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An integrative approach of SARS-CoV-2 through Ayurveda

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ABSTRACT

Coronavirus disease (COVID-19) is an infectious disease caused by SARS-CoV-2 and WHO declared the SARS-CoV-2 outbreak as a Public Health Emergency of International Concern (PHEIC). COVID-19 has become a global health threat. Till now COVID has affected large number of populations of world and still new variants affecting human's life. The scientists worldwide are striving vigorously to discover the etiology, spread, and pathogenesis of new COVID-19 disease and pragmatic approach of this knowledge for the development of standard drugs as well as treatment protocols for its successful management. The present review study is to formulate the pathogenesis of COVID-19 in the light of Ayurveda through an integrated approach. The COVID-19 pandemic is considered as one type of *Janapadodhwamsa* mentioned in *Charak Viman Sthan*. In Ayurveda, the microbial infection can be elucidated in the terms of *Bhuta*, *Rakshasa*, *Graha*, etc., having idiosyncratic manifestations. The coronavirus can be contemplated as distinct type of *Bhuta* affecting *Pranavaha Srotas* and causing *Bhutabhishangaja Jwara*, which is one type of *Agantuja Jwara*. Later as the disease advances, it gets metamorphosed into *Nija Vyadhi* (endogenous form) exhibiting as different forms of *Jwara* depending on the extent of vitiation of *Dosha* along with extensive *Pranavaha Srotodushtijanya Vikaras*. The factors involved in pathophysiology of any disease mainly *Nidana* (etiology), *Dosha*, *Dushya* (*Dhatu*, *Srotasa*), and *Agni* are reciprocally interlinked with severity and stage of disease. It is crucial to recognize extent of vitiation of each of these factors in order to determine customized diagnosis and management for the patients of COVID-19. The integrative approach plays a vital role in meticulous comprehension of COVID-19 in terms of Ayurveda to recognize each stage for specific management.

Key words: Ayurveda, *Bhuta*, *Bhutabhishangaja Jwara*, COVID-19, SARS-CoV-2, *Janapadodhwamsa*, *Pranavaha Srotodushti Lakshana*.

INTRODUCTION

Epidemics or highly communicable disease or intermittent outbreaks of infectious disease have wreaked havoc on human communities since ancient

times and lasting effects on societies throughout the history. Ayurveda described terminologies *Sankramaka Roga* and *Aupsargika Rogas* for communicable diseases and another term *Janapadodhwamsa* elaborated for pandemic situation. In *Charak Samhita Vimansthana* 3rd chapter explains epidemic as *Janapadodhwamsa*. *Janpada* means group of people or community and *Dhwamsa* means demolition or annihilation. Therefore, *Janapadodhwansh* means annihilation or destruction of community, an empire or people belonging to a country.^[1]

जनपदानां जन समूहानां उध्वंसनं इति जनपदोध्वंसनम् ।
(जल्पकल्पतरु)

In *Janapadodhwamsa*, persons having different *Prakriti* (constitution), *Aahara* (diet), *Deha* (body), *Bala*

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(strength), *Satmya* (suitableness), *Mana* (mind) and *Vaya* (age) may be affected by same disease simultaneously as happened during COVID-19 pandemic.^[2] In *Janapadodhwamsa*, four factors viz. *Vayu* (air), *Jala* (water), *Desha* (land) and *Kaala* (time period/ season) are primarily affected. The sequences of these four factors in progressive manner are prerequisite because among these factors, *Kaala* being the most powerful of them in epidemic outbreak.^[2]

The Greek physician Hippocrates known as 'father of medicine' examined the relationship between the occurrence of disease and environmental influence. He believed that disease is caused by an imbalance of four humors air, fire, water and earth or 'atom'.^[3] He has coined the term endemic and epidemic.

Janapadodhwamsa according to different Acharyas

रक्षोगणादिभिर्वा विविधैर्भूतसङ्घैस्तमधर्ममन्यद्वा
अप्यपचारान्तरम उपलभ्याभिहन्यन्ते॥ (च.वि.3/22)

Acharya Charaka mentioned that in *Janapadodhwamsa*, *Janapada* are also attacked by *Raksasas* etc. or other organisms due to that unrighteousness or other unwholesome act.^[2] *Acharya Charaka* recommended that to manage catastrophic conditions associated with outbreak of epidemics, one has to get hold and collection of drugs that are potent in all attributes (*Rasa*, *Guna*, *Virya*, *Vipaka*) well before any outbreak.^[2]

In *Vedic* period, ancient *Ayurveda* practitioners and health philosophers were aware of the existence of microorganisms as well as the causation of infectious diseases by them.^[14] The word *Krimi* was referred as infectious agent in *Vedas*. Ancient Indian classics described nearly hundred types of infectious agents. In *Mahabharata*, *Vedavyasa* narrated that *Krimi* are everywhere and nobody can avoid them. It is also mentioned in classics that *Mahamari* (communicable diseases) can spread from one person to another through air, water, animal, flies and physical contact.

According to *Acharya Chakrapani*, *Vyadhijanaka Hetu* is of two types *Asaadharan Hetu* and *Saadharan Hetu*. In *Asaadharan Hetu* there is *Doshaja Vyadhis*, where as in *Saadharan Hetu* vitiation of air, water, land and season.

Sadharan Hetu

बहुजनसाधारणं वातजलदेशकालरूपं साधारण
रोगकारणमभिधातुं जनपदोद्ध्वंसनीयो अभीधीयते ॥

तासामुपयोगाद्विधिरोगप्रादुर्भावो मरको वा भवेदिति ॥१७

Acharya Sushruta has termed *Janapadodhwamsa* as *Maraka* (destroying condition) while discussing *Ritucharya Adhyaya* and emphasized the utilization of *Aushadha* (herbs) and *Jala* (water) which are not affected or collected before the onset of *Maraka*. Here, according to *Acharya Dalhana*, *Prasangaat* means excessively and frequently if these activities are performed

Acharya Bhela used the term *Janamaar* for this devastating condition and focused on the fact that the fasting of a person due to outbreak of medical epidemics (*Mitt Bhoji*) and should remain *Dhritiman*. With the use of *Mantras* and medicines one should remain engaged in the salutation of *Bramhins*, *Janamaar* by doing this can be avoided.

भिन्नाहारवयः सात्म्यप प्रकृतीनां समं भवेत् ।

एको विकृत वाय्वादियुगपत् सेवनाद् गद ॥ (अ.स.9/71)

Acharya Vagbhatt described the concept of *Janapadodhwamsa* under the chapter entitled *Viruddhanna Vijnaniyam* and mentioned that person whose food, age, habits, favorable conditions and constitutions are all different, get affected by same disease on same time, which is caused by vitiations of air, water, land and season when they are exposed to it. The cause for such natural abnormalities is the sinful acts of community.

The therapeutic modalities for *Janapadodhwamsa* are incorporated in the disease prevention protocol in *Ashtanga Hridayam*. (A.H.Su.4)

Acharya Kashyapa also described the disease which occurs in *Janpadvishesha*.

Origin of Janapadodhwamsa

वाय्वादीनां यद्वैगुण्यमुत्पद्यते तस्य मूलमधर्मः, तन्मूलं
वाऽसत्कर्म पूर्वकृतं; तयोर्योनिः प्रजापराध । (च.वि.3/20)

Acharya Charak described the foremost reason of *Janapadodhwamsa* is *Adharma* and *Pragyaparadh*, where *Adharma* is *Moolkarana* and *Pragyaparadh* is *Yoni* for *Janapadodhwamsa Vyadhies*. *Adharma* is lack of morality in the people and to do unrighteousness, non-harmonious, sinful practices or act among communities and people. The root cause of *Adharma* is said to be *Pragyaparadha* (dereliction of wisdom). *Acharya Charaka* has also described the reason of *Bhutasangha* (contact with an organism), *Abhishapa* (curse) is *Adharma*. *Asatmyendriyarth Asamyoga*, *Pragyaparadha* and *Parinama* has been described as the main factors for emerging of any disease. The word *Pragyaparadha* is made from two words *Pragya + Aparadh*. *Pragya = Dhee + Dhriti + Smruti*, and *Aparadh* means misdemeanor. Deranged *Dhee* (intellect), *Dhriti* (patience) and *Smriti* (memory) results into *Ashubh Karma* (sinful act). This is called as *Pragyaparadha* and causes vitiation of all *Doshas*. The root cause of all *Agantuka* (exogenous) and *Manasika* (mental) *Vyadhi* is *Pragyaparadha*.

Acharya Sushruta has mentioned *Adrishta* (invisible or idiopathic) reason behind the *Maraka*. Further *Acharya Dalhana* explained *Maraka* is caused by *Adharma* (immorality) of that particular population or community. Sometimes the *Ritu Vyapad* (seasonal variations) may also be caused due to various reasons like *Abhishaap* (curse), *Rakshkrodh* (demon resentment) etc.

Location of Sambhasha

In summer weather forest area near the banks of *Ganga at Kampilya*, capital city of *Panchal* region i.e., (today *Kampilya* is *Farukhabad* district in *Uttar Pradesh* of India) which was the residence of the *Dwija* (elite of the twice born communities like brahmins). In this place *Punarvasu Atreya* speak to his disciple *Agnivesha*.^[6]

Features of Janapadodhwamsa

In *Janapadodhwamsa*, mainly the vitiated four factors *Vayu, Jal, Desh, Kaal* results in mass annihilation. As per *Ayurveda*, *COVID-19* can be understood due to *Vikriti* of *Vayu* and *Desh*. *Acharya Charaka* has described

Vikrita Lakshanas (altered characteristics) of the said factors are as follows;

Dushita Vayu (air)

तत्र वातमेवंविधमनारोग्यकरं विद्यात्; तद्यथा - यथर्तु
विषममतिस्तिमितमतिचलमतिपरुषमतिशीतमत्युष्णमति
रूक्षमत्यभिष्यन्दिनमतिभैरवारावमतिप्रतिहत - परस्पर
गतिमतिकुण्डलिनमसात्म्यगन्धबाष्पसिकतापांशुधूमोपहत
मिति || (च.वि.3/1)

Vishama (absence of features in accordance with season), *Atistimita* (excessive calm), *Atichalam* (excessive violent), *Atiparusha* (excessive rough), *Atishita* (extreme cold), *Atyushna* (extreme hot), *Atiruksha* (excessive dry), *Atyabhishtandi* (excessive humid), *Atibhairavaravam* (wind blowing with excessive sound), *Atipratihataparaspargati* (colliding in nature), *Atikundalinam* (excessively cyclonic), *Asatmya Gandha Bhashpa Sikta Panshu Dhumophatam* (wind with unwholesome smell, mixed with gases, sand, ashes and smoke).

Dushita Desha (land)

देशं पुनः प्रकृति विकृतवर्णं गन्धरसस्पर्शं
क्लेदबहुलमुपसृष्टं सरीसृपव्यालमशकशलभमक्षिका
मूषकोलूकशमाशानिकशकुनिजम्बूकादिभिस्तृणोलूपो
पवनवन्तं प्रतानादिबहुलमपूर्ववदवपतितशुष्कनष्टशस्यं
धूमपवनं प्रध्मातपतत्रिगणमुत्क्रुष्टश्वगणमुद्भ्रान्तव्यथित
विविधमृगपक्षिसङ्घमुत्सृष्टनष्टधर्मसत्यलज्जाचार
शीलगुणजनपदं शश्वत्क्षुभितोदीर्णसलिलाशयं
प्रततोल्कापातनिर्घातभूमिकम्पमतिभयारावरूपं
रूक्षतामारुणसिताभ्रजालसंवृताकचन्द्रतारकमभीक्षणं
ससम्भ्रमोद्वेगमिवसत्रासरुदितमिवसतमस्कमिव
गुह्यकाचरितमिवाक्रन्दितशब्दबहुलं चाहितं विद्यात् ||
(च.वि.3/3)

मक्षिकामूषिकाव्यालबहूत्पातप्रदूषितः |

देशोऽपथ्यान्नबहुलो नष्टधर्ममहौषधिः || (अ.स.9/94)

Contaminated land is the one having lot of flies, rats, reptiles, frequent natural calamities, full of unhealthy food, is devoid of righteousness and potent herbs.

Vikrut Gandha Varna Rasa Sparsa (Abnormal smell, colour, taste and touch), *Kledabahula* (excessive stickiness), Abundance of serpents, wild animals, mosquitos, locusts, flies, rats, owls, vulture and jackals, *Pratanaadi Bahulam* (excessive orchard with grass, weeds and creepers), *Atishuksha Nasta Shasyam* (extremely dried land with destroyed crops), *Dhumrapawanam* (abundance of smoke in air), Suffering of different animals and birds due to bewilderment and agony, Land where religion, truth, modesty, manners, conducts and other qualities of the inhabitants are absent, *Kshubhitudirnajalashayam* (disturbed and turbulent water bodies), *Pratata Ulkapata Nighata Bhumikampa* (Frequent occurrence of meteorites, thunderbolts and earthquakes), *Atibhayavaramroopam* (hearing of fearful sounds), Sun, moon and stars appears as they are covered with coppery, reddish-brown and whitish coloured clouds, people living on the land appears as confused, bewildered, agitated, sorrowful,

Mode of transmission

प्रसङ्गाद्गात्रसंस्पर्शान्निश्वासात् सहभोजनात् ।

सहशय्यासनाच्चापि वस्त्रमाल्यानुलेपनात् ।

कुष्ठं ज्वरश्च शोषश्च नेत्राभिष्यन्द एव च ।

औपसर्गिकरोगाश्च सङ्क्रामन्ति नरान् नरम् ॥ (सु.नि.5/33-34)

Acharya Sushruta mentioned, by sexual intercourse, close contact with other person, breathing, eating together, sharing bed and exchange of clothes, garlands, cosmetics can cause transmission of disease from person to person. Hence it is necessary to avoid this thing to prevent spreading of disease.

Pathogenesis of Covid-19 in Ayurveda

Word *Virus* originated from the *Sanskrit* word *Visha*. In old persian/avestan language it is *Visha*, in Greek it is *lóç* and in Latin it became *virus*, from that *Virulentu*

came which means poisonous. So, the word *virus* which means poisonous has its origin in *Visha*. *Chakrapani* in his commentary on *Ca.Sa.1/121* mentioned '*Savishakrimi*' to explain the word '*Bhuta*'. '*Savishakrimi*' or simply '*Vishakrimi*' may be an appropriate equivalent word for *virus*.

Janapadodhwamsa Vikara are manifested mainly due to vitiation of *Vayu*, *Jala*, *Desh*, *Kaal* and *Adharma* (unethical practices) is the fundamental causative factor. However, the invasion of *Bhuta* (micro-organism) also gives great contribution in the pathology of these *Vikara/diseases*.^[4] A major aspect of *Janapadodhwamsa Vikara* is that such disease manifests in many people residing in a *Janapada*, with similar cardinal clinical features. As per *Ayurveda* Covid-19 can be understood due to *Vikriti* of *Vayu* and *Desha*. The contaminated air due to presence of *Visha* (toxins/bacteria/viruses) may cause diseases like cough, breathlessness, vomiting, common cold, headache, and fever irrespective of *Desha* (geographical area), *Dosha*, and *Prakruti* (body constitution).^[5]

As per *Ayurveda* COVID-19 can be understood due to *Vikriti* of *Vayu* and *Desh*. Further COVID-19 infection may be considered as *Upsargaj Roga* (communicable disease) and can come under *Bhootaj Abhisangaj Jwara*. In *Janapadodhwamsa*, invasion *Bhuta* might be a cause of annihilation of community or death of large population.^[6] In modern literature, the term *Bhuta* means creature/devil/spirit^[7] with unknown entity. *Acharyas* has defined *Bhutas* as *Pishacha* (devil),^[8] *Devadi* (spirit),^[9] *Graha*^[10] *Amanusha* (creature or organisms)^[11] etc. According to *Amarkosha*, *Bhoot* is a type of microorganisms, when enter into the body aggravate *the Doshas*. So, it can be related with present concept of microbes (bacteria, viruses, and other microorganisms. These are considered as external causative factors for producing *Agantuja Vyadhi*.^[12]

Abhishanga is union/association/possession.^[13] The association or contagion with microbes can be equated with *Bhutabhishanga* as specified by the *Acharyas* while describing the *Jwara Nidana*. *Acharya Dalhan* considered *Abhisangaj Jwara* as *Bhutabhishangaj*

Jwara. Thus, microbial diseases in Ayurveda can be grouped under *Bhutabhisangaja Vyadhi*. Further, it is emphasized that vitiation of all the three *Dosha*, viz., *Vata*, *Pitta*, and *Kapha* occurs in *Bhutabhisangaja Jwara* and the symptoms are explicit to the type of *Bhutabhisanga*.^[14] *Bhutabhisangaja Jwara* is a type of *Agantuj Jwara* (fever caused due to exogenous factors).^[15]

According to the Ayurveda perspective, the hypothesis of pathophysiology of infection of novel coronavirus can be explained by considering it as a *Bhutabhisangaja Vyadhi*, which is *Samsargaja / Aupasargika* in nature. Therefore, COVID-19 disease can be equated with *Bhutabhisangaja Jwara* having manifestations explicit to *Bhuta* (coronavirus). In progression of the disease, the *Bhutabhisanga* (viral infection of the body) vitiates the *Tridosha* and gets transformed into *Nija Vyadhi* with the features of *Pranavaha Srotodushtijanya Vyadhi* and different forms of *Jwara* (endogenous diseases). The severity of COVID-19 in patients depends on the degree of vitiation of *Tridosha*, magnitude of infection and individual *Bala* (immunity).

The affinity toward *Pranavaha Srotasa* can be attributed to *Swabhava* (nature) of the *Bhuta* (corona virus). The *Hridaya* (heart), *Mahasrotasa* (alimentary canal), and *Rasavahi Dhamani* are *Moolasthan* (root or origination) of *Pranavaha Srotasa*.^[14] In the recent literatures, it has been cited that *Hridaya* includes whole area adjacent to heart/thoracic cavity that includes lungs.^[16] *Hridaya* is the *Adhistan* of *Prana* and *Udana Vayu* (related to respiration), *Sadhaka Pitta* (facilitating cell biological functions), and *Avalambaka Kapha* (protection and maintenance of organ) and in *Vimansthana* of *Charak Samhita*, *Shwasa Chikitsa* is recommended for treatment of *Pranavaha Srotasa* disorders.^[17] The *Shwasa Vyadhi* is *Pittasthan* *Samudbhava* (originating from seat of *Pitta*). Further, it has been mentioned that *Amashaya* is *Pittasthan*^[18] and is also seat of *Kledaka Kapha*, which is the crucial of all types of *Kapha* as it influences the status quo of other *Kaphasthan*, *Urah* (thoracic cavity) being one of them.^[19] Thus, it also plays an important role in pathology of *Pranavaha Srotasa Vyadhi*. *Amashaya* is

the common seat of *Kapha* and *Pitta Dosha*.^[20] Therefore, *Dushti* of *Sthana* leads to *Pitta Dushti*. The amalgamation of *Vikruta Kledaka Kapha* in *Amashaya* also vitiates the *Prakrit Pitta Dosha*.^[21] The vitiating *Pitta* and *Kapha Dosha* trigger *Rakta Dushti*^[22] causing *Daha*, *Raga*, *Paka*, and *Shopha* (inflammation) in the body.^[23]

In mild stage of COVID-19 after entering of virus into the *Pranavaha Srotasa*, *Shopha* (inflammation) might develop and the primary stage of stage of *Vrana/Kshata* (injury) is *Shopha* (inflammation).^[24] Therefore, the mild stage can be justify that the subsequent phase of *Shopha* of *Pranavaha Srotasa* is the damage to this *Srotasa*, which may be the initial process for pulmonary tissue injury (may be *Urakshata*). In *Charak Chikitsa* chapter 11, *Urakshata* is caused due to injury to the thoracic region and no prodromal symptoms (*Avyakta Lakshana*) are observed prior to full manifestation of disease.^[25] This can be correlated with the stage of COVID-19 where test is positive, but patients are asymptomatic. *Jwara* (fever) may be observed in prior stages of *Shopha*^[26] or as a manifestation of *Rakta Dushti*.^[27] The symptoms of *Jwara* related to specific *Dosha* are not observed at this point as it is an *Agantuja Jwara*.^[28]

According to *Acharya Vagbhatt*, *Vata Prakopa* along with *Pitta Dushti* cause *Kapha Udirana* (excess increase), thereby amplify the unctuous *Dosha* in head resulting in *Pratishyaya* (rhinitis).^[29] *Kapha Prakopa* along with *Pitta Dushti* cause *Srotorodha* (blockage of respiratory channels), thereby *Vimargaman* of *Prana Vayu* resulting in *Kasa* (cough).^[30] Due to the involvement of *Mahasrota* symptoms like *Chhardi* (vomiting), *Avipaka* (indigestion), *Atisara* (diarrhea), and *Udarshoola* (pain in abdomen) are also produced. The *Mahasrotasa* mainly comprises of *Amashaya* to *Pakwashaya*.^[31] These symptoms are analogous with symptoms of acute upper respiratory tract infection in mild stage of COVID-19.

Jwara originate in *Amashaya*.^[32] After reaching *Amashaya* the vitiating *Doshas* obstructs the seat of *Jathargni*, resulting into *Agnimandya* and *Sama Rasa Dhatu*. The vitiating *Dosha* along with *Sama Rasa Dhatu*

blocks the *Rasavaha* and *Swedavaha Srotasa*, thereby pulling out *Ushma* from its abode and propagating it via *Rasavahi Dhamani* carrying *Rasa Dhatu* into the whole body consequently resulting in *Jwara*.^[33] The intermediate vitiation of *Vata* and *Kapha* with *Pittanubandha* causes *Vata Kaphaja Jwara*. symptoms of *Vata-Kapha* involvement, is rigidity, feeling of heaviness in head, rhinitis, cough, pain in small joints, drowsiness, heaviness, moderate fever, and excess sweating.^[34]

In the later stage of *Shopha/Dushti* of *Pranavaha Srotasa*, the patient may develop *Urakshat*. It is characterized by cough with phlegm, hematemesis, chest pain, pain at the costal angles, and diminution of body tissues (*Sapta Dhatu*). This sequelae progress to deterioration in vigor, color, taste, digestion, myalgia, fever, depression, diarrhea, and hematuria. The phlegm is yellow/greyish in color, having bad odor, string like appearance, and mixed with blood.^[35] *Rasavaha Srotasa* and *Pranavaha Srotasa* have similar *Moolasthanas* i.e., *Hridya* so, can vitiate other.^[36] The symptoms related to *Pranavaha Srotodushti* are evident in the diseases of *Rasavaha Srotasa*, viz., *Hridroda*.^[37] Hence, *Rasavaha Srotodushti* further increases the *Pranavaha Sroto Dushti*, thus aggravating the symptoms. Due to the vitiation of other *Srotasa* especially *Rasavaha Srotas* the vitiation of *Tridosha* will occur.^[38] These may be parallel with symptoms of acute lower respiratory tract infection with moderate stage of COVID-19. The substantial vitiation of all the three *Dosha* leads to *Sannipata Jwara*.

In case of *Sannipata Jwara*, moreover, variable extent of permutation and combinations of *Vata*, *Pitta*, and *Kapha Dushti* manifest differently.^[39] The *Pranavaha Srotasa Dushti* may exacerbate into *Shwasa Upadrava* may be parallel to *Pratamaka Shwasa*. It may be associated with *Jwara* (fever) and *Murccha* (giddiness) due to auxiliary vitiation of *Pitta* with predominance of *Vata* and *Kapha Dosha*.^[40] It can be equated with the severe stage of COVID-19.

The vitiation of *Jatharagni* owing to *Tridosha Prakopa* in *Sannipata Jwara* impairs various *Dhatwagni* and thereby results in the formation of *Vikruta Dhatu*.^[41]

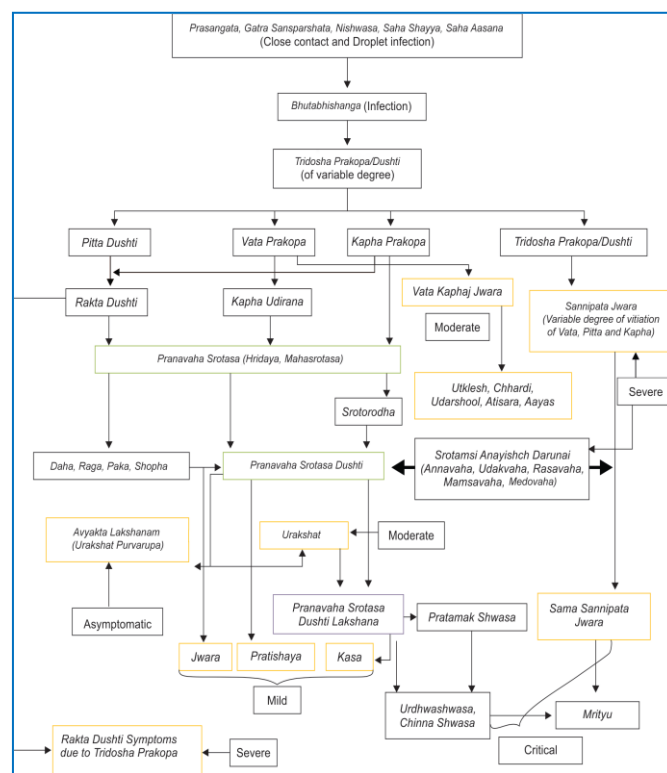
Formation of *Vikruta Dhatu* precedes vitiation of corresponding *Dhatu* and its *Srotasa*,^[42] consequently developing complications related to varied *Srotasa* in the body. The persistent *Pranavaha Srotodushti* along with comorbidities of other *Srotasa* instigate considerable vitiation of *Vata Dosha* directly causing *Urdhvaswasa* (labored respiration with Cheyne Stokes breathing) and/or *Chhinashwasa* (stertorous breathing/failing respiration) wherein there is progressive collapse of respiratory function.^[43] The *Sannipata Jwara* may aggravate into the most dangerous form *Sama Sannipata Jwara* with extensive and homogeneous vitiation of all the three *Dosha*.^[44] It manifest as intermittent cold and warm sensation, body aches in the form of pain in bones, joint pain, headache, tinnitus, choking sensation in throat, varying degree of drowsiness, giddiness, stupor, delirium, cough, dyspnea, disorientation, the sputum contains phlegm with blood, flaccidity insomnia, dehydration, restlessness, chest pain, decreased or absence of urine output and stool, subcutaneous bleeding, or purpura with patient either groaning or mute.^[43] It resembles to critical stage of COVID-19 with multiorgan failure, which ultimately leads to death.

Pathogenesis according to *Nidan Panchak* and *Shat Kriyakala*

S N	Shatkriyakala	Nidana Panchaka	Pathogenesis
1.	Samchaya	Nidana	<i>Aupsargika/Samsargaja</i> , and <i>Bhutabhishangaja</i> , a type of <i>Agantuja Vyadhi</i> . In the early manifestation stage of disease, no involvement of <i>Dosha</i> in the development of disease. The <i>Chaya</i> , <i>Prakopa</i> , and <i>Prasara</i> of <i>Dosha</i> occur subsequently. ^[38] This stage is comparable with asymptomatic stage of COVID-19.
2.	Prakopa		
3.	Prasara		

4.	<i>Sthanasamshraya</i>	<i>Purvarupa</i>	The infection of corona virus in <i>Pranavaha Srotasa</i> can be compared with <i>Sthansamshraya Avastha</i> where the vitiated <i>Dosha</i> (here <i>Agantu Dosha</i> - virus) incorporates with vulnerable <i>Srotasa</i> ^[45] This results in vitiation of all the three <i>Dosha</i> due to innate characteristic of <i>Bhutabhishtanga</i> . ^[46] In this stage, prodromal symptoms of disease occur with mild symptoms like <i>Jwara</i> , <i>Pratishyaya</i> , and <i>Kasa</i> due to minimal vitiation of <i>Doshas</i> (mild stage of COVID-19).
5.	<i>Vyakti</i>	<i>Rupa</i>	It is associated with occurrence of classical sign and symptoms of disease. ^[45] The primary symptoms of COVID-19 disease are concurrent with <i>Vata Kaphaja Jwara</i> , <i>Urakshat</i> , <i>Pratamaka Shwasa</i> , and <i>Sannipataja Jwara</i> (moderate to severe stage of COVID-19).
		<i>Samprapti</i>	<i>Vata-Kapha Pradhana Pittanubandhi; Bhutabhishtangaja Jwara</i>
		<i>Upashaya</i>	<i>Laghu, Tikshna, Snigdha, Tikta, Katu Rasatmaka, Ushna Virya Ahara Dravya, and Aushadhi</i>
		<i>Anupashaya</i>	<i>Guru, Ruksha, Khara, Madhura, Amla, Kashaya Rasatmaka, Shita Virya Ahara Dravya, and Aushadhi</i> . Further, there is need for conducting the clinical trials to confirm the provisional assessment as per the <i>Doshas</i> /stage of disease,

			etc. on basis of <i>Upashaya and Anupashaya</i>
6.	<i>Bheda</i>		It is the stage of chronicity and complications. ^[45] The prognosis becomes poor in this stage. The <i>Bheda</i> stage of COVID-19 can be associated with <i>Sama Sannipata Jwara</i> , <i>Urdhwashwasa</i> , and <i>Chhinnashwasa</i> (severe and critical stage of COVID-19).



Prognosis

In Ayurveda, *Janapadodhwamsa Vyadhis* are *Sudaruna* (not having good prognosis) and therefore it is advised to treat population before manifestation of disease.^[47] *Bhutabhishtanga* instigate *Tridosha Prakopa (Sannipataja)* and it is always *Dushchikitsya* (difficult to alleviate).^[48] The prognosis of any disorder is not good in pregnant women, children, and elderly; therefore, any disease is *Kricchrasadhya* (difficult to treat) in these populations.^[49] The magnitude of *Bhutabhishtanga* (coronavirus infection), variable

degree of vitiation of the *Tridosha (Tar-Tama Bhava)*, and individual *Sharir Bala*, which is downgraded in the presence of comorbidities and old age, further contributes to the poor prognosis of COVID-19.

Prognosis is poor in severe cases if the symptoms of *Urakshata* develops completely.^[50] The development of *Pratamaka Shwasa*, which is a *Yapya Vyadhi*,^[51] and presence of comorbidities can exacerbate the situation into severe stage further worsening the prognosis. In critical cases the prognosis is very poor or irreversible as disease progresses in to *Sannipata Jwara* along with *Sama Sannipata Jwara*^[52] and associated with *Urdhwashwasa* and *Chhinnashwasa*,^[48] which are *Asadhya Vyadhi*.

SN	Shatkriyakala	Covid-19 symptoms	Prognosis
1.	<i>Sthanasamshraya</i>	Asymptomatic, <i>Jwara</i> , <i>Pratishyaya</i> , <i>Kasa</i>	Good
2.	<i>Vyakti</i>	<i>Vata Kaphaja Jwara</i> , <i>Urakshat</i> , <i>Pratamaka Shwasa</i> Development of all symptoms of <i>Urakshata</i> , <i>Sannipata Jwara</i> .	Fair Poor
3.	<i>Bheda</i>	<i>Sama Sannipata Jwara</i> , <i>Urdhwashwasa</i> , <i>Chhinnashwasa</i> Comorbidities of other <i>Srotasa</i> in any stage.	Poor Poor

Management of pandemic through Ayurveda

येषां न मृत्युसामान्यं सामान्यं न च कर्मणाम् ।
कर्म पञ्चविधं तेषां भेषजं परमुच्यते ॥ (च.वि.3/13)
रसायनानां विधिवच्चोपयोगः प्रशस्यते ।
शस्यते देहवृत्तिश्च भेषजैः पूर्वमुद्धृतैः ॥
सत्यं भूते दया दानं बलयो देवतार्चनम् ।
सद्धृतस्यानुवृत्तिश्च प्रशमो गुप्तिरात्मनः ॥
हितं जनपदानां च शिवानामुपसेवनम् ।

सेवनं ब्रह्मचर्यस्य तथैव ब्रह्मचारिणाम् ।

तत्र, अव्यापन्नानामोषधीनामपां चोपयोगः ॥ (च.वि.3/14-17)

तत्र, स्थानपरित्याग शान्तिकर्म प्रायश्चित्तमङ्गल जपहोमोपहारेज्याञ्जलि नमस्कार तपोनियम- दयादान दीक्षाभ्युपगम देवताब्राह्मण गुरुपरैर्भवितव्यम्, एवं साधु भवति ॥ (सु.सू.6/20)

The line of treatment should be planned at breaking of etiopathogenesis of pandemic disease and according to symptoms. Some preventive measures mentioned in above explained *Shlokas* and Ayurvedic classics are;

1. Procurement of medicine or herbs in their high potential phase well before the outbreak of epidemic.
2. *Panchkarma* therapy, *Rasayana* consumption, *Sadvrut Palana*
3. Improving the immunity and strength of the body.
4. Moving to safe places away from polluted/infected environment.

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