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COVID-19: Understanding pathology and management in Unani medical perspective

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The whole world is facing a big challenge to fight against COVID-19 as it is a novel disease, highly infectious and having no treatment yet. Traditional Unani medicine is reviewed with an aim to find some solution for this disease prevention, control and management. Unani medical literature is extensively reviewed and it is found that there are some presentations similar to this disease and management of those clinical syndromes could be applied in present scenario. Major symptoms like fever, cough, fatigue, shortness of breath and rhinorrhoea are reviewed from Unani medical text having similar aetiology and interlinked pathology. It is demonstrated that in cold & humid atmospheric conditions in persons having Fuzlat (waste) in their body, Nazla (fall) of Balghami Rutubaat (phlegmatic fluids) from head comes towards lungs, infected there resulting in Zatur Riya (pneumonia/pneumonitis) and Humma Mawazba (fever caused by abnormal humour Balgham) and /or Humma Mutbiqa (fever caused by abnormal humour Dam). The bad atmospheric condition favours spread of this infection to other people who come in contact with such patient. The detailed description of these Unani concepts & interpretation is given below.

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Till date no treatment or vaccine is available for COVID-19 caused by SARS-CoV-2(ref.1). The priority of medical fraternity in this situation is to control the outbreak using all available safe and effective modes of treatment and prevention. Instead of declaring unscientific and ineffective, it is wise to assess the efficacy of traditional medicines which are safe to humans and has been in practice since long time for diseases having similar clinical presentation[2]. Due to the holistic approach of Unani Medical system, one drug may be used in several kind of illnesses. Unani medicine has previously found effective in certain difficult to treat diseases of inflammatory, autoimmune and idiopathic nature[2]. Various Unani drugs have been found to have immunomodulator and antiviral properties. Many upper and lower respiratory symptoms could be managed with Unani medicines including dry cough, dyspnoea, flu etc.[3] Each symptom is treated only after establishing its holistic pathology & diagnosis. In comparison to the development of new drug, it is easier to repurpose existing drugs on scientific grounds. Hence, it is inevitable to review and anatomise the Unani medical pathology of symptoms found in COVID-19 so that traditional medicines already in practice may be utilised and assessed for this new indication.

Causes and risk factors

Coronavirus disease 2019 (COVID-19) caused by a new virus, SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) of family Coronaviridae, is a highly infectious disease[1]. Age is a strong risk factor for severity of disease, development of complications, and chances of mortality. The case fatality rate among more than 40,000 cases of COVID-19 in China, was highest in elderly persons viz., 14.8% in ≥80 years, 8.0% in 70–79 years, 3.6% in 60–69 years,1.3% in 50–59 years, 0.4% in 40–49 years, 0.2% in <40 years. Early epidemiologic data of U.S. suggest that the case fatality was highest (10%–27%) in patients aged ≥85 years, followed by 3%–11% in ages 65–84 years, 1%–3% in ages 55–64 years, and <1% in ages <54 years. Patients without comorbidity had an overall case fatality of 0.9%, but it was higher for patients

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with underlying medical conditions e.g. 10.5% for those with cardiovascular disease, 7.3% for diabetes, and nearly 6% each for hypertension, chronic respiratory disease, and cancer. Prior stroke and chronic kidney disease also have been associated with increased severity of illness and adverse fate. In terms of age differences and prevalence of comorbidity, COVID-19 associated mortality in the United States was similar to China[4].

Clinical features of COVID-19

The incubation period for COVID-19 is considered up to 14 days, with a median time of 4-5 days. One study reported that 97.5% of persons develop symptoms within 11.5 days of SARS-CoV-2 infection. The signs and symptoms of COVID-19 vary at illness onset, but over the course of the disease, patients with COVID-19 experience the following features: Fever (83–99%), Cough (59–82%), Fatigue (44–70%), Anorexia (40–84%), Shortness of breath (31–40%), Sputum production (28–33%), Myalgias (11–35%)[4].

Headache, confusion, rhinorrhoea, sore throat, haemoptysis, vomiting, and diarrhoea have been less commonly observed (<10%). Some persons with COVID-19 have experienced gastrointestinal symptoms such as diarrhoea and nausea before developing fever and lower respiratory tract symptoms. Anosmia or ageusia prior to onset of respiratory symptoms has been reported, but more information is required to understand its part in diagnosing COVID-19. Several studies have reported similar signs and symptoms of COVID-19 in children than adults but usually milder. SARS-CoV-2 infection is documented in asymptomatic patients (who never develop symptoms) and in pre-symptomatic patients (not yet symptomatic). Abnormalities on chest imaging are reported in patients before the onset of symptoms. Some data suggest that in younger individuals, mostly pre-symptomatic infection is detected and viral pneumonia is less likely associated. Although transmission of SARS-CoV-2 from asymptomatic or pre-symptomatic patients has been documented, risk of transmission may be greatest when patients are symptomatic. Viral RNA shedding is greatest at the onset of symptom and declines over the course of several days to weeks, as measured indirectly by RT-PCR cycle threshold values. The exact degree of SARS-CoV-2 viral RNA shedding that may provoke risk of transmission is not yet clear[4]. The largest cohort of >40,000 persons with confirmed COVID-19 from China indicated that disease severity can range from mild to critical[4]:

- Mild to moderate (mild symptoms up to mild pneumonia): 81%
- Severe (dyspnoea, hypoxia, or >50% lung involvement on imaging): 14%
- Critical (respiratory failure, shock, or multiorgan system dysfunction): 5%

In this study, all deaths observed among patients with critical condition and the overall case fatality rate was 2.3%. The case fatality rate in patients with critical disease was 49%. Among children in China, disease severity was lower with 94% having asymptomatic, mild or moderate disease, 5% having severe illness and <1% having critical disease. Only one (<0.1%) death was noted in a person <18 years old[4].

Unani perspective of COVID-19

For interpreting any new disease, not existing in past era or in current medical literature, we need to assess their clinical features and possible aetiology. Correlation of symptoms and causes of new disease with those previously described, facilitates comprehensive guidance to define the pathology and management. In Unani medical literature we did not find any disease having exactly similar clinical condition to that of COVID-19, but with the help of holistic description of these symptoms and their relations with probable causes it is attempted to explain the Unani medical perspective of this disease. Major symptoms like fever, cough, fatigue, shortness of breath and rhinorrhoea are reviewed from Unani medical text having similar aetiology and interlinked pathology. It is demonstrated that in cold and humid atmospheric conditions in persons having Fuzlat (waste) in their body Nazla (fall) of Balghami Rutubaat (phlegmatic fluids) from head comes towards lungs, infected there and result in Zatur Riya (pneumonia/pneumonitis) and Humma Mawazba (fever caused by abnormal humour Balgham) and /or Humma Mutbiqa (fever caused by abnormal humour Dam). The bad atmospheric condition favours spread of this infection to other people who come in contact with such patient. The detailed description of this Unani concepts and interpretation is given below.

Unani medical concepts related to COVID-19

Waba and Humma Wabai

Waba is defined as an abnormal health condition where a large number of population is involved in

one particular disease. Its modern synonym may be epidemic or pandemic[5]. According to Avicenna, Waba is caused by severe perverted conditions of air and earth. Change of weather (climate) is of primary importance in Waba and is related to change in sky conditions which we do not know specifically. Often causes of infection are earth related, the details of which are not known to us. Often Ajsame Khabeesa (infectious agents) play a role in spread of infection. Waba may be cold or hot depending on its time & condition of origin. Waba which is originated in dry atmosphere ends early but that started in humid atmosphere last longer[6].

Here, Avicenna clearly stated that some things in origin of infection and its spread is not known specifically. Unani physicians have even pointed towards some invisible bodies and Ajsame Khabeesa (infectious agents) involved in the process of infection but not about the viruses and their characteristics[7].

It is quite obvious that this disease COVID-19 outbreak occurred in winter season and in humid atmosphere. Wuhan is divided by the rivers Yangtze and Han. This city comprises several lakes and parks including expansive picturesque East Lake[8]. The humidity of city is relatively high and the temperature of city during the outbreak was low. The disease was first noticed in seafood workers. So, the nature of Waba is most likely to be considered as cold and wet.

Humma Wabai (Humma means Fever in Arabic) is among several diseases which are classified in Waba. According to Avicenna, Humma Wabai starts from humid air. In humid air fevers last longer though are less severe in intensity. Humma Wabai is noticed mild externally (low grade fever) but internally it is worse and even fatal. It is characterised by difficulty in breathing, bad odour from mouth, restlessness, dry cough, unconsciousness, lethargy, diarrhoea[6].

Humma Balghami, Humma Mawazba and Humma Mutbiqa

The etiologic type of Humma which is likely to be considered for this disease is Humma Balghami. Humma Balghami is caused by infection of abnormal Balgham (one of the four basic humours of the body having cold and wet nature). Majoosi has stated that winter season, humid and cold climate, and flowing winds are predisposing factors for Humma Balghami. Humma Balghami occurs in adolescents or elderly. They have propensity to develop it because they have excess Balgham in their body[9]. We are observing somewhat similar pattern of this disease in the community.

Among few types of Humma Balghami, characteristics of Humma Mawazba are similar to the disease under discussion. The diagnosis of Humma Mawazba may be confirmed if illness occurred in one particular season globally[9]. In Humma Mawazba, Balgham is infected outside the blood vessels in organs like stomach or lung. Fever remains for 18 h daily but does not go off completely. Chills may be present or absent. Chills found more in Balgham Zujaji and least or absent in Balgham Haad (Zujaji and Haad are types of abnormal Balgham). Unconsciousness may develop because of loss of appetite. Balghami vomiting and diarrhoea may occur. Colour of body may be bluish white[10]. Sometimes lips become bluish like those who eat toot[6].

Unani physicians have described different aetiology of different fevers based on their pattern and course. In Hummiyate Murakkaba (fever which is supposed to be caused by more than one abnormal humour) symptoms overlap, course of fever depends on the causative matter. If hot humour is mixed with cold one, the duration and severity of fever caused by cold humour decreases based on quantity of hot humour[10]. It is mentioned that Balgham is a humour which may be converted in Dam in need under influence of Hararate Ghareezi (Normal body temperature). Similarly, due to action of Hararate Ghareebi (abnormal body temperature), the nature of abnormal Balgham may be changed to abnormal hot humour. According to Majoosi, Humma Mawazba may be mixed with Humma Mutbiqa. Mutbiqa is caused by abnormal conditions in humour Dam (hot and wet in nature). The patient of Mutbiqa feels lethargy, fatigue, weakness, thirst and difficulty in breathing[9].

Cough, Nazla and Dyspnoea

Nazla is a concept in Unani medicine which means fall of waste fluid from head to downwards usually in respiratory passages. Unani physician Ahmad bin Muhammad Tabri (10th Century AD) explained an interesting pathogenesis of a diseases he named it 'Waram (inflammation) of Nazla in Chest' which is very much similar to our interpretation for COVID-19. According to him, 'Ghaleez (thick) or Raqeeq (thin) Rutubaat (fluids) falling from head causes this disease. Usually this Rutubaat are Raqeeq, Haad (acute) and Akkal (corrosive or erosive) but sometimes may be Ghaleez and Haad. The pathogenesis is explained as follows: Ghaleez Damwi (related to humour Dam) or Safrawi (related to

humour Safra) Bukharat (vapours) ascends from whole body and get accumulated in head due to closure of Masamat of head in cold. After significant amount collected in head these are expelled towards chest and sometimes other adjacent structures[11]. According to Majoosi, cough due to lung diseases may be caused by Nazla. Nazla containing Fuzla (waste matter) of head when descends to lungs and chest may induce severe cough especially when it is acute, thin and corrosive in nature. Such material when attempted to expectorate causes severe coughing because it does not come out easily (dry cough) and more force is induced to expectorate it. Due to forcible act of coughing there are chances of haemorrhage in vessels of lung manifesting clinically as haemoptysis. Ultimately severe coughing and this noxious morbid matter in the lungs lead to ulceration and wound there. In this condition, occasionally Raqeeq Balgham (thin sputum) is expectorated and sometimes Ghaleez Sabz Balgham (greenish viscous sputum). Few patients develop fever (Hummiyate Mukhtaleta/Murakkaba)[9]. The autopsy of COVID 19 patients' lungs show that the consistency of tissue changed from normal soft spongy to gelatinous hard[12]. The nature of morbid matter Balgham lazij described in Unani text corresponds with this morphology[13].

Unani concept of pneumonitis

Zatur Riya (pneumonia/pneumonitis) caused by Barid Nazlat descended to lungs from head cause difficulty in breathing and heaviness in chest, eyes and tongue[11]. Dyspnoea and many respiratory diseases are named as Sil because the respiratory organs weaken and their functions decrease. (Sil in Arabic means weak). Sil may spread to others who come in contact with such patient[9]. Majoosi has documented that such respiratory diseases are communicable but he could not establish the factors of disease transmission here. According to Tabri, a type of Sil called as Silul Minfar produced by wound in lungs caused by Haad Akkal humour. It leads to continuous fever and deterioration of Quwwat of body (Immunity). Due to Waram (inflammation) in lungs exchange of gases becomes difficult. Inability of getting fresh air leads to difficulty in neutralising warm air in heart which becomes unable to work properly. Excess of heat in heart is the cause of fever. Severe cough along with haemoptysis and continuous fever leads to fatality[11]. With description of Sil by Tabri we may suggest that Sil should not be termed for tuberculosis exclusively but is a wider concept. Sil may be called for conditions like respiratory failure and multiorgan failure. The description of Sil may include the respiratory distress associated with critical illness of COVID-19.

Unani medical view of Cytokine storm syndrome

Possible causes of death in COVID-19 are respiratory failure, or cytokine storm syndrome. The term "Cytokine Storm Syndrome" (CSS) was coined to explain the observation that multiple inflammatory causes can result in a disease that looks very similar to sepsis. The unifying characteristic of CSS is a clinical and laboratory phenotype suggestive of massive inflammation progressing to multiple organ dysfunction syndrome (MODS) and eventually death[14]. Avicenna has ascertained that if dyspnoea occurs suddenly the cause will be Nazla. Sometimes these morbid matters accumulate in Urooqe Khashina (bronchioles) that may cause Khafqan and may be fatal. If Hejan (storm of humours) or Imtila (congestion) appear in the morbid matter and in nearby structures of lung it may worsen the breathless condition[6]. The description of CSS may correspond to Hejan or Imtila mentioned by Avicenna.

Coagulopathy and Unani Medicine

Recent studies show that coagulopathy occurs in many patients with COVID-19 and it is associated with an increased death risk. The most typical findings in this pathological scenario are raised D-dimer concentration, relative low platelet count, and increased prothrombin time. It was reported that the coagulopathy related with COVID-19 is a combination of mild Disseminated Intravascular Coagulopathy and localised pulmonary thrombotic microangiopathy. These pathological conditions could be having a substantial impact on organ dysfunction in patients who are most severely affected. According to Unani literature, the causes of obstruction (sudda) due to abnormalities in quality are Ghilzat (increased viscosity), Lazoojat, Khoone Munjamid (clotted blood) or severe Buroodat, most of these could be associated with abnormal Balgham[6]. It hints towards association of thrombosis with abnormal Balgham. Obstruction in the vessels especially arteries is considered difficult to treat. Unani etiopathology for most of thromboembolic phenomenon are attributed to abnormal Balgham like in cases of paralysis[6]. Although Unani medical description presented here may be similar to COVID-19, it is not contended specific to this disease. These points are based on qayas (Hypothesis) on literature of COVID-19, and interviews of recovered patients

available online as direct observation of such cases (which is best way of Unani diagnosis) is difficult due to certain reasons. A brief view of Unani pathology is summarized in Fig. 1.

Unani preventive measures

Based on the amount of Fuzlat (wastes) in body, preventive measures taken, Mizaj and Quwwat in the body disease severity may be explained in Unani context. Those do not have Fuzlat in their body, detoxifying regularly, having Mizaj opposite to disease remain away from disease[6,9]. So holistically one should use preventive measures of opposite nature to disease[13]. Generally hot and dry climate, separation from diseased person, moderate diet, removal of wastes and excess Balghami Rutubaat, empowering body immunity, avoiding excess physical activities and optimum sleep helps to prevent from such diseases. Loban and camphor have disinfectant properties, hence fumigations of loban and use of camphormay purify ambient air[16]. It is evident that favourable environment for virus propagation and transmission is cold and moist so our surroundings should be hot and dry for this we should avoid use of ACs and air coolers as much as possible. Smelling spices like clove, cardamom is advisable. Use of Vinegar and other sour food is advisable like lemon, Achar etc. Cow Ghee is very effective to prevent from infection to be used orally and applied on the body. Barley and its water are good diet in days of Waba. Diet should be minimized to slightly lesser than usual habit. Milk, fruits and its juices (except citrus), alcohol should largely be avoided. Use of certain Unani medicines can help in protection from disease if taken before infection e.g. Tiryaqe Arba'a, Saffron, Arqe Ajeeb and Khameera Marwareed. Mild to moderate exercise especially walking is beneficial. According to Hippocrates, walking is man's best medicine. According to Avicenna, exercise is the key of good health if it is done at correct time and in moderate quantity. According to Averroes, exercise generates some sort of heat that resembles to Hararate Ghareezi (essential quality of living body for normal physiology). Heavy physical activities must be avoided. One should remain calm and hopeful, keeping depression and fear away from him. Excess of anxiety, fear and hopelessness weakens the Hararate Ghareezi and makes body prone to diseases and infections. Rest is better with optimum sleep. Majoosi stated that Tabi'at (Immunity) is improved in two ways by sleep. One is mental and physical rest. Second is the digestion and yield of energy. Lack of sleep causes dissolution of energies, mental weakness and digestive upsets. It is necessary not to let bowel constipated as abnormal retention of faecal matter predisposes to infection[6,17-20].

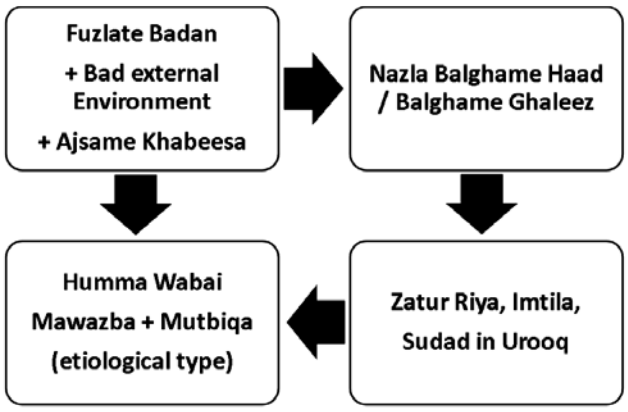

Fig. 1 — Unani pathological overview of COVID-19

Management approaches

The Unani medical management of infectious respiratory diseases has been in practice. Apart from respiratory health benefits, Unani drugs are having other beneficial systemic effects like cardioprotective, hepatoprotective and nephroprotective, immunomodulatory, antiviral and antibacterial effects. The above description of clinical presentation from Unani medical literature has its treatment according to the etiopathology as follows:

In treatment Fasd, prevention of fall of nazla, istefragh of morbid humours are useful[6]. After Fasd, Barley water, Unnab, Sapistan, Parsiyaoshan, Khashkhash safed, Badam Shirin, Aslussus, Maweez (Munaqqa), Zoofa are advisable. Zoofa, Aslussoos, Banafsha, Honey and Barley water are effective medicines for this type of Zatur Riya[11]. Maul Asal, Sikanjabeen Asali, Zoofa, Maul Usool (Bekhe Karafs, Bekhe Badyan, Bekhe Izkhir, Parsiyaoshan, Anisoon), Tiryaqe Arba'a are effective for Humma Mawazba[10]. Avicenna has mentioned drugs like abhal, suad kofi, izkhir, waj turki, kundur, hilteet, qaranfal, honey, zafran, sibr, mur makki, sirka, sandal, kafoor for prevention and treatment[6]. Pharmacological effects of Unani drugs mentioned here are shown in Table 1 respectively[3,21]. Use of traditional Chinese medicine in recent COVID-19 outbreak of China resulted in improvement in symptoms of this disease and better outcome[22].

Kalonji (*Nigella sativa*) has been traditionally used for the management of several symptoms and ailments including asthma, bronchitis, loss of appetite, diarrhoea, vomiting and it is also recommended for Humma Balghami[6]. It was reported that *Nigella sativa* has inhibitory actions against inflammatory cytokines such as interleukin-1 and 6 and the transcription factor, nuclear factor κB. *Nigella sativa* is having a

Table 1 — Pharmacological effects of Unani drugs that may be used for COVID-19

Unani Medicine	Botanical name	Traditional & Scientific Pharmacological effects
Unnab	*Ziziphus jujube* Mill.	Antitussive, antiallergic; hepatoprotective, prevents stress induced ulcer formation, used for dry cough
Barley	*Hordeum vulgare* Linn.	Protects immune system, nutritive and demulcent in cases of bowel inflammation and diarrhoea.
Sapistan	*Cordia dichotoma*	Expectorant, diuretic, mucilaginous, anthelmintic. It is used in the diseases of the chest and urinary passage
Parsiyaoshan	*Adiantum capillus-veneris* Linn.	Antitussive, expectorant, used in chronic catarrh (it is an ingredient of cough and bronchial medicines)
Khashkhash Safed	*Papaver somniferum* Linn.	used in catarrh, spasmolytic, devoid of narcotic properties
Badam Shirin	*Prunus amygdalus* Batsch var.	Nutritious, demulcent and stimulant nervine tonic; valuable dry fruit in diets
Maweez (Munaqqa)	*Vitis vinifera* Linn.	It is used in prescriptions for cough, respiratory tract catarrh, subacute cases of enlarged liver and spleen
Zoofa	*Hyssopus officinalis* Linn.	Stimulant, anti-inflammatory, diuretic, antispasmodic, used for bronchitis, coughs and colds. It induces heavy sweating in fevers
Aslussoos	*Glycyrrhiza glabra* Linn.	Expectorant, antiallergic, anti-inflammatory, mild laxative, spasmolytic, anti-stress, anti-depressive, antiulcer, hepatoprotective, used in bronchitis, dry cough, respiratory infections, catarrh, tuberculosis; Also used for adrenocorticoid insufficiency
Banafsha	*Viola odorata* Linn.	Expectorant, anti-inflammatory, antipyretic, diaphoretic, diuretic. Used for catarrhal and pulmonary affections, also for diseases of liver and intestines.
Karafs	*Apium graveolens* Linn.	Anti-inflammatory (used in rheumatic disorders, inflammation of the urinary tract), diuretic, carminative, nervine, sedative, antiemetic, antispasmodic, antiseptic (used in bronchitis, asthma, as well as diseases of liver and spleen)
Badyan	*Foeniculum vulgare* Mill.	Carminative, antispasmodic, anti-inflammatory, diuretic. Relieves bloating, nausea, used for the catarrh
Izkhir	*Cymbopogon jwarancusa* Schult.	Blood purifier, febrifuge, antimicrobial, styptic
Anisoon	*Pimpinella anisum* Linn.	Diuretic, antispasmodic, expectorant. It is used for flatulence, dry coughs, whooping cough, bronchitis, catarrhs
Abhal	*Juniperus communis* Linn.	Diuretic, urinary antiseptic, carminative, digestive, anti-inflammatory,
Suad kofi	*Cyperus rotundus* Linn.	Anti-inflammatory, antirheumatic, hepatoprotective, diuretic, antipyretic, analgesic, used for intestinal problems, indigestion, sprue, diarrhoea, dysentery, vomiting and fever
Waj	*Acorus calamus* Linn.	Sedative (with neuroleptic and antianxiety properties), analgesic, spasmolytic, anticonvulsant; used for bronchial catarrh, chronic diarrhoea and dysentery.
Kundru	*Boswellia serrata* Roxb.	Antiseptic, anti-inflammatory, analgesic. Also used in diarrhoea, dysentery, urinary disorders.
Hilteet	*Ferula foetida* Regel.	Stimulates the intestinal and respiratory tracts, used for congested mucus, bronchitis and whooping cough
Qaranfal	*Syzygium aromaticum* Linn.	Antiemetic, stimulant, carminative. Used in dyspepsia, gastric irritation. Used in inflammatory changes of oral and pharyngeal mucosa.
Zafran	*Crocus sativus* Linn.	Antispasmodic expectorant (used in dry cough, whooping cough, bronchitis)
Sibr	*Aloe barbadensis* Mill.	Anti-inflammatory, antimicrobial, used in constipation, releases immune system potentiators; enhances function of T cells and interferon production
Mur	*Balsamodendron myrrha* Nees.	Anti-inflammatory (on pharyngitis, tonsillitis, common cold and gingivitis), antiseptic, bacteriostatic, antiviral, expectorant, stomachic, carminative (in dyspepsia), a leucocytogenic agent (increases number of white cells in the blood). Blood purifier
Sirka	Vinegar	Vinegar has a variety of functional properties, including antibacterial, anti-infective, antioxidant, anticancer activities, hypoglycaemic effect, lipid metabolism regulation etc.
Sandal	*Santalum album* Linn.	Expectorant, antiseptic and bacteriostatic against Gram positive bacteria, diaphoretic, diuretic. Used as a urinary antiseptic in chronic cystitis
Kafoor	*Cinnamomum camphora* Linn.	Reflex expectorant and reflex stimulant of heart and circulation as well as respiration.

relatively potent anti-asthmatic effect. Nigellone possesses an antispasmodic efficacy and increases mucociliary clearance. *Nigella sativa* inhibits the inflammatory pulmonary responses, decreasing peri bronchial inflammatory cell infiltration, alveolar septal infiltration, alveolar oedema, alveolar exudate, alveolar macrophages, interstitial fibrosis, granuloma and necrosis formation significantly in different pulmonary aspiration models[23]. THQ also has minimal effect on normal blood coagulation function and can effectively reverse sepsis-mediated and cancer-mediated thrombosis[24].

Being holistic in nature and Mizaj based personalized medicine; Unani physicians do individualized treatment of every patient according to Mizaj of person, Mizaj of disease, Mizaj of climate and extent of pathology. Hence, one disease may be treated with several kind of drugs and different therapies.

The principle of Unani treatment according to pathology may be planned as[10]

- Nuzje Balgham i.e., preparation of morbid humour to evacuate (considering the nature of Balgham, associated symptoms)
- Tanqiya Balgham i.e., expulsion of morbid matter using expectorants, purgatives, Fasd (removal of abnormal humour dam from appropriate veins) and emetics.
- Tadeele Mizaj i.e., normalization of body functions which was disturbed due to morbid matters.
- Taqwiyate Aazae Raeesa w Riya i.e., potentiation of important body organs and lungs to avoid reoccurrence of such disease (reinfection).
- Use of antipyretic Unani drugs is advisable whenever necessary.

Conclusion

It may be concluded that there is sufficient literature available based on which we may delineate the Unani pathology, principles of treatment and use of rich treasure of the existing herbal drugs for this disease. Since beginning of this disease, there is continuous progression in understanding pathology based on evidences and findings. There is obvious chance of further changes in its pathological consideration in future. We are here attempted to explain best possible correlation in a broader way. These traditional Unani medical knowledge may be applied for planning the control, prevention and management of COVID-19 safely hoping better outcome if practiced rationally as adjuvant with conventional treatment. Randomised controlled studies may be carried out to evaluate the extent of efficacy of Unani medicine in a holistic way on its own scientific principles.

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Conflict of Interest

There is no conflict of interest.

Author Contribution statements

Mohammed Yasir has prepared complete structure of article, scientific studies and its interpretation from Unani literature. Rizwan Mansoor Khan has contributed in writing Unani preventive measures. Dr Abdul Nasir Ansari and Dr Ataullah Fahad have reviewed the article and suggested necessary modifications.

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