Short Communication

COVID-19 pandemic: A pragmatic plan for ayurveda intervention

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A R T I C L E   I N F O

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A B S T R A C T

World community is facing an unprecedented pandemic of novel corona virus disease (COVID-19) caused by Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2). The disease has spread globally with more than 1.43 million confirmed cases and 82,100 deaths as of April 8, 2020. Despite worldwide efforts to contain it, the pandemic is continuing to spread for want of a clinically-proven prophylaxis and therapeutic strategy. The dimensions of pandemic require an urgent harnessing of all knowledge systems available globally. Utilization of Traditional Chinese Medicine in Wuhan to treat COVID-19 cases sets the example demonstrating that traditional health care can contribute to treatment of these patients successfully. Drawing on the Ayurveda classics, contemporary scientific studies, and experiential knowledge on similar clinical settings, here we propose a pragmatic plan for intervention in India. We provide a plan for graded response, depending on the stage of infection among individuals, in a population. Notwithstanding the fact that no system of medicine has any evidence-based treatment for COVID-19 as yet, clinical interventions are required to be put in place. Therefore, pragmatic strategy proposed here for Ayurveda system of medicine requires immediate implementation. It will facilitate learning, generate evidence and shall be a way forward.

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1. Background

An outbreak of pneumonia in December, 2019 in Wuhan, China, has now been determined to be caused by a novel coronavirus. It is named as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) [1,2]. The disease has since spread to 185 countries and regions, with more than 2.06 million confirmed cases and more than 134,354 deaths as of April 16, 2020 [3]. Despite worldwide efforts to contain it, the pandemic is continuing to spread for want of a clinically-proven prophylaxis and therapeutic strategy [4]. Consequently, it is necessary that scientific community must draw on pluralistic knowledge systems available globally. Drawing on the original Ayurveda classics, contemporary scientific studies, and our experiential knowledge on similar clinical settings, here we propose a pragmatic plan for interventions. We provide a graded response depending on the stage of infection and proximity with disease among individuals in a population. Notwithstanding the fact that no system of medicine has any evidence-based treatment for COVID-19 as yet, clinical interventions are being done worldwide. Similar strategy is required to be implemented by Ayurveda system of medicine. Ayurveda interventions become even more relevant by the fact that there is an elaborate description of causation and management of epidemic (Janapadodhwamsa) in Ayurveda [5].

While the disease is almost controlled in China [6], it is still widespread in Europe and US which have emerged as the new epicentres of the COVID-19 [7,8]. There are various reasons for the containment of the disease in China, yet the evidence of role played by Traditional Chinese Medicine (TCM) cannot be overlooked [9,10]. This is now known that during the peak days of the epidemic, over 3100 TCM related workforce had been deployed to Hubei province [9]. TCM was officially included in the Chinese Guideline on diagnosis and treatment of COVID-19 [11]. This is exceptionally important to note that specific TCM wards were set up, and designated hospital were established which had used a variety of Chinese medicines utilising their own principle of syndrome differentiation in conjunction with treatment employing western medicine. Total numbers of confirmed cases treated by TCM are reported to be at least 60,107 [12].

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In coherence with the success of TCM in managing a communicable pandemic, it is logical and essential to explore how Ayurveda can help in addressing the COVID-19 challenge [13,14]. Indeed, an understanding of COVID-19 epidemiology and pathogenesis as learned through on-going pandemic may help us drawing a feasible plan of action. About 80% of COVID-19 cases present with mild symptoms requiring only primary medical care. Of the rest 20% cases 15% require urgent medical attention at secondary health care services. Remaining 5% are critical cases requiring an intensive care and hence require a transfer to tertiary health care units equipped with ICU [17].

Current estimated mortality of COVID-19 for overall infected population is 0.25–3.0% whereas it increases to >14% among elderly (over 80 years), 10% in associated CVD and 7% in associated diabetes. China’s experience of pandemic has built the evidences that co-morbidity such as hypertension, diabetes, coronary heart diseases and cerebrovascular disease act as risk factor with increased risk of mortality [18].

In 5% cases requiring Intensive care, the disease progression is gradual, and requires about 9–10 days to progress from symptoms of Upper Respiratory Tract Infection (URT) to Acute Respiratory Distress Syndrome (ARDS), ARDS often is followed by uncorrectable hypotensive shock, multi-organ failure and eventually death [19].

There are some risk factors that make people susceptible. People with older age, presence of co-morbidity such as diabetes, hypertension and cardiovascular disease, males, anorexia and presentation without fever are more susceptible. Reduced peripheral capillary oxygen saturation (SpO2) below 90% is also a risk indicator in apparently mild cases [20].

With this background of SARS-CoV-2 associated epidemiology and pathogenesis, a pragmatic and plausible plan of action for Ayurvedic intervention are presented (Table 1). In this context, a few important issues need to be stated at the outset. Our proposal complements the guidelines issued by Ministry of AYUSH, Government of India for boosting immunity among the masses [21]. However, it is not limited to prophylaxis alone. It addresses the therapeutic domain as well although within an integrative model of care. In that context, at a generic level, key criteria for choosing suggested Ayurveda medicines here have been safety and potential efficacy, broad-spectrum applicability, ease of availability, long-term experiential knowledge on clinical use, ease of administration, and as far as possible, affordability [22].

For the purpose of Ayurveda interventions during COVID-19 pandemic, people can be segregated into four distinct categories [23].

2. Unexposed asymptomatic group

This group will include persons who currently do not have any related symptom nor have any associated risk factor and co-morbidities. These apparently healthy people may be the most suitable for building of immunity so that infection-related pathogenesis can be countered to keep them healthy [24]. Preventive interventions here can include both pharmacological as well as non-pharmacological strategies. Among the non-pharmacological interventions healthy lifestyles, adequate physical activity, sufficient sleep, care of retainable and non-retainable urges, sadvritta, and avoidance and isolation from infected persons are vital [25]. Fumigation of homes, shelters and living-place by Ayurvedic herbs such as garlic (Allium sativum) peel, turmeric (Curcuma longa) powder, Carom or Ajwain (Trachyspermum ammi) seeds and Loban (resin of Styrax benzoin and Boswellia species) may also be a useful strategy for disinfection [26]. In addition, community based Swarna Prashana [27] and mass prophylaxis through rasayana having the predominant effects upon respiratory tract can be useful [28]. Rasayana may include Brahmi Rasayana, Chyavanprasha or Amrit Bhaillataka [29,30]. The rationale for choice of rasayana drugs can be traced back to Samhita classics of Ayurveda as well as in contemporary research [14]. Rasayana act as antioxidant, anti-stress, anti-inflammatory, anti-microbial, vaccine adjuvant, and confer immunity against diseases [31,32]. Further, according to Ayurveda classics, rasayana therapy [33], along with physical and social distancing from infected persons [34], constitute a core strategy to overcome epidemic and infectious diseases. Building immunity requires time. There may be some asymptomatic carriers who could transmit the virus to other apparently healthy people. Hence, physical and social distancing for all would be essential to avoid any transmission [34].

3. Exposed asymptomatic (quarantined)

This group comprises of people who are without apparent symptoms, but at risk due to contact history. They need to be quarantined carefully. Specific prophylaxis for this group may include Sanjeevani vati [35] and Chitrakadi vati and combination of Guduchi (Tinospora cordifolia), Shuni (Zingiber officinale) and Haridra (C. longa). This choice of medicines is aimed at maintenance of agni as well as aam pachana in order to prevent the progression of pathogenesis in its initial sanchaya-prakopa-prasara stage [36]. Sanjivani vati is widely used against communicable diseases, fever due to infection and sanmpatujyava, cold, cough, and indigestion. It

| No. | Category of people | Proposed Intervention |
|-----|--------------------|-----------------------|
| 1.  | Unexposed asymptomatic group | Common health keeping approaches of Ayurveda including healthy diet, healthy life-style, adequate sleep, physical activity, good conduct, care for retainable and non-retainable urges, and avoidance of disease causing factors (excessive cold and exposure to pollutants). In addition, Chyavanprarga, Brahmi Rasayana, Amrit Bhaillataka, Sanjeevani vati, Swarna prashan. |
| 2.  | Exposed asymptomatic (Quarantined) | Sanjeevani vati, Chitrakadi vati, Chyavanprasha, Brahmi Rasayana, and decoction of a combination of herbs, Tinospora cordifolia, Zingiber officinale, Curcuma longa, Ocimum sanitum, Glycyrrhiza glabra, Adhatoda vasica, Andrographis paniculata, Swertia chirata, Moringa oleifera, Triphala and Tikatu. |
| 3.  | With mild COVID-19 symptoms | Pippali rasayan, A. jhivadi Quath, Kantakari Avela, Chitrakadi vati, Vyagahi haritaki, Deshamul kwath, Sitopaladi, Talchadi, and Yashthinamudtu etc. |
| 4.  | With moderate to severe COVID-19 symptoms | Pippali rasayan, Laghu Vasant Malati, Sanjeevani vati, Tribhuvan Keerti rasa, Brihata Vata Chintanasi rasa, Mrityunjaya rasa, Siddha Makardvajha etc. |

**Note:** The proposed interventions are supposed to be practiced without compromising the conventional advisories by government authorities including frequent hand-washing with soap till 20 s, cough and sneeze etiquette, physical distancing and universal mask usage.

**Dosage of individual formulations are to be judged carefully on an experienced Ayurvedic physician on the basis of roga and rogi bala with an utmost care for vulnerable population like children, pregnancy and elderly. In almost all cases hot water may be considered as preferred anupan (post drink) during the treatment.**
also strengthens and rejuvenates the immune system [37,38]. This group may also be provided with decoction of a combination of Ayurvedic herbs including T. cordifolia, Z. officinale, C. longa, Ocimum sanctum, Glycyrrhiza glabra, Adhatoda vasica, Andrographis paniculata, Swertia chirata, Moringa oleifera, Triphala and Trikatu. These herbs are proposed for the reason that these are known to be broad-spectrum antivirals and protease inhibitors [39–41].

4. With mild COVID-19 symptoms

This category relates to people found positive to SARS-CoV-2 and are having mild URTI symptoms. They are required to be carefully isolated and monitored for any progression of the disease, along with giving adequate therapy to arrest the symptoms and balancing the vitiated doshas to control disease progression. Formulations like Lakshmi Vilas Rasa [42], Pippali rasayana [43], Sanjeevani vati [35], C. vati, Go jihvaadi Kashaya, Vaghiri haritaki, Kantakaari Avaleha, Dashamul kwath, Sitopaladi [44], Talishadi, and Yashthimadhu may be the most suitable drugs to be used at this stage in an integrative model. Those patients showing progression of the disease may immediately require shifting to ICU.

5. With moderate to severe COVID-19 symptoms

This category may be the population where the moderate to severe symptoms are already present and the patients also belong to high risk groups. These patients require tertiary care from the beginning itself but can also be co-prescribed with Ayurveda medicines in order to reduce the impact of the pathology and to buy more time to have intensive management [45]. Recommended formulations here may include P. rasayana [43], Laghu Vasant Malati, Sanjeevani vati, Tribhuvan keerti rasa [46], Brihata Vata Chintamani rasa, Mrityunjaya rasa, and Siddha makardhvaja rasa. The key criterion for choosing rasa aushadhi in category 3 and 4 as noted above is the urgency of initiation of therapeutic actions. Rasa aushadhi are shown to have better bioavailability and absorption through sublingual and oral route accounting to the nano size of their particles [47]. For example, suvarna bhasma has been found to get absorbed well through sublingual administration when mixed with black pepper powder and ghee [48].

Along with the above plan, Ayurveda practitioners would require training in screening of the people for associated risk factors. They should also be equipped with modern personal protection equipment and access to diagnostic facilities. Ayurveda hospitals may also be turned as the primary care setups and quarantine for the people having mild symptoms and requiring a constant monitoring. A good networking of AYUSH healthcare authorities with local health authorities may help effective utilisation of human resources in AYUSH community during the current crisis [49].

It is also important to mention a caveat here. Ayurveda doctors following the pragmatic action plan presented here should assess the prognosis and advise timely referrals to secondary or tertiary care facilities as per the need of patient. An extra and utmost care should be taken while treating COVID-19 patients/people suspected to have contracted infection of SARS-CoV-2.

This action plan, if implemented, has enormous potentials to provide learning and innovative insights. Thus, a proper documentation is crucial. Therefore, it is suggested that a proper documentation of key variables that are essential should be done on each case. These variables should include age, gender, symptoms, geography, contact history, Ayurvedic diagnosis including a roga and rogi bala examination, improvement or worsening of symptoms, Ayurvedic medicine(s) with dosage, final outcome of the management, referral to secondary/tertiary care, symptoms controlled, cured, and mortality, if any. A follow-up advice upon discharge or stop of medications should also be documented.

TCM has been employed in COVID-19 cases not for their proven effectiveness against the pathogen but rather by utilising the Chinese traditional diagnostic concept identifying the syndromes and suggesting their remedies. Similar approach is also needed to be employed in Ayurveda. Accordingly, instead of employing a western approach alone for judging the efficacy of a formulation on a western diagnosis, Ayurveda should follow its own wisdom for diagnosis and subsequent treatment choice on the basis of roga and rogi bala, as described above.

There are 3598 AYUSH hospitals available in the country including 2818 Ayurveda hospitals. Similarly, there are 25,723 AYUSH dispensaries including 15,291 Ayurveda dispensaries. There are total 7.73 lakh registered AYUSH practitioners including 4.28 lakh Ayurveda practitioners [50]. There are 8954 AYUSH drug manufacturing units (licensed pharmacies) in the country. Among these, 7718 are Ayurveda pharmacies [51]. With this infrastructure and associated human resources, implementation of the proposed action plan seems highly feasible.

6. Recommendations and the way forward

Ayurveda has enough potential and possibilities to be employed both for prevention and treatment of COVID-19. This will provide an important opportunity for learning and generating credible evidence [52]. It is pertinent to reiterate that participation of Ayurveda in addressing the COVID-19 challenge in India should not remain limited and seen as the extension of healthcare services and support to bio-medical system. Indeed, with adequate monitoring and data keeping during the implementation, important lessons and research directions are likely to emerge on the management of increasingly frequent and virulent communicable diseases. Implementation of proposed action is likely to provide evidence-based insights strengthening the scope of Ayurveda beyond preventive health care and care for non-communicable diseases. AYUSH system across the country has been put on alert for being called anytime to serve the nation. AYUSH healthcare facilities are also being readied to be converted into quarantine facilities in times of need. From this perspective, implementing the suggested intervention plan within AYUSH healthcare facilities by Ayurveda workforce may benefit the nation greatly. India is the country where the world’s oldest living health care system originated and therefore it is being carefully watched by the world community for how it handles the crisis using its own resources. China has done it. And it is India’s turn now to show its traditional healthcare might.

Conflict of interest

None.

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References

[1] Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature 2020;579:270–3. https://doi.org/10.1038/s41586-020-2012-7.
[2] Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in
wuhan, China: a descriptive study. Lancet 2020;395:507–13. https://doi.org/10.1016/S0140-6736(20)30211-7.

[3] Dong E, Hu H, Cardenas, An interactive web-based dashboard to track covid-19 in real time. Lancet Infect Dis 2020. https://doi.org/10.1016/S1473-3099(20)30121-3.

[4] Xu B, Gutierrez B, Mekaru S, Sewalki K, Goodwin L, Loskull A, et al. Epidemiological data from the covid-19 outbreak, real-time case information. Scientific data 2020;7:106. https://doi.org/10.1371/journal.pone.0244800.

[5] Goyal M. Threats and challenges of emerging viral diseases and scope of Ayurveda in its prevention. Aux Ayurveda 2019;40:67–8.

[6] Salzberger B, Gluck T, Ehrenstein B. Successful containment of covid-19: the who-report on the covid-19 outbreak in China. Infection 2020;48:151–3. https://doi.org/10.1007/s10152-020-04109-4.

[7] Grasselli G, Pesenti A, Cecconi M. Critical care utilization for the covid-19 outbreak in Lombardy, Italy: early experience and forecast during an emergency response. J Am Med Assoc 2020. https://doi.org/10.1001/jama.2020.4031.

[8] Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to covid-19 in Italy. J Am Med Assoc 2020. https://doi.org/10.1001/jama.2020.4683.

[9] Ren J-l, Zhang A-H, Wang X-J. Traditional Chinese medicine for covid-19. Infection 2020;48:151–3. https://doi.org/10.1007/s10152-020-04109-4.

[10] Rastogi S, Lakhotia SC, Singh RH. Ayurvedic rasayana therapy: a rational understanding necessary for mass benefits. In: Translational Ayurveda. Singapore: Springer; 2019. p. 77–99. https://doi.org/10.1007/978-1981-101-2062-1000-1006.

[11] Sharma R, Martins N, Kuca K, Chaudhary A, Kabra A, Rao MM, et al. Chyawanprash: a traditional Indian bioactive health supplement. Biomolecules 2019;9:161. https://doi.org/10.3390/biom9050161.

[12] Rege NN, Thatter UM, Dahanukar SA. Adaptoxic properties of six rasayana herbs used in Ayurvedic medicine. Phytother Res 2019;33:257–91.

[13] Rastogi S. Building bridges between Ayurveda and Modern Science. Int J Ayurveda Res 2010;1(1):4–61. https://doi.org/10.4103/0974-7788.59943.

[14] Rekha PS, Kurttan G, Kurttan R. Antioxidant activity of Bhringa rasayana. Indian J Exp Biol 2001;39:447–52.

[15] Sharma PV, editor. Caraka Samhita (text with English translation). Vimanthan, chapter 3, verse 13–14, vol. 1. Varanashi: Chaukhamba Orientalia;2012. p. 316.

[16] Srikanth Murthy K, editor. Susruta Samhita, Nidanasthan, chapter 5, verse 33–34, vol. 1. Varanashi: Chaukhamba Orientalia; 2014. p. 502.

[17] Rastogi S, Rastogi R, Singh RH. Adverse effects of Ayurvedic drugs: an overview of causes and possibilities in reference to a case of Vatashakha (Aconite) overdosing. Int J Risk Saf Med 2007;19(3):117–25.

[18] Tripathi JS, Singh RH. Possible correlates of free radicals and free radical mediated disorders in Ayurveda with special reference to bhrutagaiyapara and ama at molecular level. Ancient Sci Life 1999;19:17–20.

[19] Srikanta Murthy K, editor. Sarangadhara-Samhita: a treatise on Ayurveda, Madhyam khandha, chapter 7, verse 18-21. Varanashi: Chaukhamba Orientalia; 2012. p. 103.

[20] The Ayurvedic Formulary of India (first English edition), vol. 2, section 12, vati prakarana. New Delhi: Controller of Publications; 2000. p. 154.

[21] Rege A, Sadasiv Chowdhary A. Evaluation of ocimum sanctum and tinospora cordifolia as probable hiv-protease inhibitors. Int J Pharmaceut Sci Res 2014;25:315–6.

[22] Rege AA, Chowdhary AS. Evaluation of some medicinal plants as putative HIV-protease inhibitors. Indian Drugs 2013;50:24–8.

[23] Panche AN, Chandra S, Dianon AD. Multi-target β-protease inhibitors from Andrographis paniculata in silico and in vitro studies. Plants 2019;8:2231. https://doi.org/10.3390/plants8070231.

[24] Srikanta N, Singh A, Ota S, Sreedhar B, Galib, Dhiman KS. Chemical characterization of an ayurvedic herb-mineral preparation- mahabalmavilas ras. J Ayurveda Integr Med 2019;10:262–8. https://doi.org/10.1016/j.jaim.2017.09.001.

[25] Bhatwallkar SR, Shukla P, Srivastava RK, Mondal R, Anupam P. Validation of environmental disinfection efficiency of traditional Ayurvedic fumigation practices. J Ayurveda Integr Med 2019;10:203–6. https://doi.org/10.1016/j.jaim.2019.05.002.

[26] Patil A, Dindore P, Aziz A, Kadam A, Saroch V. Clinical effect of suvarna bindu prashan. J Ayurveda Integr Med Sci 2017;2:11–8. https://doi.org/10.21760/jaims.2176328201.

[27] Patil-Bhole T, Patil S, Wele AA. Assessment of bioavailability of gold bhasma in rat. J Pharmacol Res 2010;1(1):4–61. https://doi.org/10.4103/0974-7788.59943.

[28] Rege A, Sadashiv Chowdhary A. Evaluation of ocimum sanctum and tinospora cordifolia as probable hiv-protease inhibitors. Int J Pharmaceut Sci Res 2014;25:315–6.

[29] Rege AA, Chowdhary AS. Evaluation of some medicinal plants as putative HIV-protease inhibitors. Indian Drugs 2013;50:24–8.

[30] Panche AN, Chandra S, Dianon AD. Multi-target β-protease inhibitors from Andrographis paniculata in silico and in vitro studies. Plants 2019;8:2231. https://doi.org/10.3390/plants8070231.