



## Can Ayurveda be leveraged for COVID-19?

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Received 05 June 2020; revised 09 November 2020

The world is experiencing an unprecedented health crisis as a result of the highly infectious novel coronavirus. Even economically powerful countries with the best healthcare and technology infrastructure are struggling to contain COVID-19. Conventional medicine is racing against time to produce vaccine and repurpose drugs used in other viral diseases. India has been using its resources maximally to fight COVID-19. However, it is yet to make full use of one of its major resource, namely AYUSH (Ayurveda, Yoga, Unani, Siddha and Homeopathy) systems. Ayurveda, which occupies a prime position in the AYUSH systems, has a huge knowledge base and infrastructure accessible in terms of registered practitioners, dispensaries, colleges, hospitals, pharmacies, research centres, etc. It is hence only logical that in a crisis like COVID -19, ayurveda is utilised for the public. Considering the vast clinical knowledge and experience available with ayurveda, this sector should definitely be an advantage for India. This article will discuss why and how the knowledge base and support system of ayurveda sector should be leveraged in trying times as the present one.

**Key words** – Ayurveda, AYUSH, Corona virus, COVID-19

**IPC Code:** Int. Cl.<sup>20</sup>: A61K 9/00, A61P 37/02, A61K 45/06

On 30 January 2020, the World Health Organisation (WHO) declared the CORonaVirus Disease 2019 (COVID-19) outbreak as a Public Health Emergency of International Concern (PHEIC) under the International Health Regulations (IHR 2005)<sup>1</sup>. On 11 March 2020, the WHO declared COVID-19 a global pandemic<sup>2</sup>. The world is now experiencing an unprecedented health crisis as a result of the highly infectious novel coronavirus (2019-nCoV), which has a rapid human-to-human transmission<sup>3</sup>. Even economically powerful countries like USA, UK, Italy and Spain, with the best modern medicine based health infrastructure and services are struggling to contain COVID-19<sup>(refs4-6)</sup>.

There is thus, an urgent need for development of drugs which can either inhibit the virus or improve the inherent capacity of body to fight against the infection or both<sup>7,8</sup>. Conventional medicine is racing against time to produce vaccine and repurpose drugs used in other viral diseases<sup>7-9</sup>. At the same time, China, the first country to be affected by the virus had included Traditional Chinese Medicine (TCM) and Tibetan Medicine (TM) (which has similarities with Ayurveda) in their official treatment protocol and had successfully treated more than 85% of their COVID-

19 patients using TCM and TM<sup>10-16</sup>. The positive results have been taken cognisance by WHO, who have now taken keen interest in the TCM clinical trials<sup>17</sup>.

Although India has been using its means maximally and optimally to fight COVID-19<sup>(refs 18-21)</sup>, it is yet to make full use of one of its major resources, namely the AYUSH (Ayurveda, Yoga, Unani, Siddha, Homeopathy and Sowa-Rigpa) sector. Just as TCM is an officially recognised system of medicine in China, AYUSH is also an officially approved sector in India. There is a huge infrastructure accessible in terms of registered practitioners, dispensaries, colleges, hospitals, pharmacies, research centres, etc.<sup>22,23</sup> (Fig. 1). It is only logical that in a crisis like COVID -19, the system is made useful for the public. Considering the vast clinical knowledge and experience available with the AYUSH systems, this sector should definitely be an advantage for India as TCM is for China. The knowledge base and support system of AYUSH sector should be used in trying times as the present one.

Ayurveda is one of the more popular and well known of the AYUSH systems and is the topic of discussion in this article. To many outside the AYUSH fraternity, Ayurveda is still suspicious. Some of the concerns and scepticism are natural to those

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Fig. 1 — AYUSH infrastructure in a nutshell. AYUSH - Ayurveda, Yoga, Unani, Siddha, Homeopathy and Sowa-Rigpa

unfamiliar with the science of Ayurveda but not addressing these has been a stumbling block for Ayurveda. This article addresses some of these concerns in the specific context of COVID-19 and also outlines how Ayurveda can be leveraged to combat the Covid pandemic.

### Ayurveda for COVID-19: the challenges

#### Challenge 1 - Ayurveda's pre-germ theory existence renders it ineffectual in pathogen-induced diseases

Although there has always been a long-standing co-existence of humans and infectious diseases<sup>24</sup>, there is no denying the fact that the nuanced understanding of their pathologies is recent. A new era was ushered in conventional Western medicine with the advent of the germ theory, which states that microorganisms cause diseases<sup>25,26</sup>. This new concept brought in radical changes in understanding, treating and preventing diseases.

However, the issue here is whether the Ayurvedic Vaidyas of yore knew of microorganisms-induced diseases and took cognisance of it in their clinical practice. Interestingly, the answer to this question comes from two Westerners - (i) Dr. John Zephaniah Holwell (FRS-Fellow of Royal College of Surgeons), a surgeon who was an employee of the English East India Company and who later succeeded Robert Clive as a temporary Governor of Bengal in 1760. Holwell

describes how ‘certain Vaidyas in Bengal inoculate local residents with a mixture comprising the pus derived from individuals who had suffered from smallpox the year before’<sup>27</sup>. In Holwell’s words, this inoculation (considered a precursor to the present-day vaccination) “was performed before the onset of seasonal smallpox epidemics, and might have been in practice in India from around 1,000 AD”; and (ii) Donald Henderson from Johns Hopkins, USA and Bernard Moss of the National Institute of Health (NIH), USA date the appearance of vaccination in India to prior 1000 AD<sup>28</sup>.

In the words of Henderson and Moss, “A method for protection against naturally acquired smallpox infection appears to have been discovered in India sometime before AD 1000. There it became the practice to deliberately inoculate, either into the skin or by nasal insufflation, scabs or pustular material from lesions of patients. This practice resulted in an infection that was usually less severe than an infection acquired naturally by inhalation of droplets. From India, the practice spread to China, Western Asia, and Africa and finally, in the early 18th century, to Europe and North America”<sup>29</sup>.

Furthermore, the fact that ayurvedic surgeons like Susruta had successfully performed surgeries show that effective measures against infection were practised and in vogue<sup>30</sup>. It is common knowledge

that sterilisation is crucial to the success of any surgery. Lack of sterilisation can cause hospital induced infections and delayed wound healing among other problems. Susruta and other ayurvedic surgeons definitely had a clear idea of the methods of sterilisation to be adopted routinely to prevent any post-surgical complications<sup>31,32</sup>.

All the aforementioned information indicates the tacit acknowledgment of the role of microorganisms/germs in disease by the Ayurvedic Vaidyas of yester years. The convention in Ayurveda however, is to consider any disease as the result of changes happening in the status of *tridosha*, the three regulatory functional principles envisaged in Ayurveda. The diseases caused by microorganisms are also understood similarly. In other words, the microorganisms cause imbalance in *doshas*, which in turn initiate the disease process. An assault by a microorganism shall not be a serious pathological event as long as it does not influence the status of *tridoshas*. So, rather than focus on the microbiological aetiology, the resultant diseases are considered *doshic* in nature and were managed accordingly. Interventional strategies to reverse these imbalances were developed, used on patients and documented as well. All such clinical information provides the priori evidence and justification for using Ayurveda in this hour of crisis.

In COVID-19 (as in any other viral / infectious disease), there are two factors to consider - (i) the virus itself (the pathogen) (ii) the infected person (host). This offers two different strategies to manage the resultant disease. Allopathy has an anti-pathogen approach by which it contains/incapacitates the virus using pharmaceutical agents. Ayurveda would adopt a pro-host strategy using a diversity of tactics and medicines to help the host fight / keep away the pathogen and at the same time manage the already manifested clinical symptoms. The strategies of both allopathy and Ayurveda are scientific in their own rights and have definite roles to play.

#### **Challenge 2 - Absence of validation of Ayurveda's medicines by clinical trial**

Guidelines for clinical evaluation of ASU (Ayurveda, Siddha and Unani) are given in Chapter IV-A (sections 33-B to 33-N) of the Indian Drugs & Cosmetics Act (D&C Act) 1940<sup>(ref.33)</sup>. A Gazette notification titled 'Guidelines for evaluation of ASU Drugs & Other Traditional Medicines of India under Rule - 170 of Drugs & Cosmetics Rules 1945', was

also released by Government of India in December 2008<sup>(ref.34)</sup>. Section 1A of this document mentions that classical ayurvedic formulations, when used for indications mentioned in texts, are exempt from clinical trials to prove their efficacy.

Thus, rules pertaining to classical formulations with prior-human use do not necessarily follow the clinical trial rules laid down for proprietary medicines or traditional knowledge-based new drug discovery<sup>35,36</sup>. Moreover, the available methodologies for clinical trials (developed for single molecule drugs) will not do justice to the multi-modal ayurvedic therapeutics, which are comprehensive comprising of internal medicines, procedures (*panchakarma*), external applications, diet and lifestyle regulations. The psychological aspects of the patient are also given due consideration while interventions are strategized. In addition, ayurvedic formulations are complex mixtures with unique administration (*anupān*- drug vehicle) and dosing regimens. Therefore, the current methodologies for clinical trials have to be modified for the multi-factorial approach of ayurvedic management. Appropriately designed clinical trials for documenting the therapeutic efficacy of ayurvedic interventions in toto is necessary. Rigorously and meticulously planned pilot or observational studies are the other options.

#### **Challenge 3 - Providing evidence of efficacy**

The sections on therapeutics in Ayurvedic texts not only showcase the practical translation of the theoretical framework of Ayurveda but are also compendium of evidence provided by the documented clinical observations and efficacy. For example, let us look at the 30 chapters on therapeutics elaborated in Charaka Samhita. Each chapter provides comprehensive information about *nidana* (causative factors), *samprāpti* (etiopathogenesis), *lakshana* (symptomatology), prognosis and classification of the disease before detailing the therapeutics. For instance, the chapter on *jwara* (fever) has the following explained<sup>37</sup>- synonyms of *jwara* (captures the various clinical features and progression of the disease), *prakruti* (nature of the disease, i.e. fever), *pravritti* (origin of the disease), *prabhāva* (sequel of the disease), *kāraṇa* (causative factors), *purvarupa* (premonitory signs and symptoms), *adhithāna* (place of manifestation), *bala kāla* (severity and the time of manifestation of the disease), *ātma lakshana* (cardinal features off ever), *vidhi bheda* (classification of the

disease), *linga* (signs and symptoms of each type of fever), *āma jwara linga* (sign and symptoms of primary stage of the disease), *jirna jwara linga* (sign and symptoms of chronic stage of the disease), evolution of the disease, prognosis of different types of fever (curable, incurable types) and the required precautions at the initial stage of the disease.

The chapter then continues with the management principles, guidelines for diet and lifestyle regimens, recipes for dietary and beverage preparations, vegetables to avoid, contra-indications for certain dietary preparations, *aushada* (drugs for the treatment of the disease), contra-indications for certain medicines, *kriyakrama* (various therapeutic procedures), clinical indications for the various procedures, contra-indications for some procedures, hazards of improperly carried-out procedures, post-procedure care, *vimuktha prashānta chinna* (signs and symptoms of cure and remission - both separately), precautions required after being cured (to prevent recurrence), recurrent fever and reasons for the recurrence, and guidelines for management of recurrent fever.

The logical inference and interpretation of the systematic detailing of the disease and its management with comprehensive clinical details as mentioned above lead one to infer that the meticulous documentation actually provides evidence of treatment efficacy in patients afflicted with the disease. These classical management principles, procedures and formulations are still being used for treatment of various diseases thereby generating evidence currently and continuously. What is required is accurate documentation and compilation (as Charaka and Susruta and other *Acharyas* had done) of the present day evidences.

#### **Challenge 4 - Opportunity to generate evidence for COVID-19**

WHO, in its guidance for managing ethical issues in infectious disease outbreaks allows for “Monitored Emergency use of UnRegistered and Experimental Interventions” (MEURI)<sup>38</sup>. Quoting from WHO in this context “There are many pathogens for which no proven effective intervention exists. For some pathogens there may be interventions that have shown promising safety and efficacy in the laboratory and in relevant animal models but that have not yet been evaluated for safety and efficacy in humans. Under normal

circumstances, such interventions undergo testing in clinical trials that are capable of generating reliable evidence about safety and efficacy. However, in the context of an outbreak characterized by high mortality, it can be ethically appropriate to offer individual patients experimental interventions on an emergency basis outside clinical trials, provided: 1) no proven effective treatment exists; 2) it is not possible to initiate clinical studies immediately; 3) data providing preliminary support of the intervention’s efficacy and safety are available, at least from laboratory or animal studies, and use of the intervention outside clinical trials has been suggested by an appropriately qualified scientific advisory committee on the basis of a favourable risk–benefit analysis; 4) the relevant country authorities, as well as an appropriately qualified ethics committee, have approved such use; 5) adequate resources are available to ensure that risks can be minimized; 6) the patient’s informed consent is obtained; and 7) the emergency use of the intervention is monitored and the results are documented and shared in a timely manner with the wider medical and scientific community”.

The WHO guidelines go onto say “MEURI is justified by the ethical principle of respect for patient autonomy - i.e. the right of individuals to make their own risk-benefit assessments in light of their personal values, goals and health conditions. It is also supported by the principle of beneficence - providing patients with available and reasonable opportunities to improve their condition, including measures that can plausibly mitigate extreme suffering and enhance survival”. Just as repurposed allopathic drugs are being used to treat COVID-19 using this clause, the same clause can be invoked for using the time-tested ayurvedic formulations and treatment strategies to treat COVID-19 positive patients. This aside, the D & C Act of India also allows use of classical medicines for treatment of patients. However, Government of India has declared COVID-19 a notified disease with guidelines for its management issued by Ministry of Health & Family Welfare (HFW)<sup>39</sup>. Under these circumstances, COVID patients cannot be accessed by ayurvedic physicians resulting in their inability to generate evidence of the efficacy of Ayurvedic management in COVID-19. Table 1 summarises some of the challenges faced by Ayurveda and the corresponding rejoinders.

Table 1 — Some of the challenges faced by Ayurveda in the specific context of COVID-19 and the corresponding rejoinders

1. Lack of germ theory in Ayurveda	<ul style="list-style-type: none"> <li>• In 1757, Dr. Holwell, a British surgeon had recorded inoculation for smallpox by local Ayurvedic Vaidyas (27)</li> <li>• Drs. Henderson from Johns Hopkins and Moss from NIH, USA have dated vaccination in India prior 1000 AD (28)</li> <li>• Susruta, the father of surgery, had used sterilisation to prevent post-surgical infections (31, 32)</li> </ul>
2. Absence of validation by clinical trial	<ul style="list-style-type: none"> <li>• As per Drugs &amp; Cosmetics Act Rules, Government of India, classical ayurvedic formulations used for indications mentioned in texts are exempt from clinical trials to prove their efficacy (34)</li> <li>• available methodologies for clinical trials (single drugs) will not suffice for Ayurveda due to the multi-factorial and comprehensive approach of Ayurvedic treatment</li> <li>• clinical trials for standalone ayurvedic treatments with a comparator arm of standard of care (allopathy) is currently not logistically not feasible</li> <li>• there are reports of observational and pilot studies, and documentation of the efficacy of medicines in certain diseases</li> </ul>
3. Lack of evidence of efficacy	<ul style="list-style-type: none"> <li>• clinical trials involving comprehensive ayurvedic interventions (in toto) with a standard of care control arm is not currently possible to produce the required evidence</li> <li>• the detailed clinical information in the sections on therapeutics in the ayurvedic texts are evidences of the treatment efficacy observed and documented in days of yore</li> </ul>
4. Lack of opportunity to generate evidence for COVID-19	<ul style="list-style-type: none"> <li>• COVID patients not accessible to ayurveda physicians since COVID-19 has been declared a notified disease with guidelines issued by Ministry of Health &amp; Family Welfare, Government of India</li> </ul>

## Management of COVID-19: existing knowledge that provides Ayurveda the advantage

### 2.1. In-context background information

Ayurveda is a science of life encompassing both health and disease. Ayurveda understands health as a reflection of the ability of the system to adapt to stress (endogenous and exogenous as in COVID-19)<sup>40</sup>. Health exists as a continuum with the environment - from soil to plants and animals to human gut and other organs. Diseases, except traumatic injuries, are considered disruptions arising from within the system. Ayurvedic management involves bringing the system back to balance. To strategise the therapeutic management and risk stratification, Ayurveda has several classifications of disease - for example, based on clinical symptoms, body constitution (physical, physiological and psychological), *dosha* (underlying functional principles), *dhātu* (tissue elements), season, age, digestive capacity, geographical region, occupation, etc.

Ayurveda has thus, a wide array of principles and practices to deal with health and disease. The uniqueness of Ayurveda is its theoretical framework and its strength is its centuries of accumulated clinical expertise<sup>41</sup>. The clinical practices and the theories form the backbone of Ayurveda and have a living continuity of practice, documentation and validation for over several millennia. In the current context of the pandemic, the strength of Ayurveda lies in these well validated theories and practices that can be used

to understand, diagnose and strategise treatments of newer diseases like COVID -19.

‘Diseases are innumerable and newer ones would keep appearing’ says Charaka<sup>42</sup> and provides methods to diagnose and treat new diseases. Ayurveda, with its strong theoretical base and extensive pharmacopoeia with innumerable drugs, is capable of dealing with a wide range of diseases, old or new, known or unknown. To bring about cure, Ayurveda identifies and treats the disease causing factors (*dosha*) that are inherent to the system but have gone off equilibrium. The science of Ayurveda is structured in such a way that the very same principles like *tridosha* that are applied in the treatment of known diseases can be readily used to treat new and unknown conditions.

### Knowledge of epidemics in Ayurveda

*Janapadoddhvamsa* [(*Janapada* - community) + (*Udhvamsa* - destruction)] is the term that denotes epidemic in Ayurveda. Charaka Samhita has an entire chapter on epidemics detailing the causative factors, prevention, line of treatment, etc.<sup>43</sup> Ayurveda has a well-established and documented management strategy during epidemics<sup>43</sup>. Charaka says.

“It is not difficult to treat epidemic diseases, provided the herbs are collected, preserved and administered properly” (Verse 4)

“Vitiating of factors (air, water, location and seasons) lead to the simultaneous manifestations of diseases (epidemic) having the same set of symptoms leading to the destruction of a country” (Verse 6)

“One does not suffer from these (epidemic) diseases even while all these four vitiated factors (air, water, place and season) are at work if he/she is administered with medicines and treatment as given below ....” (Verses 12-18)

The knowledge of Ayurveda on management of epidemics can definitely be put to use for the current pandemic.

#### Management of fever in Ayurveda

Fever, the most common hallmark of disease known to humans dates back to civilization itself<sup>44</sup>. Diseases and fevers caused by viruses/ pathogens are also not new to humans since pathogens have always co-existed with cellular life on this planet through nearly the entire evolutionary history<sup>45</sup>. Therefore, cold, cough and fever causing viruses and bacteria would have been there since time immemorial. It is against this background that this section is discussed. It is interesting to note the importance given to fever in Ayurveda. Infact, the very first disease dealt with in *Chikitsasthān* (section on therapeutics) in Charaka Samhita is *jwara* (fever)<sup>37</sup>.

अथातोऽज्वरचिकित्सितं व्याख्यास्यामः ॥१॥

इतिहस्माह भगवानात्रेयः ॥२॥

Translated as ‘We shall now explain the chapter on the treatment of *jwara* (different types of fever), thus said Lord Atreya’ (Verses 1-2).

The chapter covers therapeutics of various endogenous and exogenous causes of *jwara*. It discusses management of different types of fevers ranging from acute, chronic, continuous, intermittent (typical of malaria), seasonal, mild, moderate, severe, arising from *dhātu* (tissue elements) to fevers with or without *āma* (definition follows) and arising from one, or combination of two or three *doshas*. *Ama* is a concept in Ayurveda, which can be best understood as accumulation of toxic metabolic by-products at various levels of physiology. More simply, *āma* is the by-product of poor digestion and according to Ayurveda; it is one of the major factor in all diseases.

*Jwara chikitsa* (treatment of fever) has been dealt with first in the classical texts because Ayurveda considers *jwara* not merely as increase in body temperature but also a feeling of malaise involving the *deha* (physical body), *indriya* (sensory organs) and *manas* (mind) (Verse 4 in ref 37). The imbalance in the three *doshas* manifests not only as increase in body

temperature and pain but also as inflammation. *Jwara* results from an imbalanced state of *pitta*, which affects digestion and metabolism. Inappropriately digested food transforms into *āmavisha* which Ayurveda considers as a predisposing factor for many diseases. *Jwara* is considered the initial manifestation of *āmavisha* in *rasa dhātu* (all nourishing fluids in the body) and if left untreated can lead to other diseases according to Ayurveda. Hence, *jwara* acquires importance and requires early intervention before its progression to other diseases. The chapter on *Jwara chikitsa* establishes many guiding principles for treatment of various diseases described later in the section on therapeutics.

Ayurveda thus has extensive knowledge and experience in treating not only various kinds of fever<sup>37</sup> but also respiratory conditions and cough<sup>46,47</sup>. Ayurveda has many effective strategies (medicines, procedures, diet, regimens) for management of the clinical conditions (eg. cough, fever, respiratory distress) associated with COVID-19. A conservative estimate puts the number of time-tested and still in-use medicines for these conditions in Ayurveda to be more than 400<sup>(ref.48)</sup>. There is no dearth of medicines in Ayurveda and its use will hence not be a blind experiment. Ayurveda can put together an excellent treatment protocol with a wide variety of medicines for the coronavirus epidemic, which from the typical symptoms of fever and respiratory conditions, appear to be induced by the predominant involvement of *kapha* and *vata doshas*.

#### Knowledge of infectious diseases in Ayurveda

Considering that virus and other microorganisms have always subsisted, long-standing coexistence of humans and infectious diseases and the associated management challenges would also have always existed. Infectious diseases (*aupasargika vyādhi*) were known to ayurvedic vaidyas of yore. The current advisory of quarantine, personal hygiene, etc. by modern medicine<sup>49</sup> is also implied by Susruta in Sushruta Samhita<sup>50</sup> -

“Skin diseases, fever, consumption, conjunctivitis and all contagious diseases spread from person to person, by indulgence in bodily contact, by (coming into contact with another’s) breath, eating with others in the same plate, sharing of bed and seat, through (contact with) clothes, ornaments, and cosmetics”

Like other diseases in ayurveda, the infectious diseases were also understood and addressed in terms of *dosha*, pathogenesis (*samprāpti*), signs &

symptoms (*lakshanā*), the location (*sthāna*) and treatment (*chikitsā*). For example, in COVID-19, the signs and symptoms of cough, fever and Acute Respiratory Distress will be considered to be induced predominantly by *kapha* and *vata* along with other *dosha* in *uras* (chest region) (location). The social and medical conventions to manage infections in Ayurveda are shown in Figure 2. The advisories for

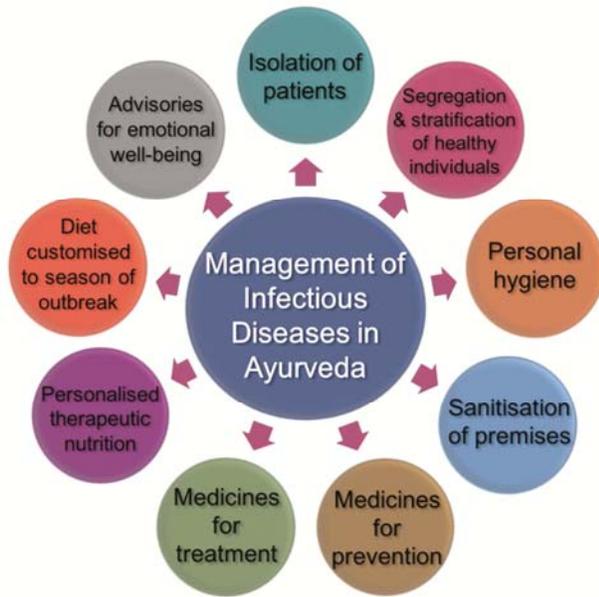


Fig. 2 — Classical management strategy for infectious diseases in Ayurveda

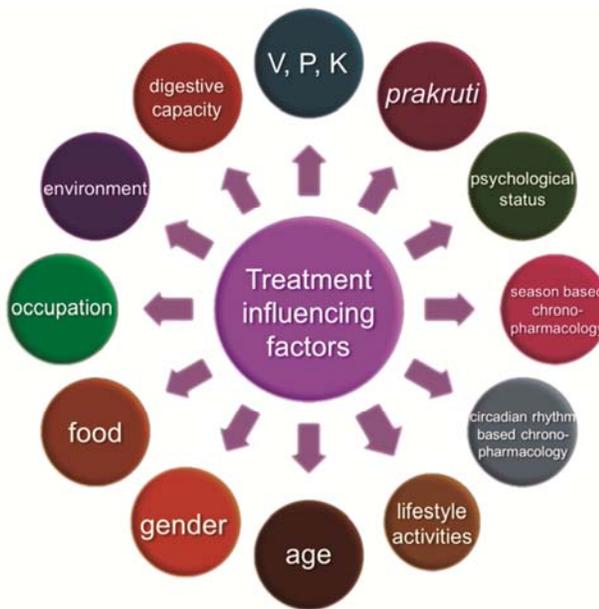


Fig. 3 — Factors considered part of treatment strategy. V - vata, P - pitta, K -kapha; prakruti- biopsychological constitution of an individual

emotional well-being include the importance of righteousness in social life, healthy interpersonal and family relations and stress management.

**Ayurvedic approach to COVID-19**

For management of COVID-19, Ayurveda will adopt a multi-pronged approach based entirely on classical, time-tested and documented information in Ayurveda (Fig. 3)- (i) therapeutic management principles for fever, cough and respiratory distress and any other clinical symptoms (ii) management of infectious disease, (iii) management during epidemics. Ayurveda will therefore adopt a comprehensive approach addressing fever, cough, respiratory distress and any other symptoms, improving the patient’s immunity, improving the patient’s emotional / psychological health and prescribing the right diet and regimen (customized to age, season, occupation and other factors)<sup>51-54</sup>.

**Conclusion**

India is fortunate to have Ayurveda, which has perhaps the longest unbroken health tradition in the world and for long been the major healthcare system in the Indian subcontinent. Ayurveda is now an officially approved system of medicine in India. Thanks to Government’s investment for the establishment and maintenance of ayurvedic facilities, there is a huge infrastructure accessible in terms of registered practitioners, colleges, hospitals, pharmacies, research centres, etc.<sup>22,23</sup>. The uniqueness of Ayurveda is that it is theory-based and not empirical. Resting on time tested theories and more importantly, unbroken clinical practices dating back to several millenia, Ayurveda is one of the most systematically codified medical systems in the world. While many diseases are described in Ayurvedic texts, it also has the wherewithal in terms of theories and concepts to diagnose and treat new and unknown diseases such as COVID-19.

In summary, Ayurveda has everything to offer and can be of immense use in the management of COVID-19 crisis. There is nothing to lose but only everything to gain by giving Ayurveda the space it deserves in the management of COVID-19. Ayurveda should be given a chance to deal with this greatest medical crisis. This will help bring about an Indian model of disease management. Let us remember that COVID-19 is not the first or the last virus we are seeing and falling prey to. It is time to use the accumulated experience and expertise of Ayurveda so meticulously

documented and passed down over several millennia. The knowledge of Ayurveda should benefit the suffering Indians and the humanity. If the efforts with Ayurveda are scientifically and meticulously planned, organized and executed in the larger public interest, then one need not be apprehensive and defensive about using the time-tested traditional medicine against COVID-19. It is the apt time to use the knowledge base and support system of Ayurveda for the welfare of the masses.

### Conflict of Interest

Author declares there is no conflict of interest

### References

- World Health Organization, Novel Coronavirus (2019-nCoV), Situation Report – 12, 2020.
- WHO announces COVID-19 outbreak a pandemic (<https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>) (accessed on 3 May 2020)
- Sohrabi C, Alsafi Z, O'Neill N, et al, World Health Organisation declares global emergency: A review of the 2019 novel coronavirus (COVID-19), *Int J Surg*, 76 () (2020) 71-76.
- Where do we stand today on COVID-19, and what have we learned?, *World Health Organisation*, Regional Office for Europe, (<http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/statements>) (accessed on 3 May 2020)
- Coronavirus: Target reached as UK tests pass 100,000 a day, *BBC News*, <https://www.bbc.com/news/uk-52508836> (accessed on 3 May 2020)
- Omer SB, Malani P & dei Rio C, The COVID-19 pandemic in the US: A clinical update, *JAMA*, 323 (18) (2020) 1767-1768.
- Thanh Le T, Andreadakis Z, Kumar A, et al., The COVID-19 vaccine development landscape, *Nature Rev Drug Discov*, 19 (5) (2020) 305-306.
- Abdullah N H, Abril M C, Amare A T, et al., Global coalition to accelerate COVID-19 clinical research in resource-limited settings, *Lancet*, 395 (10233) (2020) 1322-1325.
- Senanayake S L, Drug repurposing strategies for COVID-19, *Future Drug Discov*, 2 (2) (2020) 1-3.
- Ren J L, Zhang A H & Wang X J, Traditional Chinese medicine for COVID-19 treatment, *Pharmacol Res*, 155 (104743) (2020) 1-2.
- Li Y, Liu X, Guo L, et al., Traditional Chinese herbal medicine for treating novel coronavirus (COVID-19) pneumonia: protocol for a systematic review and meta-analysis, *Systematic Rev*, 9 (75) (2020) 1-6.
- Ho L T F, Chan K K H, Chung V C H & Leung T H, Highlights of traditional Chinese medicine frontline expert advice in the China national guideline for COVID-19, *Eur J Integr Med*, 36 (101116) (2020) 1-5.
- Traditional Chinese Medicine for severe COVID-19 – clinical trial, *NIH*, US National Library of Medicine, <https://clinicaltrials.gov/ct2/show/NCT04323332> (accessed on 30 April 2020)
- Shah H, Exploring the effectiveness of traditional Chinese medicine against COVID-19, *Pharma R&D Today*, Elsevier, <https://pharma.elsevier.com/covid-19/exploring-the-effectiveness-of-traditional-chinese-medicine-against-covid-19/> (accessed on 3 May 2020)
- Luo H, Tang Q L, Shang Y X, et al., Can Chinese medicine be used for prevention of Corona Virus Disease 2019 (COVID-19)? A review of historical classics, research evidence and current prevention programs, *Chin J Integr Med*, 26 (4) (2020) 243-250.
- China using Tibetan medicine to fight COVID-19 epidemic, *Tibetan Rev*, <https://www.tibetanreview.net/china-using-tibetan-medicine-to-fight-covid-19-epidem-ic/> (accessed on 30 April 2020)
- Maxmen A, More than 80 clinical trials launch to test coronavirus treatments, *Nature*, 578 (7795) (2020) 347-348.
- India under COVID-19 lockdown (Editorial), *Lancet*, 395 (10233) (2020) 1315.
- Krishnakumar B & Rana S, COVID 19 in INDIA: Strategies to combat from combination threat of life and livelihood, *J Microbiol Immunol Infection*, 53 (3) (2020) 389-391.
- Government of India and WHO partnership further strengthened to overcome the COVID-19 challenge, *WHO*, <https://www.who.int/india/news/detail/15-04-2020-government-of-india-and-who-partnership-further-strengthened-to-overcome-the-covid-19-challenge> (accessed on 3 May, 2020)
- Kankar A, India ramps up efforts to contain the spread of novel coronavirus, *BioSpectrum*, <https://www.who.int/india/emergencies/novel-coronavirus-2019> (accessed on 3 May, 2020)
- Ministry of AYUSH at <https://health.ncog.gov.in> (accessed on 2 May, 2020)
- Annual Report 2018-19, *Ministry of AYUSH*, 2019.
- Dobson A P & Carper E R, Infectious diseases and human population history, *Bioscience*, 46 (2) (1996) 115-126.
- Tietz T, Girolamo Fracastoro's proposal of a scientific germ theory, <http://scihi.org/girolamo-fracastoro-germ-theory/> (accessed on 3 May, 2020)
- Bastian H C, The Germ-Theory of Disease: being a discussion of the relation of bacteria and allied organisms to virulent inflammations and specific contagious fevers, *Br Med J*, 1 (745) (1875) 469-476.
- Holwell J Z, *An Account of the Manner of Inoculating for the Smallpox in the East Indies with some observations on then practice and mode of treating that disease in those parts*, (T. Becker and P. A. de Hondt, London), 1767.
- Henderson D A & Moss B, Smallpox and Vaccinia, In: *Vaccines*, edited by S A Plotkin & W A Orenstein, (WB. Saunders Company, Philadelphia) 1999.
- Null G & Feast J, *Germs, Biological Warfare, Vaccinations: what you need to know*, (Seven Stories Press, New York), 2003, 132.
- Singh V, Sushruta: The father of surgery, *Natl J Maxillofac Surg*, 8 (1) (2017) 1-3.
- Block S S, *Disinfection, Sterilization, and Preservation*, (Lippincott Williams & Wilkins, Philadelphia), 2001, 3.
- Gadag S M & Amilkanthwar R H, Concept of sterilisation in Ayurveda: a review, *World J Pharma Med Res*, 5 (5) (2019) 51-53.

- 33 The Drugs and Cosmetics Act and Rules – The Drugs and Cosmetics Act, 1940 and The Drugs and Cosmetics Rules, 1945, *Ministry of Health and Family Welfare, Government of India*, as corrected upto 30 April 2003, pp. 36-42.
- 34 G.S.R. No. 893(E), Gazetted Notification issued under the Drugs & Cosmetics Rule 1945, 24 December 2008, <https://www.yumpu.com/en/document/read/46319629/gazette-notification-issued-under-the-drugs-cosmetics-rule-1945> (accessed on 4 May 2020).
- 35 Operational guidance: information needed to support clinical trials of herbal products, *World Health Organisation*, Geneva, TDR/GEN/Guidance/05.1, 2005; <http://www.who.int/tdr/publications/documents/operational-guidance-eng.pdf> (accessed on 4 May 2020).
- 36 Kumar N K & Dua P K, Status of regulation on traditional medicine formulations and natural products: Whither is India?, *Curr Sci*, 111 (2) (2016) 293-301.
- 37 Sharma R K & Dash B (Translators), Treatment of *Jvara/fever*, *Caraka Samhita, Chikitsasthān*, 3<sup>rd</sup> Chapter, (Chowkhamba Sanskrit Series Office, Varanasi) 2008.
- 38 Guidance for managing ethical issues in infectious disease outbreaks, *World Health Organisation*, pp. 35-37, 2016. <https://apps.who.int/iris/handle/10665/250580> (accessed on 2 May 2020).
- 39 Guidance document on appropriate management of suspect / confirmed cases of COVID-19. *Ministry of Health & Family Welfare, Directorate General Health Service, Government of India*, 2020. <https://www.mohfw.gov.in/pdf/FinalGuidanceonMangaementofCovidcasesversion2.pdf> (accessed on 07 May 2020)
- 40 Jayasundar R, If systems approach is the way forward, what can ayurvedic theory of tridosha teach us?, *Curr Sci*, 112 (6) (2017) 1127-1133.
- 41 Samal J, Public health importance of shatkriyakala in relation to natural history of disease, *Intl J Res Ayur Pharm*, 4 (3) (2013) 468-471.
- 42 Sharma R K & Dash B (Translators), *Caraka Samhita, Sutrasthān*, 18<sup>th</sup> Chapter, 42-47 *Sloka*, (Chowkhamba Sanskrit Series Office, Varanasi) 2008.
- 43 Sharma R K & Dash B (Translators), *Caraka Samhita, Vimānasthān*, 3<sup>rd</sup> Chapter, (Chowkhamba Sanskrit Series Office, Varanasi) 2008.
- 44 History of fever, *Clinical Manual of Fever in Children*, (Springer, Berlin, Heidelberg), 2009. DOI. [https://doi.org/10.1007/978-3-540-78598-9\\_13](https://doi.org/10.1007/978-3-540-78598-9_13)
- 45 Shi M, Lin X D, Chen X, *et al.*, The evolutionary history of vertebrate RNA viruses, *Nature*, 556 (7700) (2018) 197-202.
- 46 Sharma R K & Dash B (Translators), Treatment of Respiratory disorders, *Caraka Samhita, Chikitsasthān*, 17<sup>th</sup> Chapter, (Chowkhamba Sanskrit Series Office, Varanasi) 2008.
- 47 Sharma R K & Dash B (Translators), Treatment of cough and related disorders, *Caraka Samhita, Chikitsasthān*, 18<sup>th</sup> Chapter, (Chowkhamba Sanskrit Series Office, Varanasi) 2008.
- 48 Some of the Ayurveda texts which lists a number of time-tested medicines for treating various types of fever, cough and respiratory conditions are given here - (i) Caraka Samhita, (ii) Susruta Samhita, (iii) Sahasrayoga, (iv) Bhaishajya Ratnāvali, (v) Shārangdhāra Samhita, (vi) Ashtānga Sangraha (vii) Ashtānga Hrday, (viii) Kashyapa Samhita, (ix) Cakradatta, (x) Yoga Ratnākara, (xi) Bhāvaprakāsh, (xii) Arkaprakāsha, (xiii) Vangasena Samhita, (xiv) Rasendrasāra Sangraha, (xv) Rāja Nighantu, (xvi) Vaidya Chintāmani, (xvii) Basasvarājeeyam, to name a few.
- 49 COVID-19 technical guidance: Infection prevention and control, *World Health Organisation*. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control> (accessed on 3 May 2020).
- 50 *Susruta Samhita, Nidānasthān*, 5<sup>th</sup> Chapter, 33-34 *Sloka*, (Chaukhambha Visvabharati, Varanasi) 2000.
- 51 Seasonal Regimen, *Ashtānga Sangraha by Vāgbhatta, Sutrasthān*, 4<sup>th</sup> Chapter, (Chaukhambha Orientalia, Varanasi) 1999.
- 52 Prevention of Diseases, *Ashtānga Sangraha by Vāgbhatta, Sutrasthān, Sutrasthān*, 5<sup>th</sup> Chapter, (Chaukhambha Orientalia, Varanasi) 1999.
- 53 Knowledge of Food, *Ashtānga Sangraha by Vāgbhatta, Sutrasthān, Sutrasthān*, 7<sup>th</sup> Chapter, (Chaukhambha Orientalia, Varanasi) 1999.
- 54 Diet Regimen, *Ashtānga Sangraha by Vāgbhatta, Sutrasthān, Sutrasthān*, 10<sup>th</sup> Chapter, (Chaukhambha Orientalia, Varanasi) 1999.