

## Review Article

# Immune boosting and anti-influenza effects of an Unani decoction in influenza like illness and COVID-19 like epidemics: a rationale approach

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## ABSTRACT

The Unani system of medicine is one of the traditional systems of medicine practised since centuries in many parts of the world including India. At a time when the coronavirus disease 2019 (COVID-19) pandemic is still raging across the globe and there is still no appreciable satisfactory management available with vaccination being the only panacea in the near future, unani medicine chiefly composed of herbal drugs is replete with many classical references for the management of influenza like illness and COVID-19 like epidemics. In Unani medicine, *nazla-i-wabāi* is referred as influenza for which a decoction containing Behidana (*Cydonia oblonga*), Unnab (*Ziziphus jujuba*) and Sapistan (*Cordia myxa*) are recommended to relieve the clinical features of *nazla-i-wabāi* and other COVID-19 like epidemics. All the three ingredients of this formulation are also individually used for the treatment of sore throat, cough, septicaemia, fever, dyspnoea, pharyngitis, chest pain etc. Certain scientific studies have validated various pharmacological actions of these drugs as claimed by unani physicians. A concerted rational approach has been attempted to highlight the effect of the unani decoction as to its immune boosting property both as prophylactic and therapeutic use in the treatment of influenza like illness and COVID-19 like epidemics in the light of ancient Unani classics and recent scientific studies.

## INTRODUCTION

### Unani medicine

The Unani medicine is considered as one of the oldest and time tested systems of medicine practiced since more than 2500 years.<sup>1</sup> This system was basically originated in Greece and has later been established in Rome, Arabia, Iran and Indian peninsula.<sup>2,3</sup> According to Unani concept, the human physiology is studied through seven basic components called *umūr al-tabī'iyya* (physiological factors) comprising *arkān* (element), *mizāj* (temperament), *akhlāt* (humours), *a'dā* (organ), *arwāh*

(pneuma), *quwā* (faculties) and *af'āl* (functions).<sup>4,5</sup> Nutrients for organs of the body are derived from four humours i.e. *dam* (blood), *balgham* (phlegm), *safrā'* (yellow bile) and *saudā'* (black bile). These humours are present in the body in equilibrium and maintain the physiological status. According to Unani theory, when the quality or quantity of anyone or admixture of these humours is compromised, the pathological condition is developed.<sup>3,4</sup> *Tabī'at* (physis-nature) or *tabī'at al-insaniyah* (human nature) or *tabī'at al-mudabbira-i-badan* (*medicatrix naturea*) is considered as supreme planner and healer of the body. The existence of this inherent power is responsible for direct or indirect active motion or repose. In physiological conditions, the *tabī'at*

maintains the homeostasis in the internal environment of the body which is responsible for normal functions of the cells, tissues and organs. Whereas in pathological states, this prime mover fights against the diseases and whenever the condition is favourable, the homeostasis is back and the disease gets cure. Ibn Sina (980-1037 AD) states that *tabī'at* would aim at reasons for health and illness far deeper than those given by the microbic and cognate theories. The homeostasis of each cell, tissue, organ and system is maintained by the *tabī'āt* through various mechanisms mainly *quwat-i-tabi'yah* (natural faculties), *quwat-i-haywaniyah* (vital faculties) and *quwat-i-nafsaniyah* (mental faculties).<sup>6</sup> These faculties control, regulate and restore the normal functions of each organ and system, and also assists in modulating the immune system of the body, and produces resistance against diseases.<sup>4</sup> Thus, the core aim of a Unani physician is to assist *medicatrix naturae*.<sup>3</sup> In general, four modes of treatment viz. '*Ilājbi'l Tadbīr*' (regimenal therapy), '*Ilāj bi'l Ghidhā'*' (dieto-therapy), '*Ilāj bi'l Dawā'*' (pharmacotherapy) and '*Ilāj bi'l Yad*' (surgery) are applied for the management of any disease.<sup>7</sup> Conventionally, plant drugs are being commonly used by different traditional systems of medicine such as Unani medicine, Ayurveda, Chinese medicine etc for treatment purposes. Nowadays, many scientific studies are supporting the use of plant materials for the prevention and treatment of several bodily ailments in a rational manner.<sup>8</sup>

### **Concept of Amrād-i-Wabāi (Epidemic diseases) in Unani medicine**

According to Unani theory, sometimes contamination or putrefaction occurs in the air resulting in *wabā'* which is the standardized term for epidemic.<sup>5,9</sup> Ibn Sina (980–1037 AD) advocates that the fever may occur in masses due to contamination of water and air with *ajsām khabītha* (pathogenic organisms).<sup>10</sup> The contamination of air is caused when the bodies died during epidemic are not disposed properly.<sup>10,11</sup> The putrid fruits, vegetables, accumulated water at one place; dead animals etc may also contaminate the air. Such contamination may cause infection which is appeared with body ache, sweating, halitosis, bilious vomiting and diarrhoea, changes in urine etc.<sup>12</sup> Ibn Khatima (1369 AD) says the human body is surrounded by minute bodies which when entered in the human body may cause disease.<sup>13</sup> The history is evident that several contagious diseases such as meningitis, leprosy, tuberculosis, small pox, rabies were common in olden days. Hippocrates (460–370 BC) depicts the symptomatology of certain contagious diseases which are currently referred as influenza, mumps, diphtheria, tuberculosis, malaria etc. Galen (129–200 AD) has given miasma theory of transmission of infectious diseases. According to this theory, few infectious diseases such as plague, cholera and chlamydia transmits through a toxic form of unpleasant air which capitulate hazardous vapours or toxic elements that penetrate in the body via inhalation or pores of skin.<sup>14</sup> First time, the complete

clinical picture of small pox and measles was described by an Unani physician, Zakaria Razi (854–925 AD) in his treatise *Kitab fi al-Jadariva al-Hasbah* (De Variolis et Morbilliis/ Book on Small Pox and Measles).<sup>14,15</sup> He stated that “when zoonotic diseases are epidemic, the human being should avoid being in close contact with animals”. At another place, he quotes that “the droplets inhalation is more contagious and an infected person should avoid visiting to the houses of others”.<sup>16</sup> According to Razi, rain during the hot weather is more prone to develop epidemic diseases.<sup>17</sup> He has also affirmed that the infectious diseases may be more prevalent when the person moves from non-contaminated to contaminated zone.<sup>18</sup> Ibn Zohar (1126–1198 AD) has asserted that he observed few patients who died in spite of having mild fever and concurrently some recovered completely when their place of stay and diets were modified. He further avows that the normal function of heart may be disturbed due to inhalation of contaminated air, and the patient is died because of heart failure.<sup>19</sup> During epidemics, the severity of the disease is assessed by respiratory distress and foul smell of breath. The detail clinical features of epidemic diseases viz. redness in eye, hotness in the chest, polyuria, increased viscosity of urine, loss of appetite, ulcers around the mouth etc have been discussed in Unani literature.<sup>18</sup> Apart from detailed description of epidemic diseases in general, the classical Unani literature has also described certain specific diseases which have been categorized as epidemic in earlier days such as *hasba* (measles), *judariyya* (small pox), *judhām* (leprosy) etc, nevertheless ancient Unani scientists were completely cognisant about the existence of microbial organisms in the environment.<sup>9,10,12,20</sup> Though, the germ theory was absolutely understood after the invention of microscope in 1683 AD.<sup>21</sup>

### **Nazla-i-Wabāi (Influenza)**

In unani medicine, two terminologies i.e. *zūkām* and *nazlā* are being used for common cold and influenza like conditions. It is further explained that in *zūkām* the matter of brain is dripping down towards nose whereas in *nazlā* the morbid matters drip towards throat.<sup>9,20,22</sup> Razi (854–925 AD) opined that bare head and exposure to cold air of north direction causes irritation, itching in the nose and sneezing which results *zūkām*.<sup>17</sup> *Nazlā va Zūkām* may be associated with pharyngitis, sore throat, conjunctivitis, headache, hoarseness of voice, cough, fever, gastric pain, diarrhoea etc. According to Unani medicine, the etiological factors of this disease are abrupt change of weather, toxic substances, excessive hot or cold climate, excessive bathing with cold water, extreme physical exertion, stress, *su-i-mizāj* (deranged temperament) etc.<sup>20</sup> Hakim Ajmal Khan (1868–1927 AD) states that sometimes plague, cholera and other epidemic diseases spread everywhere and responsible for several deaths. Similarly, *nazlā* and *zūkām* also transmits epidemically. He termed these conditions as *nazlā va zūkām-i-wabāi* and correlated it with influenza.<sup>23</sup> Najeebuddin Samarqandi (d. 1222 AD), a Persian physician has

described the epidemic influenza in his classical text ‘*Al-asbabwa-Alamat*’ (the book of causes and symptoms). In urdu translation of this book, the translator, Hakim Kabiruddin (1894–1976 AD) has mentioned the cardinal features of *nazlā-i-wabāiyā* viz. sneezing, nasal irritation, sore throat, fever and malaise. The patients may also complain of cough, diarrhoea and delirium, and when the condition is worsened, they may have pneumonia and pleurisy as sequel.<sup>11,21</sup> Some patients may also suffer from hoarseness of voice, throat pain, difficulty in breathing, loss of appetite, nausea and vomiting, headache etc which closely resembles to influenza like illness and COVID-19 like infections. Sudden onset of fever in a large population at a time is the cardinal feature of *nazla-i-wabāi*. Most of the patients get fast recovery even within a week, if the complications are not severe.<sup>23</sup>

In conventional medicine, influenza is classified as zoonotic disease of viral origin and naturally found in birds and mammals. The history suggests that this disease exist since ancient time. Many species of animals are considered as domestic animals and lived along with human being. The influenza is usually transmitted through animals mostly in crowded places. The clear clinical explanation of this disease was first described by Caus in 1551. He termed the condition of influenza as “sweating disease” manifested with fever, headache and body ache which may cause rapid death in some patients. The term “una influenza” which means “celestial influence” was first used by villaini and segui.<sup>24</sup> Influenza virus causes significant morbidity and mortality in human population every year.<sup>25</sup> The pandemic of influenza has been reported in 1918, 1957 and 2009.<sup>26</sup> In 1918 influenza pandemic, approximately 50-100 million people were died whereas in 2009 H1N1 influenza pandemic nearly 100,000 persons were died.<sup>27</sup> Approximately 18 hemagglutinin (HA) and 11 neuraminidase (NA) subtypes of influenza virus have been identified till date but only three subtypes such as H1N1, H2N2 and H3N2 causes pandemics in human being in the past.<sup>28</sup> The pandemic of influenza A virus is due to antigenic shift of the virus resulting with the appearance of H or N antigens. The influenza virus produces an acute febrile illness along with body ache, headache and cough; and often encountered respiratory complications. This disease is transmitted through air borne droplets inhalation. Most of the uncomplicated patients of influenza require only symptomatic treatment. The antiviral drugs such as amantadine and rimantadine are currently used for treatment as well as prophylaxis purposes against influenza A.<sup>29</sup>

**COVID- 19**

The world health organization (WHO) has declared the outbreak of COVID-19 as public health emergency of international concern (PHEIC) on January 30, 2020 and a pandemic on March 11, 2020.<sup>30</sup> According to the weekly operational update on COVID-19 published by the WHO, till 09 September 2020 CE, 27486960 patients of

COVID-19 have been confirmed and 894983 deaths have been reported due to this disease in the whole world and more than 227 countries and territories, and 26 cruise and naval ships are affected.<sup>31,32</sup> In India, as of 11 September 2020, 08:00 IST (GMT+5:30), 4486143 cases have been confirmed and 76271 patients have been died because of COVID-19.<sup>33</sup> The mortality rate due to COVID-19 is different in various countries, and as of 6 August 2020, the death rate in United Kingdom, Italy, France, Belgium, Spain, United States and India is 15.12%, 14.14%, 13.95%, 13.86%, 9.32%, 3.29%, 2.07%, respectively.<sup>34</sup> The SARS CoV-2 is an enveloped single stranded RNA beta coronavirus which genome sequence shared 79.5% sequence identity to severe acute respiratory syndrome related coronaviruses.<sup>35</sup> The transmission and infectivity rate of this virus are high but the death rate is low in comparison to other coronaviruses such as severe acute respiratory syndrome coronavirus (SARS-CoV) and middle-east respiratory syndrome coronavirus (MERS-CoV).<sup>36</sup> The commonest clinical features of COVID-19 are fever, cough, muscular pain, difficulty in breathing, sore throat, headache, vomiting, diarrhoea etc; and patients are died due to acute respiratory distress syndrome (ARDS), hypoxemia, septic shock, coagulation disorders, heart failure etc.

Many patients are asymptomatic except having fatigue and low grade fever.<sup>37</sup> Since no curative treatment or vaccine has been introduced till date to combat the COVID-19 infection; only supportive treatment such as rehydration therapy, use of antipyretic and antitussive drugs, oxygen support etc have been recommended according to appearance of clinical features and severity of illness.<sup>38</sup> Recently, convalescent plasma therapy along with corticosteroid has clinically been trialled in two patients which has given favourable result.<sup>39</sup>

**FORMULA OF UNANI DECOCTION**

Hakim Ajmal Khan (1868–1927 AD) has recommended a Unani formulation of decoction which is very much useful in the prevention and treatment of *nazla-i-wabāi*. This formulation contains the following drugs (Table 1).<sup>23</sup>

**Table 1: Formulation contains the drugs.**

S no.	Ingredients	Parts used	Ratio
1.	Behidan ( <i>Cydonia oblonga</i> Mill.)	Seed	3 g
2.	Unnab ( <i>Ziziphus jujuba</i> Mill.)	Fruit	5 numbers
3.	Sapistan ( <i>Cordia myxa</i> Linn.)	Fruit	9 numbers

### Method of preparation of decoction

All the ingredients are to be boiled in 250 ml of plain water till the quantity of water remains half. After that the decoction is to be filtered through sieve.



Figure 1: Behidana, Unnab, Sapistan.

### Method of use

Decoction to be taken twice in a day by oral route.<sup>23</sup>

### INDIVIDUAL INGREDIENTS OF DECOCTION WITH DETAILS

#### Behidana (*Cydonia oblonga* Mill.)

Vernacular (s) name

Quince seed (English)

#### Botanical description

It is a plant origin drug belongs to the family *Rosaceae* and is used for medicinal, nutritional and ornamental purposes. It is classified as small plant or shrub which height is 5-8 m and width is 4-5 m. This plant is indigenous to Iran and Turkey, and is cultivated in India, Middle East, Europe and South Africa. The fruit of this plant is bright yellow colour with 7-12 cm length and 6-9 cm width. Behidana is the seed of *Cydonia oblonga* Mill. and named as quince seed in English.<sup>8</sup>



Figure 1: *Cydonia oblonga* (A) plant (B) fruit.

### Temperament

Cold and moist in 2<sup>nd</sup> degree<sup>40</sup>

### Pharmacological actions

The pharmacological properties of this drug are anti-tussive, antipyretic, bronchodilator, anti-diarrhoeal, laxative, haemostatic, soothing, demulcent etc.<sup>40,42,43</sup>

### Therapeutic uses

The seed is therapeutically used in Unani medicine for the treatment of various ailments. The mucilage of behidana is very effective in the treatment of sore throat, dry cough, hyperacidity, fever, dyspnoea, asthma, haemoptysis intestinal erosion, diarrhoea etc. The decoction or infusion of behidana is very beneficial in the treatment of burning micturition.<sup>40,42</sup>

### Dosage

3-5 g<sup>41</sup>

### Compound formulations

The compound preparations which contain behidana are Banadiq al-Bazur, Sharbat Arzani, Sharbat Aijaz, Laooq Behidana and Laooq Sapistan.<sup>44</sup>

### Chemical constituents

Behidana yields triterpenes, sterols, phenolics, organic acids, amino acids and tannins, responsible for its anti-diarrhoeal activity. The major phenolic compounds are D-(-)-quinic acid derivatives, apigenin, stellarin and 6-C-pentosyl-8-C-glucosylchrysoeriol. Flavonoids are the major phytoconstituents of quince seed (63-66 %) with important flavones are isoschaftoside (18%), caffeoylquinic acids (35-37%), and 5-O-caffeoylquinic acid (19-24%).<sup>8</sup>

### Scientific studies

The aqueous and methanolic extracts of quince seeds exhibited spasmolytic activity in isolated rabbit jejunum and guinea pig ileum. The local application of seed extract on isolated trachea of rabbit has shown bronchodilator activity due to presence of Ca<sup>++</sup> antagonist constituents.<sup>8</sup> Silva et al carried-out antioxidant activity of methanolic and its fractionated extracts of quince (pulp, peel, and seed) and jam into phenolic and organic acid fractions using 1,1'-diphenyl-2-picrylhydrazyl. This study has reported that the phenolic fractions possess significant antioxidant effect compare to that of whole methanolic extract. Among the phenolic fractions, the seed extract showed much significant antioxidant effect.<sup>45</sup> In the same way, Magalhaes et al separated phenolic compounds from methanolic extract of quince fruit seed, pulp and peel through HPLC/UV and

simultaneously assessed their antioxidant properties through 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2,2-azobis (2-amidinopropane) dihydrochloride (AAPH). The result showed antioxidant activities of extracts of all three parts of quince fruit.<sup>46</sup> Baars et al studied the in vitro anti-allergic activity of the combined product (*Citrus e fructibus* and *cydonia e fructibus*) and individual products of citrus and cydonia against immunological pathways involved in seasonal allergic rhinitis (SAR). This study demonstrated that citrus produces selective effect on decreasing chronic inflammatory cytokine (TNF- $\alpha$ ) and Th2 pathway activity whereas cydonia promotes the SAR-related Th1 pathway activity.<sup>47</sup> Hamauzu et al investigated the anti-oxidant and anti-influenza activities of phenolic extracts of chinese quince, quince, and apple fruits. The result showed significant anti-oxidant effects of chinese quince and quince phenolic extracts compared to chlorogenic acid or ascorbic acid against the linoleic acid peroxidation system and the DPPH radical scavenging system. Similarly, the chinese quince phenolics exhibited noteworthy anti-influenza activity against the hemagglutination inhibition test.<sup>48</sup>

### Unnab (*Ziziphus jujuba* Mill.)

#### Vernacular names

Unnab (Arabic), Seelana (Persian), Jujube (English).<sup>43,49</sup>

#### Botanical description

*Ziziphus jujuba* Mill. belongs to the family *Rhamnaceae*, also known as Jujube, has been extensively utilized in the food industry and medicine since more than 3000 years.<sup>50</sup> This plant is classified as small tree or shrub which height varies from 3-4 to 10-16 m. This is a semi deciduous and much branched tree which bark is greyish brown or reddish in color and has deep longitudinal furrows. The leaves have petioles with 1.1-5.8 mm long; flowers comprise with sepals and give an acrid smell. The fruit is oval shape with approximately 1.5 cm diameter and greenish, yellow or reddish in colour.<sup>51</sup>



**Figure 2: *Ziziphus jujuba* whole plant.**

#### Temperament

*Moa'tadil* or hot and moist in 1<sup>st</sup> degree<sup>52</sup>

#### Pharmacological actions

The pharmacological activities of this drug are tonic, emollient, antitussive, antiallergic, protects liver and prevents stress ulcer formation, laxative, concoctive for viscid morbid humours, expectorant, anti-cough, blood purifier etc.<sup>41,43,53</sup>

#### Therapeutic uses

In Unani medicine, the fruit is therapeutically used for the treatment of cough; pain in kidney, urinary bladder and chest, septicaemia, chicken pox, sore throat, burning micturition, hyperacidity, asthma, urticaria etc.<sup>52,68</sup>

#### Dosage

5-7 Numbers<sup>41</sup>

#### Compound formulations

The compound preparations which contain Unnab are Itrifal Zamani, Sharbat Arzani, Sharbat Aijaz, Sharbat Khaksi, Sharbat Zufa Murakkab, Sharbat Ushba Khas, Sharbat Sadar, Arq Murakkab Musaffi Khoon, Looq Sapistan, Looq Sapistan Khayar Shambar and Dayaquza.<sup>44</sup>

#### Chemical constituents

The fruit of *Ziziphus jujuba* contains 3-O- (trans-p-coumaroyl)-aliphatic acid, 3-O-(cis-p-coumaroyl)-aliphatic acid, 3 $\beta$ -O-(trans-p-coumaroyl)-maslinic acid, pomonic acid, 2-oxo-pomolic acid, benthamic acid, terminic acid, oleanic acid, betulinic acid, quercetin 3-O-robinobioside, apigenin, traumatic acid, (Z)-4-oxotetradec-5-enoic acid, 7(E)-9-keto-hexadec-7-enoic acid, 9(E)-11-oxo-octadecenoic acid, magnoflorine etc.<sup>54</sup> Anti-allergic activity of fruit extract of *Ziziphus jujuba* is due to higher concentration of cyclic AMP and cyclic GMP found in it.<sup>43</sup>

#### Scientific studies

Mohebbati et al reported the long-term administration of different dose levels of hydro-alcoholic extract of *Ziziphus jujuba* fruit promisingly reduced hypertension in rats induced by NG-nitro-L-arginine methyl ester (L-NAME). This effect is possibly due to increased production of nitric oxide (NO) since its deficiency causes for the development of hypertension.<sup>55</sup> Zhang et al reported the anti-oxidant and immunological activities of polysaccharides isolated from *Ziziphus jujuba*.<sup>56</sup> Hong et al evaluated the anti-influenza activity of betulinic acid isolated from methanolic extract of root of *Ziziphus jujuba*. In this study, they have reported that the betulinic acid significantly inhibits the multiplication of influenza A/PR/8 in A549 cells without producing remarkable cytotoxicity. They also reported the same effect in influenza A/PR/8 virus infected mice. The influenza

infected mice treated with betulinic acid satisfactorily decreased pulmonary necrosis and oedema, and numbers of inflammatory cells. The result of this study suggested that the betulinic acid of *Ziziphus jujuba* may be an imperative therapeutic agent for the treatment of viral diseases especially influenza.<sup>57</sup> Ganachari et al revealed the promising cell mediated immune system stimulation through increasing neutrophil phagocytic function, of hydro-alcoholic extract of *Ziziphus jujuba* leaves.<sup>58</sup> Min-Kyun et al reported the potent anti-oxidant activity of methanolic extract of *Ziziphus jujuba* fruit against DPPH radical scavenging activity and lipid peroxidation inhibitory activity.<sup>59</sup>

**Sapistan (*Cordia myxa* Linn.; Synonym: *Cordia dichotoma* G. Forst)**

*Vernacular name (s)*

Greek: Fatroon; Arabic: Mukheeta, Atibba al-Kalba, Dubaq; Persian: Sapistan, Sag-i-Pistan, Sabitan; Ayurvedic: Lasoda, Shleshmaataka, Shelu, Bahuvaara, Bahuvaaraka, Bhutvrkshak, Uddaalaka Shita, Picchila, Lisodaa; Siddha/ Tamil: Naruvili.<sup>43,49</sup>

*Botanical description*

*Cordia myxa* Linn. is a deciduous medium sized tree which height is approximately 10.5 m, belongs to the family Boraginaceae.<sup>60</sup> The bark of this tree is cracked with grey in colour; spread branches with forming a dense crown; branchlets are hairy but later glabrous. The leaves are simple, alternate, stipules absent with 0.5-4.5 cm long petioles. The flowers are regular, unisexual, and white to creamy in colour with 1-2 mm long pedicle. The fruits are drupe, globular to ovoid in shape with 2-3.5 cm diameter.<sup>61</sup>



**Figure 1: *Cordia dichotoma* (A) plant (B) fresh fruit.**

*Temperament*

*Mo'tadil* in hot and cold & moist in 1<sup>st</sup> degree.<sup>41</sup>

*Pharmacological actions*

The pharmacological activities of this drug are expectorant, laxative for throat and chest, demulcent,

astringent, demulcent, diuretic, anthelmintic, mucilaginous, anti-tussive, anthelmintic, antispasmodic, analgesic etc.<sup>41,43,53</sup>

*Therapeutic uses*

In unani medicine, commonly fruit of this plant is medicinally used for the treatment of various bodily ailments viz. sore throat, pharyngitis, cough, burning micturition, asthma, chest pain, fever etc.<sup>52,62</sup>

*Dosage*

9-15 Numbers<sup>41</sup>

*Compound formulations*

The compound preparations which contain Sapistan are Looq Sapistan, Looq Sapistan Khayar Shambar, Dayaqua and Sufuf Habis.<sup>44</sup>

*Chemical constituents*

The fruit of *Cordia myxa* contains alkaloids, glycosides, flavonoids, sterols, saponins, terpenoids, phenols, coumarines, tannins, resins, mucilage etc.<sup>61</sup> The fruit also contains Ca 55, P 275, Zn 2, Mn 2, Cr 0.2 and Cu 1.6 mg/100 g. Of them, chromium is reported to have hypoglycaemic effect in case of diabetes mellitus.<sup>43</sup>

*Scientific studies*

Ali et al carried out immunomodulatory activity of aqueous extract of fruit of *Cordia myxa* in mice immunized with hydatid cyst fluid antigen (HCFAG). The result showed significant increase in the thickness of spleen, mitotic index of bone marrow and spleen cells, and marked hyperplasia of lymphoid cells.<sup>63</sup> Likewise, Ali et al reported the immunomodulatory effect of alcoholic (70%) extract of *Cordia myxa* fruit with reference to significant increase in the total leucocyte count in rats.<sup>64</sup> Al Bayaty et al studied the tracheal smooth muscle relaxant activity of *Cordia myxa* plant extract in sheep. The result of this study exhibited that the test drug relaxes both epithelium-intact and denuded sheep trachea ring contracted by acetylcholine. The possible mechanism of action for tracheal smooth muscle relaxation after administration of *Cordia myxa* plant extract is stimulation of nitric oxide synthesis.<sup>65</sup>

## UNANI DECOCTION RECOMMENDED DURING PANDEMIC OF COVID-19

The ministry of AYUSH, government of India has recommended that the drugs as mentioned in the formula of Unani decoction may be used during the pandemic of COVID-19 for prevention purpose.<sup>66</sup> The Central Council for Research in Unani Medicine (CCRUM), an autonomous organization of ministry of AYUSH, government of India designed a project entitled

“Population based prospective study on effectiveness and outcomes of unani medicine prophylactic interventions on population at risk of COVID-19”. This project allotted to various centres of CCRUM including Regional Research Institute of Unani Medicine, Srinagar, Jammu & Kashmir.<sup>67</sup> In this project, the decoction containing Behidana (*Cydonia oblonga*), Unnab (*Ziziphus jujuba*) and Sapistan (*Cordia myxa*) along with *Tiryaq-i-Arba* (a pharmacopoeial preparation) were given to one group of population at risk of COVID-19 in different parts of Kashmir valley for 20 days while the second group of population did not receive any treatment. The assessment was done on 0, 10<sup>th</sup>, 20<sup>th</sup> and 35<sup>th</sup> (post-trial) days through immune status questionnaire (ISQ) and WHOQOL-BREF. The unpublished data revealed significant improvement in immune system and quality of life of recipients. The result of this population-based study is under publication.

## CONCLUSION

In Unani system of medicine, *tabī'at mudabbira-i-badan* (*medicatrix naturea*) is considered as supreme planner and healer of the body which maintains the equilibrium in the internal environment of the body and responsible for normal functions of cells, tissues and organs. In other words, this supreme power is very much similar to the defence mechanism of human body which is also called as immune system. Scientific studies have reported the immunomodulator effects of all the three ingredients of the decoction and two of them possess anti-influenza activity. On the basis of observational claim of Unani physicians regarding use of this decoction during epidemics and reported pharmacological activities of individual drugs of this formulation, it is therefore suggested that this decoction may be used to enhance the immune system of the body and to combat COVID-19 symptoms to alleviate the prevalence of such infections. But, further studies on the decoction as to its safety and efficacy in viral diseases are imminent and being explored through *in-vitro* and *in-vivo* studies.

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