



ISSN 2456-3110

Vol 7 · Issue 1

Jan-Feb 2022

Journal of
**Ayurveda and Integrated
Medical Sciences**

www.jaims.in

JAIMS

An International Journal for Researches in Ayurveda and Allied Sciences



Maharshi Charaka
Ayurveda

Indexed

Ayurvedic interpretation and management of Covid-19 and Post Covid Symptoms

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ABSTRACT

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). Despite worldwide efforts to contain it, the pandemic is continuing to spread because of nonspecific drugs trial and still the exact medicine is yet to discovered. Ayurveda an ancient science has already described the pandemic with reference to *Janapadodhwamsa* along with its prevention and cure with reference to *Aupsargika-Rogas*. All kinds of *Jwara* are mentioned in our Ayurvedic classics with details of patho-physiology and management. Thus, Covid-19 whose main manifestation is *Jwara* can be managed and prevented by following the Ayurvedic daily regimen and treatment protocols which lessens the bad prognosis of Covid-19 thereby preventing the Post Covid Symptoms. Covid-19 can be managed by the treatment protocol mentioned in *Jwara-Chikitsa*, *Janapadodhwamsa*, *Aupsargika Rogas* while the Post Covid Symptoms can be managed by *Jirna Jwara Chikitsa* along with different forms *Rasayana* based on feasibility. *Rasayana Chikitsa* works well in the preventive as well as curative in both Covid-19 and Post Covid Symptoms. Role of *Panchakarma* in Covid-19 and Post Covid Symptoms has a special place in treating the *Strotodushti* of various level mainly the *Pranavaha Strotas*. *Vyadhikshamatva* and *Agni* play an important role in developing Covid-19 and Post Covid Symptoms therefore, attention should be given to increase the *Vyadhikshamatva* and maintain the optimum power of *Agni* of the public health. In this way Covid-19 infection is prevented thereby minimizing the further health hazards. Therefore, Ayurvedic principles should be adopted to prevent and manage the Covid-19 infection by interpreting the elements of patho-physiology in Ayurvedic perspective so as to plan an effective management protocol and to recover the *Swasthya*.

Key words: Covid-19, Post Covid Symptoms, Jirna Jwara, Vyadhikshamatva, Agni

INTRODUCTION

A Coronavirus is a kind of common virus that primarily causes respiratory infection. Most Coronaviruses are not dangerous. In early 2020, after a December 2019 outbreak in China, the World Health Organization

identified SARS-COV-2 as a new type of Coronavirus. The outbreak quickly spread around the world. The WHO has declared the coronavirus disease 2019 (Covid-19) a pandemic. Covid-19 is a disease caused by SARS-CoV-2 that triggers respiratory tract infection. It affect upper respiratory tract (sinuses, nose, and throat) and lower respiratory tract (windpipe and lungs).^[1]

Coronaviruses are a family of viruses known for containing strains that cause potentially deadly diseases in mammals and birds. In humans, they are typically spread via airborne droplets of fluid produced by infected individuals.^[2]

The Covid-19 outbreak has brought the number of identified coronaviruses that infect humans to seven. Four of these are community acquired and have circulated through the human population continually for a very long time. The four community-acquired

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Submission Date: 26/12/2021 Accepted Date: 27/01/2022

Access this article online

Quick Response Code



Website: www.jaims.in

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human Corona viruses typically cause mild cold-like symptoms in humans. Two of them, hCOV-OC43 and hCOV-229E, have been responsible for between 10% and 30% of all common colds since about the 1960s. Three of these (SARS-COV, MERS-COV and SARS-COV-2) appear to have jumped to the human population more recently. Worryingly, these three results in a high mortality rate.^[3]

All Coronaviruses are zoonotic. They start off in animals and can then, following mutation, recombination and adaptation, be passed on to humans. It has been determined that MERS-COV was transmitted from dromedary camels to humans and SARS-CoV from civet cats to humans. The source of the SARS-COV-2 (Covid-19) is yet to be determined, but investigations are ongoing to identify the zoonotic source to the outbreak.^[4]

Fundamentally, Ayurveda classifies diseases as *Nija* (from Intrinsic Causes), *Agantuja* (Extrinsic causes) and *Manasa* (Psychosomatic). The concept of pathogenic agents is interpreted in terms of *Agantuja Karana* and infectious disease caused by it is called *Agantuja Vyadhi*.^[5] *Jwara* (Hyperthermia) is cardinal symptom in many of the infectious diseases.^[6]

The initial stage of Covid-19 is exogenous (*Agantuja Jwara*) disease which later converts into systemic (*Nija Jwara*) disease.^[7] *Chakrapanidatta* clarifies that *Bhuta* means *Vishakrimi* or a virulent organism;^[8] *Krimi* may be *Sahaja* (natural) or *Vaikarika* (pathogenic) organisms that may be visible (macroscopic) or invisible to the naked eye (microscopic).^[9] Hence SARS-COV-2 comes under *Vaikarika Krimi. Abhishangaja Jwara* which is one of the forms of *Agantuja Jwara* is the term for those caused by the contact of the poisonous air or toxic plants or other such toxins (*Visha*).^[10] However, this *Abhishangaja Jwara* later may complicate with involvement of multiple tissues and organs. Thus, *Abhishangaja Jwara* can be correlated with Covid-19.

Janapadodhwamsa is an Ayurvedic term for epidemics or pandemics. In Ayurvedic literature, the communicable diseases are mentioned under *Janapadodhwamsa* i.e., communicable diseases

affecting an entire country or the whole world. *Janapada* refers to particular geographic consideration. Impairment of *Vayu* (air), *Udaka* (water), *Desha* (land), and *Kala* (season) and are more lethal in their consecutively increasing order. *Adharma* (unrighteousness) is the root cause of vitiation of all factors and is led by *Pragyaparadh* (intellectual error).^[11] Interestingly there is mention of an epidemic fever with respiratory system presentation (fever, cough, breathlessness, rhinorrhoea, headache and even anosmia) caused by entry of pathogenic agent through the nasal passages.^[12] *Dalhana* in his commentary has mentioned that symptoms like anosmia, cough, catarrh will occur after the entry of contaminated air through the nasal opening which is similar to typical clinical features of Covid-19.^[13] This clinical presentation by *Sushrut* is amazingly analogous to epidemics/pandemic like SARS, MERS, Swine Flu and even Covid-19 as *Janapadodhwamsak Roga*. Contagious diseases and means of contagion as physical contact, inhalation, eating together, sleeping, sitting together and sharing used linens and garlands are well discussed under *Aupsargika Vyadhis* like *Kushtha, Jwara, Shosha* and *Netra-Abhishyanda* by *Sushruta*.^[14] Thus, Covid-19 can also be considered as *Aupsargika Vyadhi*.

From above explanation, Covid-19 disease can be interpreted as *Agantuja Jwara, Abhishangaja Jwara, Janapadodhwamsak Roga* and *Aupsargika Vyadhi*.

Immunity level plays an important role in Covid-19 disease because of its different prognosis gradation. It is found that patients with comorbidities tend to have low immunity level suffer more than the healthy individual. Strength, health, lifespan, and vital breath are dependent on the condition of *Agni*.^[15] Charaka has mentioned the term *Vyadhikshamatva* and states that during certain conditions, or due to certain factors, even unwholesome (unhealthy) food does not produce disease immediately; all unwholesome diet are not equally harmful, all *Doshas* are not equally powerful, all persons are not capable of resisting diseases.^[16] This suggests that the body's immune system plays a crucial role in disease development. The equilibrium state of *Dhatu* is called *Swasthya*.^[17] The person who is

desirous to be healthy should adopt healthy practices related to diet, conduct, and activities.^[18] Thus, immunity can be considered in Ayurveda as *Vyadhikshamatva* and *Ojas (Sarvadhata Sara)*; which depends on the condition of *Agni, Dosha, and Dhatu*.

Vijayrakshit has classified *Hetu* as *Utpadaka Hetu* and *Vyanjaka Hetu*. *Utpadaka Hetu* is those which favour accumulation of respective *Dosha* in respective season due to seasonal effect. For example: in *Hemanta Ritu* due to indulgence of *Madhura Rasa*, accumulation of *Kapha* is observed. *Vyanjaka Hetu* is those which stimulate the development of diseases. For examples: accumulated *Kapha* in *Hemanta Ritu* produces disorders of *Kapha* in *Vasanta Ritu* due to effect of the Sun. Here effect of the Sun is the *Vyanjaka Hetu*.^[19] Similarly, SARS COV-2 can be better interpreted as *Vyanjaka Hetu* (etiological factor acting at time of genesis of disease), whereas *Utpadaka Hetu* are etiological factors which disturbs *Vyadhikshamatva* and *Ojas*, by mainly faulty diet and lifestyle leading to accumulation of *Dosha*. In Ayurvedic conceptualization; accumulated *Doshas* makes the body susceptible to disease. Even in an exogenous disease, there is involvement of *Dosha* and the role of *Agni* in prognosis of disease. As Covid-19 prognosis is associated with comorbidities like HTN, CVA, Diabetes Mellitus, Obesity, IHD, etc, this concept of *Utpadaka Hetu* becomes important. When these *Hetus* are consumed or are found, *Doshas* get aggravated and will tend to move into a *Kha-Vaigunya* (Defective Space) of *Dhatu*. If the *Dhatwagni Bala* is weak, vitiated *Doshas* favours pathogenesis (i.e., *Dosha-Dushya Sammurcchana*) leading to Covid-19.^[20]

Dwandwaja or *Sannipatika* is an *Avastha* with vitiation of two or all three *Doshas* in the pathogenesis. *Agantuja* varieties of any diseases may complicate into *Dwandwaja* or *Sannipatika* state with severe prognosis depending upon the presence of harshness of *Utpadaka Hetu*.^[21] The viral or bacterial fevers, along with malignancy, auto immune diseases, etc. are needed to be considered as *Sannipatika* state. In Covid-19, primary manifestations are seen at *Pranavaha Strotas* as virus enters through nasal passage. When all the three vitiated *Doshas* gets involved in the *Dhatu*,

it results in *Sannipatika Avastha* of Covid-19. Following are the symptoms of *Sannipatika Avastha* of *Abhishangaja Jwara* that can be co-related with Covid-19.^[22]

SN	<i>Sannipatika Avastha of Abhishangaja Jwara</i>	Covid-19
1.	<i>Jwara</i>	Fever
2.	<i>Kasa</i>	Dry cough
3.	<i>Tandra Moha</i>	Tiredness
4.	<i>Asthi-Sandhi Ruja</i>	Joint aches and pain
5.	<i>Kantha Shukai Aavrut</i>	Sore throat
6.	<i>Alpa Mala-Mutra Pravritti, Ati Mala Pravritti (Vagbhat)</i>	Diarrhea
7.	<i>Sa Strave Kalushe Rakte Lochane</i>	Conjunctivitis
8.	<i>Shiro-Ruja</i>	Headache
9.	<i>Aruchi</i>	Loss of taste or smell
10.	<i>Kothanam Shyava Raktanam Mandalanam Cha Darshanam</i>	Skin-Rashes
11.	<i>Hridi Vyatha</i>	Chest pain
12.	<i>Mukatva, Swarasaad (Vagbhat)</i>	Loss of speech
13.	<i>Shwasa</i>	Breathlessness

It is difficult to co-relate Covid-19 with specific Ayurvedic terminology but, while interpreting the disease on the basis of *Samprapti Ghatak* by considering the causative agent and the clinical features mentioned above can be contemplated as an *Agantuja Vyadhi* which later on due to the involvement of *Nija Dosha* (faulty diet and lifestyle) develops to *Nija Vyadhi* as *Vata Kapholbana Hina Pitta Sannipataja Jwara* (Severe *Vata* and *Kapha* with mild *Pitta*).^[23]

While talking about the *Samanya Samprapti* of *Jwara*, *Charak* mentioned that when *Vataadi Dosha* either singly or in *Sansrista* (2 *Doshas*) or in *Sannipataja* (all 3 *Doshas*) get aggravated then it enters *Amashaya* and

mixed with *Rasa Dhatu* causing obstruction of *Agni*; *Agni* then spreads out from its *Sthana* to whole over the body causing febrile condition.^[24] Hence, pathogenesis of Covid-19 can be explained by considering the entry of Corona virus resulting in *Agantuja Abhishangaja Jwara* which later converts to *Nija Abhishangaja Jwara* by involvement of either 2 or 3 aggravated *Doshas* on the basis of *Utpadak Hetu Sevan*. These aggravated *Doshas* further travels to Gastro-Intestinal (GI) tract where the toxins released by Corona virus are absorbed into systemic circulation and fever results. Although the Covid-19 is typically an airborne infection, the massive expression of its receptor, Angiotensin Converting Enzyme type 2 (ACE2) throughout the GI tract, the identification of virus in the surface epithelial cells of the stomach, small intestine and the colon, can involve the GI tract symptoms like anorexia, diarrhoea and shedding of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in faeces.^[25]

Strotas means channels which are present all over the body through which nutrients i.e., *Rasadi Dhatus* are transported in and out. When the flow of appropriate nutrients and energies through these channels is unobstructed, there is health; when there is excess, deficiency, or blockage in these channels disease occurs (*Strotodushti*).^[26] Therefore, Covid-19 patients may show involvement of *Strotodushti Lakshana* in the following ways-

- *Pranavaha - Kupitam Shwasam* ^[27] (difficulty in breathing)
- *Annavaha - Aruchi, Avipaak* ^[27]
- *Rasavaha - Aruchi, Aasyavairasya, Tandra, Angamarda, Jwara, Sada* ^[27]
- *Raktavaha - Kothastramandalam, Raktapitta* ^[27]
- *Mamsavaha - Myalgia, Myositis* ^[28]
- *Medovaha - Higher level of visceral fat (Adiposity), intramuscular adipose tissue is shown to contribute to physical impairment, enhancement of insulin resistance and increased the risk of negative health-related events.* ^[29]

- *Asthi - Majjavaha - Asthi-Shoola* ^[27]
- *Shukravaha Strotas* – affects seminal inflammatory mediators, antiviral therapies for Covid-19 may have additional harmful consequences on male fertility.^[30]

Marmas are the vital areas of the body. The word *Marma* comes from Sanskrit word “*Mri*” meaning death. By definition, a *Marma* point is a junction on body where two or more types of tissue meet, such as muscles, veins, ligaments, bones or joints. *Marmas* are the seats of *Jeeva* or life. This means to tell that *Marmas* are important points where life elements exist.^[31] Covid-19 is said to cause Pneumonia/Acute Respiratory Distress Syndrome (ARDS)/Cardiac failure/Disseminated Intravascular Coagulation, etc which may result into death. Since Acute Respiratory failure is a mode of death in Covid-19^[32] by affecting *Fuffusa* and *Hridaya* which comes under *Marmas* shows that in severely bad prognosis or other pre-existing comorbid conditions, such as COPD, Bronchial Asthma, Chronic Bronchitis, IHD, Cancer and DM increases the risk of developing complications by affecting *Marmas* are considered as the underlying cause of death. Thus, symptoms or complications which manifest in Covid-19 stated from the Ayurvedic classics imply Covid-19 as multi-systemic disease.

While talking about *Vishesh Samprapti* of *Agantuja Abhishangaja Jwara*, initial pathogenesis is of *Agantuja* (exogenous) *Jwara* and later converts to *Nija Jwara* thus exhibit symptoms of *Rasavaha Strotodushti* i.e., tastelessness, headache, nausea, body ache.^[27] This is followed by symptoms of *Pranavaha* due to same *Moolasthana* of *Rasavaha Strotas* and *Raktavaha Strotodushti* due to *Uttarottar Strotodushti*.^[33] As we all know that *Prana Vayu* and *Udana Vayu* primarily function at *Pranavaha Strotas* i.e., *Urasthana*,^[34] which when get affected *Prana Vayu Dushti* and *Udana Vayu Dushti* results. *Vitiated Prana Vayu causes disease like Shwasa, Pratishtyaya, Swarabheda, Kasa* etc. *Udana Dushti* is evident as there is extreme loss of *Bala* ^[35] i.e., deterioration of immune response, speech related symptoms in few. *Raktavaha Strotodushti* is also evident from

coagulopathies and extremity discolorations. Fatal complications are possible because 'Prana' (vitality or oxygen) follows 'Rakta' (blood). In Ayurveda, embryological point of view, *Fuffusa* (lungs) are made from froth of blood i.e., *Rakta Phenodhbhava Fuffusa*.^[36] In respiratory mechanism Ayurveda considers the cardiopulmonary unit as a whole without differentiating heart and lungs. *Mahasrotas* (Gastro-Intestinal Tract) is also associated with *Pranavaha Strotas* as *Moolasthanas*.^[37] When pathogenesis get worsened, it later involves heart and kidney which are considered as third 'Roga Marga' i.e., *Marma-Asthi-Sandhi Marga* (disease pathway).^[38]

In Ayurveda, haematuria is seen as associated symptom under *Kasa-Roga* i.e., *Kshayaja Kasa*^[39] indicating involvement of urinary system as complication of respiratory pathologies. Pathogenesis worsens or complicates depending upon the *Kha-Vaigunya* i.e., the site or organ affected like in ARDS, or in individuals who are having involvement of *Marma* like Heart or Kidney. *Kshayaja Kasa* means cough produced by destruction of body tissues (*Dhatu-Kshaya*). This condition is said to be caused by aggravation of all three *Doshas* and is dreadful in nature.

In *Kshayaj Kasa*, there are symptoms which mimic Covid-19 like chest pain, runny nose, anorexia, fever, weakness (asthenia) inspite of good appetite, disturbed bowel function and slurred speech.^[40] Hiccup, dyspnoea, cough and complications in vital organs are symptoms when pathogenesis of *Majja Dhatu Gata Jwara* occurs.^[41] Thus, the later stage of Covid-19 with aggravated immune response indicates invasion of *Jwara* in *Uttarottar Dhatu*.

Presently, there is no cure for the disease and the treatment is symptomatic. In some countries, patients are being treated using existing combinations of antivirals used for other viral infections. Clinical evidence explaining the efficiency of these antivirals against SARS-COV-2 are limited and not defined. Traditional medicine systems such as Ayurveda, have a holistic approach of considering mind-body-physiology to deal with disease conditions.

Enhancement of immunity plays an important role in maintaining optimum health and preventing such communicable diseases. Ayurveda's insights of preventive care are based on the concepts of "Dinacharya" (daily regimes) and "Ritucharya" (seasonal regimes). These help in maintaining health, immunity and longevity. *Panchakarma* (bio-purification) and *Rasayana* (immunomodulators) can be planned for people in the risk-prone areas to improve immunity and minimize the risk of infection. It is noted that certain viral infections occur in a specific period of the year when either the weather is favourable for viral potency or there are potent vectors to primarily infect individuals with low immunity.

The word '*Rasayana (Rasa & Ayana)*' refers to nutrition and its transportation in the body for attaining excellent *Rasadi Dhatus*; which leads to gain longevity, freedom from disorders, optimum strength of physique and sense organs.^[42] *Rasayana* promotes nutrition by explicitly enriching the nutritional value of *Rasa* by enhancing *Agni*, i.e., digestion, metabolism, and absorption (by *Strotashodhana*). Consequently, any medication that improves *Rasa's* consistency would enhance the health of all body tissues. The Ayurvedic philosophy suggests delivering "a group of phytoconstituents" that holds potential to give adaptogenic, immunomodulatory effects and also act on drug targets. Thus, in Ayurveda *Rasayana* botanicals are used for rejuvenation by boosting the immune system and alleviating disease condition. Of several known botanicals *Asparagus racemosus* (AR) commonly known as *Shatavari*, *Tinospora cordifolia* (TC) known as *Guduchi* and *Withania somnifera* (WS) known as *Ashwagandha*, are known to modulate the immune system and possess antiviral activities. The ideal Covid-19 therapy should show (a) antiviral properties against SARS-COV-2, (b) be safe for concomitantly administered drugs like anti-hypertensive, anti-diabetic, antiasthmatics, and drugs those are used in respiratory tract infections (c) should modulate immune system with rejuvenation ability (mainly for cardio-respiratory and nervous system) (d) should show therapeutic adjuvant activity with drugs used in WHO Solidarity trials. An Ayurvedic

intervention can be made to fulfil these criteria when used judiciously.

A total of 31 major phytoconstituents are identified from *Withania somnifera*, *Tinospora cordifolia* and *Asparagus racemosus*. Clinical application of *Rasayana* botanicals is important in prophylaxis because of their potential in inhibiting the replication of SARS-COV-2 by increasing *Vyadhikshamatva*. Thus, these botanicals can also be used as adjunct or mainstream treatment for Covid-19 when the disease is manifested with its symptom. The activities on immune mechanisms provide a sound logic for use of these botanicals in treatment. Some of the phytoconstituents have a possible role in arresting disease progression and preventing organ failure by reducing inflammatory responses.^[43]

High mortality among immune-compromised and those with some underlying pathology implies that the factors that improve *Vyadhikshamatva* can prevent serious manifestations due to Covid-19 infection. Considering the importance of immunity boosting measures in the wake of Covid-19 outbreak, the Ministry of AYUSH, Government of India with the interest of health promotion of the masses, recommends 'Ayush Kvatha' or 'Ayush Kudineer' or 'Ayush Joshanda' which comprises of four medicinal herbs like Holy Basil, Cinnamon, Ginger, Black Pepper are highly available, accessible and widely used in the kitchen and are convenient to educate and train about its use to community health workers, community and even to all public that they can have cost-effective treatment with herbal home remedies. Thus, *Ayush Kvatha* due to its immunomodulatory, anti-viral, anti-oxidant, anti-inflammatory, anti-platelet, anti-atherosclerotic, hepato-protective, reno-protective properties; seems to be effective in immune regulation for controlling viral infection like Covid-19.^[44]

When the *Rugna Bala* experiencing *Kshayaj Kasa* is fair or moderate, *Brumhana* and *Dipana Chikitsa* can be administered to promote *Jatharagni Bala*. If there is severe accumulation of *Doshas*, the patient should be given *Snigdha Mrudu Virechana*. Also, there is a reference of *Mamsa-Rasa* administration orally.

Because of its *Ushna* and *Pramathi Guna*, it eliminates the *Leena Dosha* stuck in the *Strotas* thus purifying the channels of the body. When the channels get cleansed, the nutritive juice flow easily throughout the body (*Rasa-Samhanan*) and nourish all the tissues which have got depleted in the process of Covid-19.^[45]

Ayurveda and Yoga can certainly play a pivotal role to augment preventive measures provided in the guidelines by Ministry of Health and Family Welfare (MoHFW). The current understanding of Covid-19 indicates that good immune status is vital to prevention and to safeguard from disease progression.^[46]

The Covid-19 symptoms last for 7 to 14 days. However, a significant proportion of patients have been found to remain unwell at post-discharge follow-ups. Post Covid-19 syndrome is defined as (1) persistence of illness signs and symptoms (except fever, respiratory distress, and hypoxia) after viral clearance (negative real time-polymerase chain reaction [RT-PCR] results for Covid-19 at day 14 after initial positivity) or meeting the World Health Organization (WHO) clinical criteria of improvement,^[47] including no fever for >3 days, improved respiratory symptoms, pulmonary imaging showing obvious absorption of inflammation, and no hospital care needed for any pathology or clinician assessment; (2) fresh development of symptoms within a month after initial clinical and virological cure, the aetiology of which is postulated to be a viral infection (occurring after recovery); (3) exaggeration of previously experienced chronic disease, such as migraine, mental disorder, bronchial asthma, and rheumatologic disorders, within a month after initial recovery from Covid-19.^[48]

The incidence of post-Covid-19 syndrome is 46%. The median (IQR) interval between the recovery and development of post-Covid-19 symptoms was 7 (5–10.5) days. Covid-19 symptoms persisted beyond recovery in approximately 17% cases, whereas they developed after 7 days of recovery in 43% cases. In total, 105 (30%) patients show at least one post-Covid-19 symptom, while 57 (16%) patients showed multiple symptoms. Post-viral fatigue was the most prevalent

feature (117 [33%]). Other features included persistent cough (8.5%), post-exertional dyspnoea (7%), headache (3.4%), vertigo (2.3%), and sleep-related disorders (5.9%).^[48]

Although the literature on Post Covid symptoms is still in its earlier stages, “long-haulers” report a plethora of symptoms affecting different systems: neurocognitive post-Covid (brain fog, dizziness, loss of attention, confusion), autonomic post-Covid (chest pain, tachycardia, palpitations), gastrointestinal Post-Covid (diarrhoea, abdominal pain, vomiting), respiratory post-Covid (general fatigue, dyspnoea, cough, throat pain), musculoskeletal post-Covid (myalgias, arthralgias), psychological-related post-Covid (post-traumatic stress disorder, anxiety, depression, insomnia), and other manifestations (ageusia, anosmia, parosmia, skin rashes). In fact, most published studies to date on Post-Covid symptoms have found that 50–70% of hospitalized patients exhibit several post-Covid symptoms up to 3 months after hospital discharge.^[49]

In Ayurveda, Post Covid Syndrome can be correlated with *Jirna Abhishangaja Jwara* which lasts for more than 21 days.^[50] Although Covid-19 patient is tested negative after 14 days, vitiated *Doshas* (i.e., virus) are present in *Leena Avastha* resulting in *Daurbalyata* in *Deha Dhatu*.^[51]

People with severely vitiated *Doshas* and fever when treated with aggressive management results into *Dosha-Pak* and fever subside suddenly leaving behind Post Covid Symptoms (*Daruna Moksha*).^[52]

Thus, there will be *Dhatu-Kshaya* and *Agnimandya Avastha* in Post Covid-19 Syndrome where *Dhatuposhana* and administration of *Rasayana* drugs like *Amalaki*, *Guduchi*, *Draksha* for at least 45 days can be given to combat the residual effects of the virus on the body. *Vishaghna Chikitsa* with *Shirisha* or *Haridra Churna* is suggested after clinical recovery. *Deepana Pachana* drugs like *Shadanga Paneeya* may be used in case of vomiting, diarrhoea or loss of appetite.

Rasayana Dravya acts on micro and macro cellular level with reference to *Rasa*, *Agni* and *Strotas* followed by required *Shodhana Chikitsa* improving digestion,

metabolism, micro-circulation and tissue perfusion resulting in nourishment of good quality of *Saptadhatu* which further provides the rewarding properties of *Rasayana* like longevity, strong immunity, mental competence, etc. *Rasayana* improves overall *Agni* produces *Uttama Ahara Rasa* making *Uttama Rasa Dhatu* nourishing the further *Dhatu*s achieving *Saptadhatu Sarata* and *Prakrut Kapha Dosha* enhances the *Ojas* in terms of similar *Panchabhautik* properties. *Ajastrik*, *Naimittik*, *Kamyā* and *Vatatapik* are the forms of *Rasayana* which are taken internally while external employment of *Achara Rasayana* and *Sadvritta Palana* helps to prevent *Pradnyaparadha* induced *Vyadhis* as *Pradnyaparadha* create *Adharma* which is said to be the root cause of *Janapadodhwamsa*.^[53]

Ministry of Health & Family Welfare, Directorate General of Health Services (EMR Division) has issued Post-Covid management protocol which includes Immunity promoting AYUSH medicine like *Ayush Kwatha*, *Samshamani Vati* or *Guduchi Churna*, *Ashwagandha Churna* daily for 15 days and *Amalaki* fruit one daily/*Amalaki Churna*. *Mulethi Churna* (in case of dry cough) with lukewarm water twice daily. Warm Milk with ½ teaspoonfuls *Haldi* (turmeric) in morning/evening. Gargling with warm water containing turmeric and salt. It is also suggested by the Ministry of AYUSH that the use of *Chyawanprash* is highly recommended (under the direction of Registered Ayurveda physician) as in the clinical practice It is believed to be effective in post-recovery period. Daily practice of *Yogasana*, *Pranayama* and Meditation, as much as health permits or as prescribed/ Breathing exercises as prescribed by physicians. Diet has a very important role in the management of Post Covid-19 and it should be *Shadrasatmaka* (with all six tastes) and may include ginger, turmeric, pepper, cinnamon, *Amla* (*Indian gooseberry*), mint in their diet to boost immunity.^[54]

Depending on the condition of *Dhatu* and *Dosha*, *Shamana* in the form of *Brumhana Chikitsa* can be adopted to restore the function of *Tridosha*. Beside this, *Satvavajaya Chikitsa* (ayurvedic psychotherapy), *Sadvritta*, and *Achara Rasayana* (behavioural therapy) can play an important role to manage Post Covid

Symptoms. These are the non-pharmacological approach aimed to maintain mental health. Regular practice of *Yogasana* and *Pranayama* with *Achara-Rasayana* is useful for mental stability. *Rasayana* like *Chyawanprash*, should be given in respiratory tract illnesses like *Kasa*, *Shwasa*. It improves the retention power, intelligence, provides *Aarogya* (disease free state), longevity, and improves *Uro-Roga* (diseases of chest region), *Hrid-Roga* (diseases of heart) etc. *Pippali Rasayana* is said to be best for *Kasa*, *Gala-Roga* (diseases of the throat), *Vishama-Jwara* (fever with irregular nature, action, and time of onset).

The transmission of virus occurs in the form of air droplets through eyes, nose and mouth. *Shira* (*Mastishka*), *Netra*, *Karna*, *Mukha*, *Kantha* and *Nasika* are collectively called them as *Urdhvajatru*. *Urdhvajatrugata Rogas* and their management have a special place in Ayurveda. *Shira* (Brain) being the prime seat of knowledge and also the prime controller of the entire body has been termed as '*Uttamanga*'. Hence the diseases occurring in the *Urdhvajatru* have been very clearly highlighted in the Ayurvedic classics along with their management. *Nasa* is considered to be that *Indriya*, whose functions are not only limited to respiration but it is considered as a pathway for drug administration. This special procedure is called *Nasya*.

Nasya Karma also acts on *Shukra Dhatu*; hence this procedure has importance in *Pumsavan-Sanskar*. Thus, showing the strong relationship between *Ghranendriya* and *Prajanana Indriye*.^[55] Covid-19 can impair male fertility with alterations in sperm morphology and DNA integrity could be a major Post Covid-19 Complication in men.^[56] Therefore, *Nasya Chikitsa* can be administered to prevent infertility.

Sharangdhara has classified *Nasya* according to the functions into two groups viz. *Rechana* and *Snehana*. *Snehana Nasya* is subdivided into *Marsha* and *Pratimarsha Nasya*.^[39] *Marsha* and *Pratimarsha Nasya* both consist of administration of oil through the nostrils. It is well tolerated and is very much convenient procedure. *Marsha* and *Pratimarsha* are same in principle, but the main difference between them is of

dose. In *Pratimarsha Nasya* 1-2 drops are given while in *Marsha Nasya* the dose is 8/16/32 drops.

Marsha Nasya may cause side effects (*Vyapada*) but it gives quick result and hence it is more effective in aggravated vitiated *Doshas* where the *Vyadhi Bala* is at peak.

Pratimarsha Nasya can be given daily and even in all the seasons at morning and evening. It is given by dipping the finger in the required *Sneha* then dropping it in each nostril. The patient is advised not to sniff the *Sneha* given in the form of *Nasya*. The *Sneha* should at least reach from nose to gullet, but it should not be too much to produce secretion in the gullet. *Pratimarsha* can be given in any age, any season and even in *Akala*. i.e., in *Varsha* and *Durdina*. It can be given to *Bala*, *Vridhdha*, *Bhiru* and *Sukumara* patients. It is contraindicated in *Dushta Pratishtaya*, *Bahudosha* and *Krimija Shiroroga* and also in *Madhyapi* (Drunkers habitual), *Badhira* (deafness) and the persons having *Utklishta Doshas*. It should not be given to them because as *Sneha Matra* is quite insufficient to eliminate *Doshas* and already aggravated *Doshas* may get vitiated further.

Jirna Jwara Rugna who are experiencing *Shirogaurava*, *Shir-shoola*, *Vibaddha-Indriye* (lose/reduced normal functions of sense organs) can be given *Ruchikara Shiro-Virechana*.^[57]

Orally intake of medicated ghee called as *Ghritapana Chikitsa* can be given to *Jirna Jwara Rugna* in *Shamana Matra* decided by *Jatharagni Bala*. *Charak* has mentioned *Pippalyadi Ghrita*, *Vasadi Ghrita* as *Jirna-Jwaraghna*.^[58]

Anuvasana Basti can be administered in *Jirna* or *Purana Jwara*, where *Kapha-Pitta Doshas* are decreased, *Jatharagni* is *Balwana* along with *Ruksha-Baddha Purisha* (constipation).^[50]

When vitiated *Doshas* are present in *Pakvashaya*, *Jwara-Nashaka Niruha* and *Anuvasana Basti* is given.

In any airborne disease, *Dhupana Chikitsa* (Medicinal Fumigation) is used to purify the environment from infectious viruses around the patient. It helps in pacifying the *Doshas* present in *Twak Dhatu*. Similarly,

Dhumapana (Inhalation of medicated fumes through the nose) can be used for *Urdhvajatru-Gata Vyadhis* especially *Vata-Kaphaj*.^[59]

Anjana is said as *Drikbalam* i.e., strengthens the eyesight. *Anjana* (Collyrium) is the procedure of applying medicinal pastes or liquid to the inner side of the lower lid, either by fingertip or with applicator (*Anjana Shalaka*). It contains *Chakshushya drugs* which are useful in curing and controlling the progression of disease and improve the eyesight as well. Therefore, *Anjana* can be used in *Jirna Abhishangaja Jwara* to pacify and prevent ophthalmic infection and complications.

Jirna Abhishangaja Jwara may be managed by *Balya* and *Brumhana Chikitsa* by means of food and medicines as mentioned by Charak.^[60] Milk, is one of the most important foods to promote *Ojas* because of their similar ten *Gunas*. Milk is also the most suitable diet in all types of *Jirna Jwara* given in the form of *Dugdhapana*.^[61] Heating the milk with added water makes it lighter to digest, process called as *Kshirpaak*. It reduces the heaviness of the milk and reduce *Kapha Vardhak* side effects. *Dravyas* having properties of *Balya* and *Brumhana* like *Aswagandha*, *Shatavari*, *Bala* etc. can be added to *Kshirpaak Vidhi* acting as both food and medicine.

In *Jirna Jwara*, there is also the mention of *Bahyopchar* to reduce the temperature of the body with respect to causative factors. For example, *Ushna Bahyopchar* in case of *Shita Hetu Sevan* and vice versa.^[62]

Thus, the role of prevention of Covid-19 plays an important role in the management of Covid-19 and Post Covid Symptoms with the help of Ayurvedic management mentioned in classics. The body's resistance is of tremendous importance in the daily welfare of living beings not only for disease prevention but also for rapid recovery after disease affliction therefore, Ayurveda propounds that prevention is an equally important aspect of disease management as cure and thus, strengthening the immune system, is a natural way to help the body fight against the disease-causing pathogens with the help of Ayurveda to maintain *Swasthya*.

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How to cite this article: Shweta Deolekar, Ashish Thatere, Prakash Kabra. Ayurvedic interpretation and management of Covid-19 and Post Covid Symptoms. J Ayurveda Integ Med Sci 2022;1:119-129.

Source of Support: Nil, **Conflict of Interest:** None declared.
