



Review Article

www.ijrap.net (ISSN:2229-3566)



AYURVEDA FOR PREVENTION, PROPHYLAXIS AND MANAGEMENT OF COVID-19: A REVIEW

Abhishek Upadhyay^{1*}, Meghna Vaidya²

¹ Lecturer, Post Graduate department of Kayachikitsa, National Institute of Ayurveda, Jaipur, Rajasthan, India

² Associate Professor, RB Ayurvedic Medical College and Hospital, Agra, Uttar Pradesh, India

Received on: 18/09/20 Accepted on: 11/11/20

***Corresponding author**

E-mail: dr.abhishek82@gmail.com

DOI: 10.7897/2277-4343.1106197

ABSTRACT

COVID-19 pandemic which has spread to 216 countries in eight months resulted in 7.50 lakh deaths across the globe. SARS CoV-2, highly infectious causative agent of this disease is transmitted through droplets, contact routes and aerosols. Even the most developed nations are experiencing difficulty to limit its spread and the disease is still spreading at an alarming rate. For filling the gaps and lacunas in the healthcare system this is high time to integrate different healthcare systems available to meet the ever emerging health challenges. Ayurveda has documented the first reference of epidemics as Janapadodhwamsa and has given a scientific insight to its causes, effect and prevention along with management strategies. No established and approved treatment of COVID-19 is yet available and off label drugs are being tried for prophylaxis and therapeutic purpose. Variation in host susceptibility and outcomes has been observed and host factors are being explored along with fast track vaccine development. Ayurveda treatment always take into account the host factors to alleviate the disease by improving the Agni and providing nutrition and strength to the host by means of Rasayana, Panchakarma, lifestyle measures and using drugs of varied origin. The clinical profile of COVID-19 matches with Vata-Kapha dominant Sannipataja Jwara for which detailed treatment guidelines and array of pharmaceutical preparations are described in Ayurvedic literature which are being practiced by qualified Ayurvedic physicians effectively since long. This paper highlights the Ayurvedic perspective of the COVID-19 along with its prevention, prophylaxis and management strategies through Ayurveda.

Keywords: COVID-19, SARS CoV-2, Ayurveda, Vata Kaphaja Jwara, Pathogenesis, Janapadodhwamsa

INTRODUCTION

Whole world is currently facing a grave pandemic COVID-19, which has exposed the weaknesses and lacunas in the healthcare system across the globe. This serious illness which has clutched around 29.1 million people and has resulted into near 9.25 lakh deaths across 213 countries till now¹ has revealed the need of critical analysis and revamped approach towards healthcare. COVID-19 was the name given by WHO to disease caused by severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) on 11th February 2020, which was first reported in the wake of an outbreak of pneumonia of unknown origin from the city of Wuhan in China on 31 December 2019. China on 31 December 2019. The outbreak was declared a Public Health Emergency of International Concern on 30th January 2020 and as a pandemic on 11th March 2020.² Even with so many advancements in the conventional medicine and technology, the diseases like COVID-19 always remain a challenge to health care machinery and cause devastating effect. Conventional medicine has been of limited value in battling the COVID-19 crisis till date³ and off label medications found effective on earlier strains of coronavirus are being used for the treatment.⁴ Variety of drugs like chloroquine, hydroxychloroquine, Lopinavir and ritonavir, Interferon beta-1a, Famotidine, Nafamostat and camostat, Ivermectin, Nitazoxanide, Corticosteroids⁵ etc. have been experimented as prophylactic as well as therapeutic agents but majority of them were not found effective over standard of care in trials and later few of them were discontinued by WHO on recommendations of Solidarity Trial's International Steering Committee.⁶ This crisis is a much needed impetus to advance and explore Ayurveda principles and drugs for its utility to navigate through such uncharted territories of various health challenges. Many diseases of possible infectious aetiology like Jwara, Visarpa, Kushtha, Masurika, Rajyakshama,

Krimi, Aptanaka etc. had been documented in Ayurveda texts and majority of them had been dealt effectively and prognosticated as curable though may be challenging to treat. Presently in COVID-19, conventional drugs being tried are ones which were found effective in previous pandemics but are not approved yet. When these medicines can be used without evidence then why not Ayurveda drugs which are being used effectively since long. This article is an attempt to understand COVID-19 in the light of ancient Indian medical science i.e. Ayurveda with management strategies to be employed in this rapidly spreading infectious disease.

Coronavirus (CoV)

Coronaviruses are large, enveloped, positive-stranded RNA viruses having largest genome among all RNA viruses⁷ ranging from 26 to 32 kilo bases (kb) in length.⁸ Due to spike glycoproteins on its surface, they appear like crown under the electron microscope, hence are termed as coronavirus (coronam is the Latin term for crown).⁹ They belong to the *Coronaviridae* family in the order *Nidovirales* and are classified into *Alphacoronavirus*, *Betacoronavirus*, *Gammacoronavirus* and *Deltacoronavirus* genera.¹⁰ Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) belongs to the family of β -Coronaviruses. In research studies, genome of this virus is found almost identical to that of bat coronavirus which points towards the bats being the possible natural hosts of the virus.¹¹ Till now seven human Coronaviruses have been identified out of whom four corona viruses namely HKU1, NL63, 229E and OC43 generally cause mild respiratory disease¹² whereas members of *Betacoronavirus* genera SARS-CoV, MERS-CoV and SARS-CoV-2 are highly pathogenic.¹³

Transmission and Prevention

COVID-19 caused by SARS-Cov-2 is speculated to be transmitted through droplets, contact routes and aerosols generated (in specific hospital settings where procedures or support treatment that generate aerosols are performed and indoor settings with poor ventilation) from non-violent and violent expirations of SARS-CoV-2-infected people.¹⁴ Transmission of SARS-CoV-2 can occur through direct, indirect, or close contact with infected people through infected secretions such as saliva and respiratory secretions or their respiratory droplets, which are expelled when an infected person coughs, sneezes, talks or sings. Fomite (contaminated surfaces) transmission may occur indirectly through touching surfaces in the immediate environment or objects contaminated with virus from an infected person, followed by touching the mouth, nose, or eyes. Some other modes of transmission like feco-oral, blood borne, mother's milk are yet to be established. Evidences of transmission from human to other mammals like dog, cat etc. have been found but transmission from infected mammals to humans is still unclear.¹⁵ The recommendations for preventing the spread in society are frequent hand hygiene, social distancing, respiratory etiquettes, environmental cleaning and disinfection, avoiding outdoor and indoor crowded gatherings, wearing face masks to protect others and ensuring good ventilation in any closed setting. Effective control and limiting the spread of virus can be achieved through identifying the suspected cases, increased testing capacity, strict quarantine (self or institutional), contact tracing and their isolation.^{15,16}

Historical evidence of infections and epidemics in Ayurveda

Modern medicine dates the origin of infectious diseases to 3000 years back as evidence of smallpox was found in 3000 years old Egyptian mummies. First documented evidence of infectious diseases in modern medical literature is found in the writings of Hippocrates where he wrote about the means of disease spread by air, water and places.¹⁷ Documentation of epidemics in Ayurveda have been done much before Hippocrates during Vedic or post Vedic period under the heading of Janpandodhwansa but has never been given the credit by the scientific community in the history of epidemics. Janapadas were the realms, republics and kingdoms of the Vedic period on the Indian subcontinent.¹⁸ Term Janapada is composed of two words "Janas" and "Pada". "Jana" means "people" whereas the word "Pada" means "place of habitation" of Jana.¹⁹ In Vedic period Janapada constituted a tribe which was ruled by a king and was framed for administrative purpose. The earliest description of term 'Janapada' is found in the Vedic literature Brahmanas, and in post Vedic texts like Mahabharata and Ramayana.²⁰ When any disease or conditions like natural calamities or disasters affected a Janpad, it was called as Janpandodhwansa. Factors responsible for such an outbreak resulting in mass casualties are deranged Vayu (air), Jala (water), Desh (land) and Kala (seasons). These four factors are in common to habitants of an area which when vitiated are responsible for outbreak of a disease.²¹ Sins of present life and bad deeds of past life, Pragyaparadha (intellectual misconduct), Adharma (unrighteousness) have been ascribed as the root cause of such type of calamities.²² According to Thomas Love joy, a modern day biologists who coined the term "biological diversity", covid-19 pandemic is the consequence of human persistent and excessive intrusion in nature and the vast illegal wildlife trade, and in particular, the wildlife markets, the wet markets, of south Asia and bush meat markets of Africa which comes under the definition of unrighteous intellectual misconduct.²³

India and Covid-19

India confirmed its first case of novel coronavirus disease from state of Kerala on 30th January 2020.²⁴ Government of India (GOI) took robust and courageous decisions to face the challenge and threat posed by the growing pandemic of Covid-19. With an objective to contain the spread of coronavirus outbreak, GOI enforced largest nationwide strict lockdown in four phases for 68 days. Relaxation in lockdown was initiated from 1st June 2020 in phased manner and unlocking is in its third phase till the time of data compilation.²⁵ After all these strict measures number of infected individuals is still increasing at an alarming rate and till the time of writing this article, out of 20 million tests carried out 2.5 million positive cases have been found with 6,68,220 active cases and 49,036 deaths.²⁶ All the departments and machinery of government along with the citizens are working hard to manage the threat posed by this disease. In this hard time greatest burden is on the health care system of the country and health care providers are also at the highest risk of acquiring the infection. Till now no definitive treatment of Covid-19 is available²⁷ and even the most developed nations have failed in controlling the disease. Scientists are digging deep to unravel the mystery behind the course of disease to find out the variation in response to infection from person to person. The studies have so far indicated that the circulating virus appears to be stable and the reasons from host side are being explored to explain this variation in susceptibility and outcomes.²⁸ Answer for all these questions lies in the principle of Ayurveda "Purusham Purusham Veekshya"²⁹ that explains the individual uniqueness, their vulnerability towards diseases and personalized management strategies. So, it is high time to mainstream AYUSH in India to meet the needs of society through customized health care.^{30,31}

Potential of Ayurveda in management of Covid-19

Experts believe that Ayurveda along with other AYUSH systems of Indian medicine has the potential to manage and combat Covid-19 in collaboration with conventional medical system.³² In Ayurveda classics, conditions with infectious aetiologies have been described in detail including symptomatology, pathophysiology, classification, prognosis along with treatment approach. Notable references which have been systematically documented by ancient Indian medical scientists and indicate towards infectious nature are Agantuja hetus (external causative factors),³³ Abhishangaj Jwara,³⁴ Aupsargika (communicable) diseases³⁵ like Kushtha (skin diseases), Jwara (febrile conditions), Shosha (disorders causing emaciation), Netrabhishyanda (conjunctivitis), Krimi.³⁶ Ayurveda mainly aims at prevention of health³⁷ revolving around the harmony of Tridosha with other focus on treating diseases resulted due to deranged Doshas³⁸. Health according to Ayurveda revolves around the normalcy of Dosha, Dhatu, Agni, Mala, and clarity of Atma, Indriya and Mana.³⁹ Physiological balance of these factors depends on the strength of Agni which is ultimately responsible for immune status of an individual.⁴⁰ Thus Agni is a key factor in balance of Tridosha and maintenance of immune status of an individual, which ultimately helps in recovering an individual from the disease. In COVID-19 also, like other viral infections, there is variety of clinical presentation ranging from asymptomatic infection, mild flu like illness, pneumonia to severe form of Acute Respiratory Distress Syndrome and critical stages like sepsis and shock^{41,42} If Ayurvedic treatment is instilled at appropriate time, it will help infected individual's immune system to limit the inflammatory response and reduce the virulence of the SARS CoV-2, thus checking the severity of illness. China used its Traditional Chinese medicine (TCM) to full potential in managing Covid-19 based on their experience of using TCM in prevention and treatment during SARS in 2003.⁴³ This is the high

time that our ancient medical heritage must be used and tested in such emerging diseases through well planned studies⁴⁴ for the benefit of society keeping away all the prejudice and bias.

Ayurvedic approach to Covid-19

Considering the mode of transmission (Oro-nasal route through droplets/hand contact), Covid-19 has Agantuja hetu (external cause i.e. SARS-CoV 2). Disease symptoms manifest abruptly without having the prodromal phase when the cause is agantuj⁴⁵ and the clinical presentation will depend upon the status of already deranged doshas at the site where they are maximally concentrated. After gaining entry in a host Agantuja hetu ultimately leads to derangement of Sharirika dosha (Vata, Pitta and Kapha) and gets converted to Nija (internal) type⁴⁵ following the incubation period (variable, from 2-14 days in COVID-19).^{46,47} Although the route of entry of SARS-CoV-2 is Oro-nasal and it mainly hits the respiratory system but multiple organ system involvement is seen in different hosts. SARS CoV-2 after entering the body, leads to derangement of Shareerika dosha and manifests mainly as Rasapradoshaja diseases like Jwara (fever) and Arasagyata (loss of taste)⁴⁸ along with Pranavaha srotodushti symptoms (Pulmonary symptoms) like Shwasa (dyspnoea) and Kasa (cough). Annavaha Srotodushti (digestive system) symptoms like Aruchi (anorexia), Chardi (vomiting) and Purishavaha srotodushti (excretory system) symptoms like Atisara (diarrhoea) are also not uncommon.⁴⁹ Other associated symptoms of COVID-19 are headache, bodyaches and arthralgia (Table-1) which are general symptoms associated with all the

fevers. In severe stage, disease manifests as pneumonia, ARDS, shock, coagulation disorders with multi organ failure.⁵⁰ All these symptoms are described in Jwara under different types (Table 1) and COVID-19 can be categorized as Vata-Kapha dominant Sannipataja Jwara with variable involvement of Pitta. Hence, the line of treatment mentioned under Jwara chikitsa must be adopted for its management. In addition to this, principles of Shwasa and other diseases like Atisara (Diarrheal diseases), Chardi (Vomiting), Raktapitta (bleeding disorders and Coagulopathies) can be employed depending upon the presenting case.

Jwara (fever) according to Ayurveda arises from Amashaya and has been classified as a disease due to vitiation of Rasavaha srotas. Aggravated Dosha (Vata, Pitta or Kapha) due to underlying etiology, either alone or in combination of two or three, gets mixed with the improperly formed rasa (the first dhatu formed after digestion) which cause sluggish circulation and further blocks the micro channels of rasa and sweda (thermoregulatory apparatus). The Agni (digestive fire) gets displaced out of its original site (Paktisthana), spreading out through the body which is not able to dissipate heat due to blocked sweat channels, causing fever.^{51,52} Moreover, displacement of Agni from its seat impairs all the metabolic functions of the body⁵³ and leads to impaired immune response.⁵⁴ Greater the derangement of agni greater will be the accumulated dosha and poor will be the prognosis⁵⁵ as is seen in Covid-19 cases with co-morbidities like hypertension, diabetes, cardiac and hepatic disorders, cerebrovascular accidents, cancer and cases with renal impairment.⁵⁶

Table 1: Ayurvedic Clinical conditions resembling Covid-19

Disease Condition	Common Clinical Presentation
COVID-19 ⁵⁷	Fever, Cough, Fatigue, Anorexia, Shortness of breath, Myalgia Non-specific – Sore throat, nasal congestion, headache, diarrhoea, nausea and vomiting Loss of smell and Loss of taste
Vata-KaphaJwara ⁵⁸	Fever, Bodyaches, Cough, Coryza, Headache, Muscle and joint pain,
Vata Kapha dominant, Recessive Pitta (Vata Kapholvana Heena Pitta Sannipata) ⁵⁹	Cold, Cough, Anorexia, Fatigue, Thirst, Burning, Bodyaches
Tridoshaja Jwara (Vrudha Vata, Heena Kapha, Madhya Pitta) ⁶⁰	Fever, Cough, Dyspnoea, Coryza, Pain in lower chest region or flanks
Majjadhatushaja Jwara ⁶¹	Shwasa, Kasa, affliction of vital organs, Fever, Fatigue, Syncopal attacks

Treatment approach

Ayurveda primarily focuses on preventive aspect of health through a set of guidelines mentioned under Dinacharya (daily regime), Ritucharya (seasonal regime), Dharniya and Adharniya Vega (suppression and non-suppression of urges), Sadvritta and Achara Rasayana (moral ethics) along with elaborate dietary recommendations. For therapeutic purpose, diagnostic, clinical and general as well as disease specific treatment guidelines are also mentioned. As Covid-19 is Sankramaka (communicable) disease having Agantuja cause resulting into Janapadodhwamsa (affecting a large geographical area), it also has preventive as well as curative angles to control its spread. Self-discipline, avoiding intellectual errors (following all recommended guidelines), to remember and follow the set of guidelines mentioned for prevention (dietary, daily and seasonal regimes, moral guidelines etc.) must be practiced and they become even more important during epidemics. All the possible modes of spread of Sankramaka diseases (close contact, respiratory secretions, sharing of personal things) should be avoided and preventive Ayurveda guidelines as mentioned above should be incorporated into lifestyle.

During Covid-19, studies have shown significant impact on mental health.⁶² Due to restricted movements, work from home,

temporary unemployment, online classes of children, lack of physical contact with other family members, friends and colleagues, loss of nears and dears due to covid-19 has resulted into fear, worry and stress.⁶³ For minimizing the stress and anxiety truthfulness, compassion for living beings, charity, worship of god, observing moral conduct, protection of self (through various physical and spiritual methods), residing in an unaffected place (indicative of isolation), reading or listening to religious scriptures, constant association with the righteous must be practiced.⁶⁴ All these methods when employed strictly have preventive role not only in Covid-19 but also in prevention of all the diseases.

Prophylaxis

Panchkarma (Five Ayurvedic Therapeutic cleansing methods) and Rasayana therapy are mentioned as the cornerstone prophylactic modalities in Janpadodhwamsa.⁶⁵ Seasonal Panchakarma is recommended to remove the excess accumulated Doshas from the body for maintaining the health. As it is difficult to perform Panchakarma during the outbreak of Covid-19, utility of Rasayana becomes more important as they possess nutritive, restorative and immunomodulatory properties. Rasayana acts as antioxidant, anti-stress, anti-inflammatory, anti-microbial and confer immunity against diseases.⁶⁶ Single ingredient Rasayana

drugs of potential benefit in Covid-19 are *Withania somnifera*, *Tinospora cordifolia*, *Asparagus racemosus*, *Phyllanthus emblica*, *Glycyrrhiza glabra*, *Piper longum* and are recommended for its prophylaxis and as an add-on treatment.⁶⁷ Chyavanaprasam, Brahm Rasayana, Pippali Rasayana, Amrita Bhallataka are also potential Rasayana in Covid -19.⁶⁸ Dhupana (fumigation) for disinfection of surroundings must be carried out with Ayurvedic drugs of antimicrobial properties⁶⁹ which might limit the spread of virus.

Treatment

Asymptomatic or Cases with Mild symptoms

Covid-19 cases of these categories must be treated on the line of treatment of Vata-Kapha Jwara. Shwasa and Kasa treatment principles can also be opted depending on the percentage of respiratory symptoms. Though Langhana is the prime treatment modality for fevers in Ayurveda⁷⁰ but in Covid-19 it must be used judiciously.⁷¹ Deepana, Pachana with drugs having dominance of Tikta (bitter taste) and Katu (pungent) Rasa⁷² must be given to arrest or limit the severity of disease. Light but nutritious diet must be given to the patient. Hot water or medicated water⁷³ is recommended in moderation.

Moderate to Severe Cases

Patients in this category must be treated on the line of treatment of Sannipataja Jwara with Vata-Kapha dominance, Shwasa and Kasa. Ayurvedic drugs of herbo-mineral origin with faster absorption, rapid action and better bioavailability⁷⁴ must be prioritized in the treatment plan. Patients under these categories especially with co-morbidities require careful monitoring and integrative treatment approach in intensive care settings must be adopted for better clinical outcome. Ayurvedic drugs of significance in Covid-19 which are routinely used by qualified Ayurveda practitioners are recommended according to the severity of disease in Table 2. Ayurvedic drugs as add on therapy to recommended conventional treatment will result into better outcome as was observed with TCM.⁷⁵

Post Covid care

Fatigue and dyspnoea are persistent symptoms that are experienced after acute Covid-19.⁷⁶ With large number of recovered Covid-19 cases,⁷⁷ a great pool of patients will be created who will likely end up in symptom complex as that of chronic post-SARS syndrome which include fatigue, pain, weakness, depression and sleep disturbance.⁷⁸ These patients can very well be managed using principles of Satvavjaya,^{79,80} Unmada,⁸¹ and Rasayana.⁸² Ayurvedic therapeutic procedures like Abhyanga, Swedana, Avgahana, Vasti, Nasya, Shirodhara, Pranayama and Yoga will definitely help these patients.

Table 2: Ayurvedic drugs for Stage wise management of Covid-19

Severity of the disease	Drug Recommendations
Asymptomatic or Mild	Churna – Pippali churna, Trikatu churna, Panchkola churna, Sitopaladi Churna, Talisadi churna Kashaya (decoction) - Gojhivadi, Bharangayadi, Kantkaryadi Herbomineral - Godanti mishran, Lakshmvilas Rasa, Tribhuvankirti Rasa Vati – Sudarshanghan vati, Samshamni vati, Lavangadi and Vyoshadi vati
Moderate	Churna – Same as in mild cases Kashaya (decoction) – Shatyadivarga kashaya, Kantkaryadi, Bharangayadi Vati – Sanjivani vati, Sudarshanghan vati Herbomineral - Godanti mishran, Tribhuvankirti Rasa, Mritunjaya Rasa, Kafketu Rasa, Shwaskuthar Rasa Avaleha – Kantakari Avaleha, Agastya Haritaki Avaleha
Severe	Sanjivani vati, Hingukarpoor vati, Mritunjaya Rasa, Sameerpanag Rasa, Mala sindoor, Kasturibhairava rasa
Post COVID care	Herbomineral - Basantmalti rasa, Jayamangal rasa, Putpakvavishma Jwarantaklauha Avaleha – Chyavanprash Avaleha, Brahma Rasayana, Ashwagandhadi Leha, Sarpi Guda Churna – Sitopaladi Churna, Talisadi Churna Ghrta – Indukant Ghrta, Dhanwantari ghrta, Amritprash Ghrta, Pippalyadi Ghrta

AYUSH initiatives during Covid-19 Pandemic

During the address to nation, Prime Minister of India urged the citizens to follow seven steps to fight corona⁸³ which included following AYUSH ministry guidelines for boosting immunity. AYUSH ministry issued advisory to meet challenge arising out of spread of corona virus (Covid-19) in India⁸⁴ along with Ayurveda's immunity boosting measures for self-care during COVID-19 crisis.⁸⁵ These guidelines consist of general measures such as drinking warm water, use of spices in cooking, practice of yoga, Pranayama and Asanas for at least 30 minutes, Ayurvedic immunity promoting measures such as use of Rasayana (e.g. Chyavanprash), herbal decoction and turmeric milk daily once or twice. Simple Ayurvedic procedures such as Pratimarsha Nasya (nasal application of oil or ghee) and Gandusha / Kawala (oil pulling therapy), steam inhalation and use of clove for throat irritation. AYUSH guidelines also included use of Samshamni vati for preventive and prophylactic care, AYUSH-64, Agastya Haritaki and Anu tail nasya for symptom management of Covid like illness and as add on therapy to conventional treatment along with dietary recommendations. AYUSH ministry also took up the research related activities and

issued guidelines for the same on the basis of recommendations of interdisciplinary AYUSH R & D task force.⁸⁶ For scientifically evaluating the role of AYUSH interventions, population based AYUSH studies for prophylaxis, AYUSH interventional studies for Covid-19, stand-alone AYUSH interventional studies, integrative clinical trials and AYUSH Sanjivani application based study for impact assessment of acceptance and usage of AYUSH advisories for its role in prevention of Covid 19 were planned as per guidelines and are being carried out.⁸⁷

CONCLUSION

Infectious diseases like Covid-19, Zika virus disease, Ebola virus disease, H1N1 influenza are emerging at regular intervals that can wipe out the human generations and has unveiled the gaps in health care systems. It is high time to consider all the systems of healthcare available across the globe, study and test them scientifically to effectively control such diseases. Ayurveda, an ancient Indian medical wisdom having documented evidence of diseases of infectious etiology has immense potential to contribute to the society in such situations. Strong and visionary backup by the policy makers, unbiased outlook of modern

medical system and scientific community towards Ayurveda, Mainstreaming of AYUSH in healthcare policy with appropriate funding will pave the way forward. Ayurveda scholars also need to come out of shell and develop scientific acumen by enhancing their skills through capacity building, upgrading their research skills and openness to the modern science will benefit the system as well as the workforce. Scientific validation of Ayurvedic principles and drugs will make this science stand high in contemporary times and will definitely help the ailing mankind but still a lot is required to be done.

REFERENCES

1. WHO coronavirus disease (Covid-19) dashboard. Geneva: World Health Organization; 2020. Available online: <https://covid19.who.int/> (last cited: [15-09-2020]).
2. Rolling updates on coronavirus disease (Covid-19). Events as they happen. Geneva: World Health Organization. Available online: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen> (Accessed on 26 October 2020); 2020.
3. Rismanbaf A. Potential Treatments for Covid-19; a Narrative Literature Review. Arch Acad Emerg Med 2020; 8(1): e29. Published 2020 Mar 21.
4. Off-label use of medicines for Covid-19 Scientific Brief 31 March 2020 | Covid-19: Clinical care. WHO reference number: WHO/2019-nCoV/Sci_Brief/Off-label_use/2020.1 (Accessed on 26 October 2020)
5. Leah Shaffer: 15 drugs being tested to treat Covid-19 and how they would work. Nature medicine, news feature. Published 2020 May 15. Available at: <https://doi.org/10.1038/d41591-020-00019-9> (Accessed on 26 October 2020)
6. "Solidarity" clinical trial for Covid-19 treatments: World Health Organization. Available online: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/global-research-on-novel-coronavirus-2019-ncov/solidarity-clinical-trial-for-covid-19-treatments>(Accessed on 26 October 2020); 2020.
7. Li F. Structure, Function and Evolution of Coronavirus Spike Proteins. Annu Rev Virol 2016; 3(1): 237-261. DOI: 10.1146/annurev-virology-110615-042301
8. Malik YA. Properties of Coronavirus and SARS-CoV-2. Malays J Pathol 2020; 42(1): 3-11.
9. Cascella M, Rajnik M, Cuomo A, *et al.* Features, Evaluation and Treatment Coronavirus (Covid-19) [Updated 2020 Jul 4]. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2020 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK554776/>
10. Li F. Structure, Function and Evolution of Coronavirus Spike Proteins. Annu Rev Virol 2016; 3(1): 237-261. DOI: 10.1146/annurev-virology-110615-042301
11. Pascarella G, Strumia A, Piliago C, *et al.* Covid-19 diagnosis and management: a comprehensive review. J Intern Med 2020; 288(2): 192-206. DOI: 10.1111/joim.13091
12. Singhal T. A Review of Coronavirus Disease-2019 (Covid-19). Indian J Pediatr 2020; 87(4): 281-286. DOI: 10.1007/s12098-020-03263-6
13. Harapan H, Itoh N, Yufika A, *et al.* Coronavirus disease 2019 (Covid-19): A literature review. J Infect Public Health. 2020; 13(5): 667-673. DOI: 10.1016/j.jiph.2020.03.019
14. Jayaweera M, Perera H, Gunawardana B, Manatunge J. Transmission of Covid-19 virus by droplets and aerosols: A critical review on the unresolved dichotomy [Published online ahead of print, 2020 Jun 13]. Environ Res 2020; 188: 109819. DOI: 10.1016/j.envres.2020.109819
15. Transmission of SARS-CoV-2: implications for infection prevention precautions. Geneva: World Health Organization; 2020 (Available online: <https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions>). (Accessed on 26 October 2020)
16. Infection prevention and control during health care when coronavirus disease (Covid-19) is suspected or confirmed: Interim guidance. Geneva: World Health Organization; 2020 (Available online: <https://www.who.int/publications/i/item/WHO-2019-nCoV-IPC-2020.4>). (Accessed on 26 October 2020)
17. Philip S Brachman, Infectious diseases-past, present, and future, International Journal of Epidemiology 2003; 32(5): 684-686. <https://doi.org/10.1093/ije/dyg282>
18. Wikipedia contributors. (2020, May 17). Janapada. In Wikipedia. The Free Encyclopaedia. Retrieved 18:31, August 14, 2020, from <https://en.wikipedia.org/w/index.php?title=Janapada&oldid=957205580>; 2020.
19. Ramchandra, Gade Arun, Chousalkar, Ashok S. Political ideas and constitutional experiments in Ancient Indian republics, Emergence of Republics in Ancient India, Chapter II, p. 53. Available from: <http://hdl.handle.net/10603/139002>. (Accessed on 27 October 2020)
20. Ramchandra, Gade Arun, Chousalkar, Ashok S. Political ideas and constitutional experiments in Ancient Indian republics, Emergence of Republics in Ancient India, Chapter II, p. 56. Available from: <http://hdl.handle.net/10603/139002>. (Accessed on 27 October 2020)
21. Charaka Samhita, Vimana sthana, Janpadodhwansniya vimanam 3/6. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
22. Charaka Samhita, Vimana sthana, Janpadodhwansniya vimanam 3/20. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
23. 'We did it to ourselves': Scientist says intrusion into nature led to pandemic. The Guardian (Available at: https://www.theguardian.com/world/2020/apr/25/ourselves-scientist-says-human-intrusion-nature-pandemic-aoe?CMP=share_btn_link). (Accessed on 27 October 2020)
24. Responding to Covid-19 - Learnings from Kerala. Geneva: World Health Organization; 2020. Available from: (<https://www.who.int/india/news/feature-stories/detail/responding-to-covid-19---learnings-from-kerala>). (Accessed on 27 October 2020)
25. Wikipedia contributors. (2020, August 11). Covid-19 pandemic lockdown in India. In Wikipedia. The Free Encyclopaedia. Retrieved 12:04, August 15; 2020. from https://en.wikipedia.org/w/index.php?title=COVID-19_pandemic_lockdown_in_India&oldid=972348182
26. Covid-19 Dashboard as on : 15 August 2020, 08:00 IST (GMT+5:30) Available from: <https://www.mygov.in/covid-19/>
27. Ali I, Alharbi OML. Covid-19: Disease, management, treatment, and social impact. Sci Total Environ 2020; 728: 138861. DOI: 10.1016/j.scitotenv.2020.138861
28. Zhang, X., Tan, Y., Ling, Y. *et al.* Viral and host factors related to the clinical outcome of Covid-19. Nature 2020; 583: 437-440. <https://doi.org/10.1038/s41586-020-2355-0>
29. Charaka Samhita, Sutra sthana, Dirghamjivitiyam adhyaya 1/123. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
30. Shrivastava SR, Shrivastava PS, Ramasamy J. Main streaming of Ayurveda, Yoga, Naturopathy, Unani, Siddha and Homeopathy with the health care delivery system in India. J Tradit Complement Med 2015; 5(2): 116-118. Published 2015 Jan 7. DOI: 10.1016/j.jtcm.2014.11.002
31. Patwardhan B, Tillu G. Universal Health Coverage and AYUSH systems. J Ayurveda Integr Med 2018; 9(1): 1-2. DOI: 10.1016/j.jaim.2018.03.001

32. Rastogi S, Pandey DN, Singh RH. Covid-19 pandemic: A pragmatic plan for Ayurveda intervention [Published online ahead of print, 2020 Apr 23]. *J Ayurveda Integr Med*; 2020; S0975-9476(20)30019-X. DOI: 10.1016/j.jaim.2020.04.002
33. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/111. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
34. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/117. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
35. Sushruta Samhita, Nidana sthana, Kushtha Nidanam 5/33-34. Available from <http://niimh.nic.in/ebooks/esushruta> (Accessed on 09 September 2020)
36. Charaka Samhita, Vimana sthana, Vyadhitrupiya vimanam 7/9. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
37. Charaka Samhita, Sutra sthana, Arthedashmahamooliya 30/26. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
38. Charaka Samhita, Sutra sthana, Khudaakchatushpada 9/4. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
39. Sushruta Samhita, Sutra sthana, Doshadhatumalakshayavidhi vigyaniya 15/41. Available from <http://niimh.nic.in/ebooks/esushruta> (Accessed on 09 September 2020)
40. Charaka Samhita, Chikitsa sthana, Grahani chikitsa15/3-4. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
41. Cascella M, Rajnik M, Cuomo A, *et al.* Features, Evaluation and Treatment Coronavirus (Covid-19) [Updated 2020 Jul 4]. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; Available from: <https://www.ncbi.nlm.nih.gov/books/NBK554776/>; 2020. Jan
42. Li H, Liu SM, Yu XH, Tang SL, Tang CK. Coronavirus disease 2019 (Covid-19): current status and future perspectives. *Int J Antimicrob Agents* 2020; 55(5): 105951. DOI: 10.1016/j.ijantimicag.2020.105951
43. Yang Y, Islam MS, Wang J, Li Y, Chen X. Traditional Chinese Medicine in the Treatment of Patients Infected with 2019-New Coronavirus (SARS-CoV-2): A Review and Perspective. *Int J Biol Sci* 2020; 16(10): 1708-1717. Published 2020 Mar 15. DOI: 10.7150/ijbs.45538
44. Goyal M. Threats and challenges of emerging viral diseases and scope of Ayurveda in its prevention. *Ayu* 2019; 40(2): 67-68. DOI: 10.4103/ayu.AYU_18_20
45. Charaka Samhita, Nidana sthana, Jwara Nidanam 1/30. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
46. Backer JA, Klinkenberg D, Wallinga J. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20-28 January 2020. *Euro Surveill* 2020; 25(5): 2000062. DOI: 10.2807/1560-7917.ES.2020.25.5.2000062
47. Centre for Disease Control and Prevention. Department of Health and Human Services. US. Interim Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease (Covid-19). Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html> (Accessed on 09 September 2020)
48. Charaka Samhita, Sutra sthana, Vividhashitpeetiya 28/9-11. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
49. Charaka Samhita, Vimana sthana, Srotovimaniya 5/8. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
50. Juan A. Siordia. Epidemiology and clinical features of Covid-19: A review of current literature, *Journal of Clinical Virology*, Volume 127, 2020, 104357, ISSN 1386-6532, <https://doi.org/10.1016/j.jcv.2020.104357>.
51. Charaka Samhita, Nidana sthana, Jwara Nidanam 1/20. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
52. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/129-31. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
53. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/273,275. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
54. Charaka Samhita, Chikitsa sthana, Grahani chikitsa15/3-4. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
55. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/109. Available from: <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
56. World Health Organization. Geneva. 2020. Clinical management of Covid-19. WHO Reference Number: WHO/2019-nCoV/clinical/2020.5. Available at: <https://www.who.int/publications/i/item/clinical-management-of-covid-19> (Accessed on 09 September 2020)
57. World Health Organization. Geneva. 2020. Clinical management of Covid-19. WHO Reference Number: WHO/2019-nCoV/clinical/2020.5. Available at: <https://www.who.int/publications/i/item/clinical-management-of-covid-19> (Accessed on 09 September 2020)
58. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/86-87. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
59. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/92. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
60. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/101. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
61. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/81. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
62. Mental health and Covid-19. Geneva: World Health Organization; 2020. Available at <https://www.who.int/teams/mental-health-and-substance-use/covid-19>
63. Mukherjee S., Pawar, N., Kulkarni, O. *et al.* Evaluation of free-radical quenching properties of standard Ayurvedic formulation Vayasthapanna Rasayana. *BMC Complement Altern Med* 2011; 11, 38. <https://doi.org/10.1186/1472-6882-11-38>
64. Charaka Samhita, Vimana sthana, Janpadodhwansniya vimanam 3/20. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
65. Charaka Samhita, Vimana sthana, Janpadodhwansniya vimanam 3/13. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
66. Girish Tillu, Sarika Chaturvedi, Arvind Chopra and Bhushan Patwardhan. *The Journal of Alternative and Complementary Medicine*. May 2020.360-364. <http://doi.org/10.1089/acm.2020.0129>
67. Rege N.N., Thatte U.M. and Dahanukar S.A. Adaptogenic properties of six rasayana herbs used in Ayurvedic medicine. *Phytother. Res* 1999; 13: 275-291. DOI: 10.1002/(SICI)1099-1573(199906)13:4<275::AID-PTR510>3.0.CO;2-S
68. Rastogi S, Pandey DN, Singh RH. Covid-19 pandemic: A pragmatic plan for Ayurveda intervention [Published online ahead of print, 2020 Apr 23]. *J Ayurveda Integr Med* 2020; S0975-9476(20)30019-X. DOI: 10.1016/j.jaim.2020.04.002

69. Bhatwalkar SB, Shukla P, Srivastava RK, Mondal R, Anupam R. Validation of environmental disinfection efficiency of traditional Ayurvedic fumigation practices. *J Ayurveda Integr Med* 2019; 10(3): 203-206. DOI: 10.1016/j.jaim.2019.05.002
70. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/139. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
71. Sidhinandan Mishra, Bhaishajya Ratnavali, Jwaradhikara, 5/323, Varanasi: Chaukhambha Surbharti Prakashan; 2011. p. 116.
72. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/142. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
73. Charaka Samhita, Chikitsa sthana, Jwara chikitsitam 3/143-45. Available from <http://niimh.nic.in/ebooks/ecaraka> (Accessed on 09 September 2020)
74. Savrikar SS, Ravishankar B. Introduction to 'Rasa Shastra' the Iatrochemistry of Ayurveda. *Afr J Tradit Complement Altern Med* 2011; 8(5 Suppl): 66-82. DOI: 10.4314/ajtcam.v8i5S.1
75. Niu M, Wang RL, Wang ZX, Zhang P, Bai ZF, Jing J, Guo YM, Zhao X, Zhan XY, Zhang ZT, Song XA, Qin EQ, Wang JB, Xiao XH. [Rapid establishment of traditional Chinese medicine prevention and treatment of 2019-nCoV based on clinical experience and molecular docking]. *Zhongguo Zhong Yao Za Zhi* 2020 Mar; 45(6): 1213-1218. Chinese. DOI: 10.19540/j.cnki.cjcmm.20200206.501. PMID: 32281327.
76. Carfi A, Bernabei R, Landi F, for the Gemelli Against Covid-19 Post-Acute Care Study Group. Persistent Symptoms in Patients after Acute Covid-19. *JAMA* 2020; 324(6): 603–605. DOI: 10.1001/jama.2020.12603
77. Worldometers.info [homepage on the Internet]. United States. Worldometer Covid-19 Data. [Last updated: October 29, 2020, 13:49 GMT; cited 2020 Oct 28]. Available from: <https://www.worldometers.info/coronavirus/country/india/>
78. Moldofsky, H., Patcai, J. Chronic widespread musculoskeletal pain, fatigue, depression and disordered sleep in chronic post-SARS syndrome; a case-controlled study. *BMC Neurol* 2011; 11, 37. <https://doi.org/10.1186/1471-2377-11-37>
79. Amin H, Sharma R. Nootropic efficacy of Satwavajaya Chikitsa and Ayurvedic drug therapy: A comparative clinical exposition. *International Journal of Yoga* 2015 Jul-Dec; 8(2): 109-116. DOI: 10.4103/0973-6131.158473.
80. Rawal P, Vyas M, Baghel AS, Kamble S. Efficacy of Satwavajaya Chikitsa in the form of relaxation techniques and Guda Pippalimula Churna in the management of Anidra (insomnia) - An open labelled, randomized comparative clinical trial. *Ayu* 2019; 40(2): 89-96. DOI: 10.4103/ayu.AYU_91_17
81. Shreevathsa M, Ravishankar B, Dwivedi R. Anti depressant activity of Mamsyadi Kwatha: An Ayurvedic compound formulation. *Ayu* 2013; 34(1): 113-117. DOI: 10.4103/0974-8520.115448
82. Deole YS, Chavan SS, Ashok BK, Ravishankar B, Thakar AB, Chandola HM. Evaluation of anti-depressant and anxiolytic activity of Rasayana Ghana Tablet (A compound Ayurvedic formulation) in albino mice. *Ayu* 2011; 32(3): 375-379. DOI: 10.4103/0974-8520.93918
83. www.timesofindia.indiatimes.com Covid-19: PM Narendra Modi asks citizens to follow these seven steps. The Times of India, (Updated 2020, April 14, cited 2020 August 16). Available from: <https://timesofindia.indiatimes.com/india/from-caring-for-elders-to-honouring-frontline-staff-pm-narendra-modi-seeks-peoples-support-in-seven-areas/articleshow/75134524.cms>
84. www.ayush.gov.in Ministry of AYUSH (March 2020). Advisory from Ministry of AYUSH for meeting the challenge arising out of spread of corona virus (Covid-19) in India. Available from: <https://www.ayush.gov.in/>
85. www.ayush.gov.in Ministry of AYUSH (March 2020). Ayurveda immunity boosting measures for self care during Covid 19 crisis. Available from: <https://www.ayush.gov.in/>
86. www.ayush.gov.in Ministry of AYUSH, Government of India. Interdisciplinary AYUSH Research and development task force – Guidelines for AYUSH clinical studies in Covid-19. (2nd April – 2nd May 2020) Available from: <https://www.ayush.gov.in/>
87. www.health.ncog.gov.in/ayush-covid-dashbaord/home Ministry of AYUSH. Tentative Proposed list of activities. Available at https://health.ncog.gov.in/ayush-covid-dashbaord/assets/Classified/Research_studies.docx

Cite this article as:

Abhishek Upadhyay and Meghna Vaidya. Ayurveda for Prevention, Prophylaxis and Management of Covid-19: A Review. *Int. J. Res. Ayurveda Pharm.* 2020;11(6):112-118 <http://dx.doi.org/10.7897/2277-4343.1106197>

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: IJRAP is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publishing quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IJRAP cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of IJRAP editor or editorial board members.