant, antiulcer on gastric mucosa
5	Tabasheer	Bambusabambos (L.) Voss, Poaceae	Manna	Decoction for oral use	Coumaran, palmitic acid, adipic acid ester, α -elemol	Anti-helminthic, anti-inflammatory, anti-diarrhoeal
6	Tukhm-e-Kahu	Lactucasativa L., Compositae	Seeds paste	For oral use	Folate, β -carotene, lutein, phenolics, vitamins, iron	Anti-inflammatory, anti-diabetic, nutritive
7	Za'fran	Crocus sativus L., Iridaceae	Stamen	For local application on the chest wall	Safranal, crocin	Antioxidant
8	Unnab	Zizi phus jujube Mill., Rhamnaceae	Fruit	Decoction for oral use	Betulinic acid	Anti-proliferative on some influenza viruses, anti-inflammatory

Conclusion

The aim of this paper is to focus on the Perception of epidemic diseases in Unani medicine and possible role for prevention and treatment of COVID19. Concepts of sanitation, isolation, air purification and immune-modulation described in Unani medicine remain the basic tenets of infection containment in the contemporary preventive medicine.

This may also encourage the researchers to conduct the scientific studies on the prophylactic clinical trials by boosting the immunity and trials on therapeutical effectiveness of Unani drugs in COVID-19 patients. As Herbal medicines have several bioactive compounds such as phenols, vitamins, several antioxidants,

etc. with important pharmacological activity, hence they can play a significant role in reducing the disease burden in the contemporary world.

The Holistic approach of Unani medicine gives focus on prevention through life style modification which can be achieved by keeping balance in Asbabsittazarooria, dietary management, prophylactic drugs to boost the immunity and some other medicines based on the presentation of the symptoms of the disease. Therefore, in case of pandemic situation the above factual deliberation suggests the Importance of Unani drugs as well as preventive measures which have been used for several decades in the treatment of various illnesses which are similar to covid-19.

References

- 1 Moazzam SW, Manzoor F (2020) Prevention and treatment approach in unani medicine against covid-19- A review. *Eur J Pharm Med Res* 7: 625-628.
- 2 Jean SS, Lee PI, Hsueh PR (2020) Treatment options for COVID-19: the reality and challenges. *J Microbiol Immunol Infect* 53: 436-443.
- 3 Guo YR, Cao QD, Hong ZS, Tan YY, Chen SD, et al. (2020) The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak- An update on the status. *Mil Med Res* 7: 11.
- 4 del Rio C, Malani PN (2020) COVID-19—new insights on a rapidly changing epidemic. *JAMA* 323: 1339-1340.
- 5 Rodriguez-Morales AJ, Bonilla-Aldana DK, Sah R (2020) COVID-19, an emerging coronavirus infection: current scenario and recent developments -An overview. *J Pure Appl Microbiol* 14: 1-9.
- 6 Vellingiri B, Jayaramayya K, Iyer M, Narayanasamy A, Govindasamy V, et al. (2020) COVID-19: A promising cure for the global panic. *Science of the Total Environment* 4: 138277.
- 7 Fauci AS, Kasper DL, Hauser SL, Longo DL, Jameson JL, et al. (2019) *Harrison's Principles of Internal Medicine*. 20th edn. New York: McGraw Hill education.
- 8 Kakodkar P, Kaka N, Baig MN (2020) A Comprehensive Literature Review on the Clinical Presentation, and Management of the Pandemic Coronavirus Disease 2019 (COVID-19). *Cureus*.
- 9 Rocklöv J, Sjödin H, Wilder-Smith A (2020) COVID-19 outbreak on the Diamond Princess cruise ship: estimating the epidemic potential and effectiveness of public health countermeasures. *J Travel Med*.
- 10 Li G, Fan Y, Lai Y, Han T, Li Z, et al. (2020) Coronavirus infections and immune responses. *J Med Virol* 92: 424-432.
- 11 Misra DP, Agarwal V, Gasparyan AY, Zimba O (2020) Rheumatologists' perspective on coronavirus disease 19 (COVID-19) and potential therapeutic targets. *Clin Rheumatol* 10: 1.
- 12 Cortegiani A, Ingoglia G, Ippolito M, Giarratano A, Einav S. A systematic review on the efficacy and safety of chloroquine for the treatment of COVID-19. *J Crit Care*.
- 13 <https://tbsnews.net/international/coronavirus-chronicle/chinas-first-coronavirus-case-traced-back-november-17-55612>
- 14 https://www.who.int/docs/default-source/searo/bangladesh/covid-19-WHO-Bangladesh-situation-report/who-bancovid-19-sitrep-10.pdf?sfvrsn=c0aac0b8_4
- 15 WHO Bangladesh (2020) COVID-19 Morbidity and Mortality.
- 16 Nikhat S, Fazil M (2020) Overview of Covid-19; its prevention and management in the light of Unani medicine. *Science of the Total Environment* 728: 138859
- 17 Husain A, Sofi G, Dang R, Kumar N (2010) Unani system of medicine - Introduction and challenges. *Med J Islam World Acad Sci* 18: 27-30.
- 18 Islam A (2018) Origin and development of unani medicine: An analytical study. *Intellect Discourse* 26: 23-49.
- 19 Ministry of AYUSH (2020) Anonymous, Guidelines for Unani Practitioners for Covid 19, India.
- 20 <https://www.sciencedirect.com/book/9780433106906/a-history-of-medical-bacteriology-and-immunology?via=ihub>
- 21 Sina I (1878) *Al QanoonFilTibb*. MunshiNawal Kishore, Lucknow.
- 22 Qadeer A (2001) *Tareekh-e-TibwaAkhlaqiyat*. 1st edn. New Delhi.
- 23 Cambra LMA (2018)The causes of the black death described by IbnKhatima in his work Tahsil Al-Garad. *Am Res J English Lit* 4: 1-3.
- 24 Rehman SZ (1991) *Daur-e-JadeedAurTib*. Tibbi Academy, Bhopal.
- 25 Siddiqui (2020) Prevention and management of Covid-19 in Unani medicine. *World J Pharm Res* 9: 1097-1106.
- 26 Budholiya P, Ali AW, Gunwan D, Sahil S, Tyagi CK, et al. (2020) COVID-19: A Global Pandemic of 21st Century. *J Drug Deliv Ther* 10: 311-321.
- 27 IbnSina, Al Qanoonfilitib. *Kulyat-e-Qanun part-4 Edition-1981*, translated by Rizwan Ahmed, DarulTalyfat, Karachi.
- 28 IbnRushd (2008)*Kitab al-Kulliyat*, New Delhi.
- 29 Anonymous (2020) Training module/Investigators brochure for Population based Prospective Study on effectiveness and outcomes of Unani Medicine prophylactic interventions on population at risk of COVID-19.
- 30 Ahmad SF (2020) COVID-19, its prophylaxis and management in the light of Unani system of Medicine- A Review. *JETIR* 7: 553-561.
- 31 <https://www.nhp.gov.in> Concept-of-prevention-of-diseases-in-Unani-Medicine_mtl
- 32 Parvez A, Ahmed Z, Anwar N, Razi'sKA (2016) Unique approach to Amraz-e-Wabaiya (Infectious Diseases): An overview. *Int J Herb Med* 4: 176-178.
- 33 Fu JT, Tang L, Li WS, Wang K, Cheng DM, et al.(2015) Fumigant toxicity and repellence activity of camphor essential oil from *Cinnamomumcamphora Siebold* against *Solenopsisinvicta* workers (Hymenoptera: Formicidae). *J Insect Sci* 15: 129.
- 34 Kim S, Na YE, Yi JH, Kim BS, Ahn YJ (2007) Contact and fumigant toxicity of oriental medicinal plant extracts against *Dermanyssusgallinae* (Acari: Dermanyssidae). *Vet Parasitol* 145: 377-382.
- 35 Bhatwalkar SB, Shukla P, Srivastava RK, Mondal R, Anupam R (2019) Validation of environmental disinfection efficiency of traditional Ayurvedic fumigation practices. *J Ayurveda Integr Med* 10: 203-206.
- 36 Kim J, Jang M, Shin E, Jeongmin K, Lee SH, et al. (2016) Fumigant and contact toxicity of 22 wooden essential oils and their major components against *Drosophila suzukii* (Diptera: Drosophilidae). *Pestic Biochem Physiol* 133: 35-43.
- 37 EzzEldin HM, Sarhan RM, Khayyal AE (2019)The impact of vinegar on pathogenic *Acanthamoebaastrologyxis* isolate. *JParasit Dis* 43: 351-359
- 38 Amini M, GhorannevissM, Abdijadid S (2017) Effect of cold plasma on crocin esters and volatile compounds of saffron. *Food Chem* 235: 290-293.
- 39 Rahmani AH (2015) *Cassia fistula* Linn: potential candidate in the health management. *Pharm Res* 7: 217-224.
- 40 Razi Z (1991) *Kitab al-Mansoori*. Central Council for Research in Unani Medicine, NewDelhi.
- 41 Chaleshtori SF, Saholi M, Chaleshtori SR (2018) Chemical composition, antioxidant and antibacterial activity of *Buniumpersicum*, *Eucalyptus globulus*, and rose water on multidrug-resistant *listeria* species. *J Evidence-Based Integr Med*.
- 42 Bassiri-Jahromi S (2018)*Punicagranatum* (pomegranate) activity in health promotion and cancer prevention. *Oncol Rev* 12: 1-7.
- 43 Ho CW, Lazim AM, Fazry S, Zaki UKHH, Lim SJ (2017) Varieties,

- production, composition and health benefits of vinegars: a review. *Food Chem.*
- 44 Lim SH, Choi CI (2019) Pharmacological properties of morusnigra L. (Black Mulberry) as a promising nutraceutical resource. *Nutrients.*
 - 45 Imani G, Mehrpoya M, Khalilian A, Dastan D, Imani B (2020) Effects of cinnamon extract on complications of treatment and eradication of *Helicobacter pylori* in infected people implication for health policy/practice/research/medical education. *J Herbmed Pharmacol.*
 - 46 Baghdadi IH (2004) *Kitab al-Mukhtaratil-Tib.* Central Council for Research in Unani Medicine, New Delhi
 - 47 Hamauzu Y, Yasui H, Inno T, Kume C, Omanyuda M (2005) Phenolic profile, antioxidant property, and anti-influenza viral activity of Chinese quince (*Pseudo cydoniasinensis* Schneid.), quince (*Cydoniaoblonga* Mill.), and apple (*Malusdomestica* Mill.) fruits. *J Agric Food Chem* 53: 928-934.
 - 48 Arain IU, Husnain A, Talat A (2016) Effects of aloe vera in local massage oils in alternative medicine for the treatment of joint pains: a double blind study. *Ann King Edward Med Univ* 22: 8.
 - 49 Al-Massarani SM, El Gamal AA, Alam P, Al-Sheddi ES, Al-Oqail MM, et al. (2017) Isolation, biological evaluation and validated HPTLC-quantification of the marker constituent of the edible Saudi plant *Sisymbriumirio* L. *Saudi Pharm J SPJ Off Publ Saudi Pharm Soc* 25: 750-759.
 - 50 Oza MJ, Kulkarni YA (2017) Traditional uses, phytochemistry and pharmacology of the medicinal species of the genus *Cordia* (Boraginaceae). *J Pharm Pharmacol.*
 - 51 Samarqandi N (2010) *SharahAsbab.* Aijaz Publishing House, New Delhi.
 - 52 Vairappan CS, Nagappan T, Hui LT (2015) Chemical constituents and biological activities of essential oils from four species of bamboo genus *Schizostachyum*. *J Trop Biol Conserv* 12: 127-136.
 - 53 Kim MJ, Moon Y, Tou JC, Mou B, Waterland N (2016) Nutritional value, bioactive compounds and health benefits of lettuce (*Lactucasativa* L.). *J Food Compos Anal.*
 - 54 Bukhari SI, ManzoorM, DharMK (2018) A comprehensive reviewof the pharmacological potential of *Crocus sativus* and its bioactive apocarotenoids. *Biomed Pharmacother.*
 - 55 Hong EH, Song JH, Bin KK, Sung SH, Ko HJ, et al. (2015) Anti-influenza activity of betulinic acid from *Zizyphusjujuba* on influenza A/PR/8 virus. *Biomol Ther* 23: 345-349.
 - 56 Umar S, Subhan SMT, Azam T, Nisa Q, Khan MI, et al. (2016) Protective and antiviral activities of *Nigella sativa* against avian influenza (H9N2) in turkeys. *J Saudi Soc Agric Sci.*
 - 57 Harazem R, Rahman SAE, El-Kenawy A (2019) Evaluation of Antiviral Activity of *Allium Cepa* and *Allium Sativum* Extracts Against Newcastle Disease Virus. *Alexandria J Vet Sci* 61: 108-118.
 - 58 Singh VK, Singh DK (2008) Pharmacological Effects of Garlic (*Allium sativum* L.). *Ann Rev Biomed Sci* 10:6-26.
 - 59 Nagai K (1973) Experimental studies on the preventive effect of garlic extract against infection with influenza virus. *J Infect Dis* 47:321-325.
 - 60 Zhen H, Fang F, Ye DY, Shu SN, Zhou YF, et al. (2006) Experimental study on the action of allitridin against human cytomegalovirus in vitro: inhibitory effects on immediate early genes. *Antiviral Res* 72:68-74.
 - 61 Rasool A, Khan MR, Ali MA, Anjum AA, Ahmed I, et al. (2017) Antiavian influenza virus H9N2 activity of aqueous extracts of *Zingiboefficialis* (Ginger) and *Allium sativum* (Garlic) in chick embryos. *Pakistan J Pharm Sci*30:1341-1344.
 - 62 Chang JS, Wang KC, YehCF, Shieh DE, Chiang LC (2013) Fresh ginger (*Zingiberofficinale*) has anti-viral activity against human respiratory syncytial virus in human respiratory tract cell lines. *J Ethnopharmacol* 145:146-151.
 - 63 Nassan MA, Mohamed EH (2014) Immunopathological and antimicrobial effect of black pepper, ginger and thyme extracts on experimental model of acute hematogenous pyelonephritis in albino rats. *Int J Immunopath Ph* 27: 531-541.
 - 64 Hirabayashi K, Iwata S, Matsumoto H, Mori T, Shibata S, et al. (1991) Antiviral activity of glycyrrhizin and its modified compounds against human immunodeficiency virus type 1and herpes simplex type 1 in vitro. *Chem Pharm Bull.* 39:112-115.
 - 65 Fiore C, Eisenhut M, Krausse R, Ragazzi E, Pellati D, et al. (2008) Antiviral effects of *Glycyrrhiza* species. *Phytother Res* 22: 141-148.
 - 66 GhannadSM, Mohammadi A, Safiallahy S, Faradmal J, Azizi M, et al. (2014) The effect of aqueous extract of *Glycyrrhizaglabra* on Herpes simplex virus 1. *Jundishapur J Microbiol* 7:e11616.
 - 67 Wang L, Yang R, Yuan B, Liu Y, Liu C. The antiviral and antimicrobial activities of licorice, a widely-used Chinese herb. *Acta Pharm Sin* 5: 310-315.
 - 68 Crance JM, Scaramozzino N, Jouan A, Garin D (2003) Interferon, ribavirin, 6-azauridine and glycyrrhizin: antiviral compounds active against pathogenic flaviviruses. *US National Library of Medicine National Institutes of Health.*
 - 69 Michaelis M, Gieler J, Naczek P, Sithisarn P, Leutz A, et al. (1970) Glycyrrhizin Exerts Antioxidative Effects in H5N1 Influenza A Virus-Infected Cells and Inhibits Virus Replication and Pro-Inflammatory Gene Expression. *Plos One* 6: 1-5.
 - 70 Ansari S, Siddiqui MA, Malhotra S, Maaz M (2018) Antiviral efficacy of *Qust* (*Saussurealappa*) and *Afsanteen* (*Artemisia absinthium*) for chronic Hepatitis B: A prospective single arm pilot clinical trial. *Phcog Res* 10:282-290.
 - 71 Siddiqui MA, Ansari S (2015) Efficacy of a Unani Formulation on Viral Load in Chronic Hepatitis, B. *Indo American J Pharm Res* 5:1487-1490.
 - 72 Awasthi LP. The purification and nature of an antiviral protein from *Cuscutareflexa*.
 - 73 Zhou M, Xing HH, Yang Y, Wang YD, Zhou K, et al. (2017) Three New Anthraquinones From the Twigs of *Cassia fistula* and Their Bioactivities. *J Asian Nat Prod Res*19: 1073-1078.
 - 74 Yusuf G (1975) *KitabulMutamadfi'Adwiya al-Mufrada*, Daru'IMarifa, Beirut.
 - 75 Singh D, Chaudhuri PK (2017) Chemistry and Pharmacology of *Tinosporacordifolia*. *Nat Prod Commun*12:299-308.
 - 76 Chetan B, Nakum A (2010) Use of natural compounds, chitin and tinosporin for the treatment of the targeted viruses (retroviruses) (HIV-1, HIV-2) all subgroups, HTLV and other viral disease. *Indian patent Appl.*
 - 77 Khan F, Ali S, Ganie BA, Rubab I (2009) Immuno-potentiating effect of *Khamira Marwarid*, a nherbo-mineral preparation. *Clin Exp Pharmacol* 31:513-522.

- 78 Agarwal R, Diwanay S, Patki P, Patwardhan B (1999) Studies on Immunomodulatory Activity of Withania Somnifera (Ashwagandha) Extracts in Experimental Immune Inflammation. *J Ethnopharmacol* 67: 27-35.
- 79 Ziauddin M, Phansalkar N, Patki P, Diwanay S, Patwardhan B (1996) Studies on the Immunomodulatory Effects of Ashwagandha. *J Ethnopharmacol* 50: 69-76.
- 80 Verma SK, Shaban A, Purohit R, Chimata ML, GeetaRai G, et al. (2012) Immunomodulatory activity of Withaniasomnifera (L.). *J Chem Pharm Res* 4:559-561.
- 81 Davis L, Kuttan G (2000) ImmunomodulatoryActivity of WithaniaSomnifera. *J Ethnopharmacol* 71: 193- 200.
- 82 Fazlullah M, Makhzanul YNM. Mufradat MaroofbaJamiul Adwiya, Royal Printing Press, Lucknow.
- 83 Chinazzi M, Davis JT, Ajelli M, Gioannini C, Litvinova M, et al. (2020) The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak.
- 84 Zeinali M, Zirak MR, Rezaee SA, Karimi G, Hosseinzadeh H (2019) Immunoregulatory and anti-inflammatory properties of *Crocus sativus* (Saffron) and its main active constituents: a review. *Iran J Basic Med Sci* 22: 334-344.