

## Review Article

# COVID-19 Ayurveda treatment protocol of governments of Nepal and India: a review and perspective

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**Abstract:** SARS-CoV-2 originated in Wuhan city of China in Dec 2019, was named COVID-19 and declared pandemic by WHO. Conventional system of medicine is seen proving ineffective in its treatment. The first case of COVID-19 was confirmed on 23rd January 2020 in Nepal and on 30<sup>th</sup> January 2020 in India. SARS, MERS and COVID-19 in China were effectively managed through Traditional System of Medicine (TSM). Glycyrrhizin like active component of medicinal herbs potentially inhibit virus replication and bear antiviral property. Government of Nepal and India released a treatment protocol for COVID-19. Protocols have taken COVID-19 on the basis of *Dosha, Dhātu, Mala*, etc. The symptoms of COVID-19 resembles to *Kapha-Vata-Samasargaj-Jawara* with *Pitta* association (i.e. *Sannipataj-Jawara*). For foreign etiology of COVID-19 Ayurveda considers it *Rakshayadi-Prakopa-Janya-Janapado-udhamsha* and deployed management accordingly. Good immunity is important factor for arresting or preventing the disease, which can be achieved by regular administration of *Rasayanas*. The physician should not treat any COVID-19 infected patient without safety precautions or without informing the local authorities. Clinical researches on individual and poly herbal drugs in the protocol should be taken into series of clinical trials to test its effectiveness against COVID-19 and discover the pharmacology and prove its effectiveness and establish it among global scientific community.

**Keywords:** COVID-19; Ayurveda, Govt. of India, Govt. of Nepal, treatment protocol

**सारांश:** सन् २०१९ को डिसेम्बरमा चीनको वुहान शहरमा पहिलो पटक देखा परेको सार्स कोभ-२ वा कोभिड-१९ नामक रोगलाई विश्व स्वास्थ्य संगठनले वैश्विक महामारीको रूपमा घोषणा गर्यो । प्रचलनमा रहेका चिकित्सा पद्धती यस रोगको उपचारमा निष्प्रभावी सावित भईरहेको छ । यस रोगबाट संक्रमित पहिलो रोगी नेपालमा २३ जनवरी सन् २०२० मा र भारतमा ३० जनवरी सन् २०२० मा भेटिएका थिए । चीनमा परम्परागत चिकित्सा पद्धतिद्वारा सार्स, मर्स तथा कोभिड-१९ को प्रभावकारी उपचारात्मक व्यवस्थापन गरिएको थियो । औषधीय गुण भएको वनस्पतिहरूमा हुने ग्लाइसीराईजिन जस्तो सक्रिय तत्वले भाईरसको रेप्लिकेसनलाई निषेध गर्दछ, भन्ने धेरै दृष्टान्तहरू छन् । नेपाल सरकार र भारत सरकारले यस रोगको चिकित्साका लागि उपचार विधि सार्वजनिक गरेको छ । उक्त विधिपत्रमा यस रोगलाई त्रिदोष, धातु मल आदिको आधारमा विश्लेषण गरिएको छ । कोभिड-१९ को लक्षणहरूको समानता पित्तसँगै, कफ-वात-संसर्गज-ज्वर (सन्नि पातज ज्वर) सँग मिल्ने देखिन्छ । आयुर्वेदको दृष्टिले कोभिड-१९ को शरीर बाहिरको कारण भनेको राक्षसादि प्रकोपजन्य जनपदोद्ध्वंस मानिएको छ, र सोही अनुसार उपचार विधि सिफारिस गरिएको छ । यस रोगलाई नियन्त्रण गर्नको लागि राम्रो व्याधिक्रमत्व (ईम्युनिटी) महत्वपूर्ण हुन्छ, जुन दैनिक रूपमा उचित प्रकारको रसायनको सेवन गरेर मात्र प्राप्त गर्न सकिन्छ । सुरक्षात्मक विधिहरू नअपनाईकन वा स्थानीय निकायलाई जानकारी नदिईकन कोभिड-१९ का रोगीहरूलाई चिकित्सकले उपचार थाल्नु हुँदैन । सरकारी उपचार विधिपत्रमा उल्लेख भएका एकल र मिश्रित औषधीहरूलाई पटक पटक क्लिनिकल ट्रायल एवं अनुसन्धान गरी वनस्पतिहरूको प्रभावकारीतालाई परिक्षण गर्नुपर्छ । र ती वनस्पतिहरूले शरीरमा गर्ने कार्यविधि र त्यसको प्रभावकारीता विश्व वैज्ञानिक समुदायमा समेत स्थापित गराउनु पर्दछ ।

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## 1. Introduction

In December 2019, there was an outbreak of unexplainable pneumonia in Wuhan city, Hubei province, China (Gralinski and Menachery, 2020). By Jan 7, 2020, it was confirmed that a new type of coronavirus named SARS-CoV-2 (formerly named as 2019-nCoV) had emerged (Burki, 2020). The World Health Organization (WHO) named the pneumonia originated in Wuhan as Coronavirus Disease-2019 (COVID-19) on Feb 11, 2020 (Ghebreyesus, 2020). The COVID-19 patients showed typical respiratory symptom (such as cough, fever, and lung damage) and some other symptoms such as fatigue, myalgia, and diarrhea (Guan et al., 2020; Huang et al., 2020). The first case of COVID-19 was confirmed on 23<sup>rd</sup> January 2020 in Nepal (Ministry of Health and Population [MoHP], 2020) and on 30<sup>th</sup> January 2020 in India (Khanna, 2020). As of June 1, 2020 a total of 1798 cases of the SARS-CoV-2 infected pneumonia has been reported in Nepal and 197862,970 cases in India. The disease has since spread to 185 countries and regions, with 1,97, 862 6 057 853 cases confirmed cases globally and 371,166 deaths as of June 1, 2020 (World Health Organization [WHO] International, 2020).

## 2. Materials and methods

All the relevant literatures including classical Ayurvedic texts with their commentaries and electronic data base including Google scholar, PubMed, different government health agencies websites, Google search were searched to collect the relevant data by using the key words- corona virus disease, COVID-19, Ayurveda, *Janapadodhwamsa*, Traditional medicine, WHO, immunity, and *Rasayana* etc.

## 3. COVID-19 as per Ayurveda Protocol of GoN

Ayurveda and Alternative Medicine Guidelines of Preventive Measures and Management Protocol for COVID-19 in Nepal quotes that like in modern medicine, direct description of COVID-19 disease is not available in Ayurveda literatures. Ayurveda has its own philosophical and principal basis for understanding diseases like COVID-19. Ayurveda does not focus on the microbiological etiology. It deals newly detected diseases on the basis of its principles like *Dosha*, *Dhatu*, *Mala*, etc. involvement. Based on the same principle, the protocol has been developed through sign and symptoms of COVID-19.

Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19) that Symptoms of COVID-19 are non-specific and the disease presentation can range from no symptoms (asymptomatic) to severe pneumonia and death. As of 20 February 2020 and based on 55924 laboratory

confirmed cases, typical signs and symptoms include: fever(87.9%), dry cough (67.7%), fatigue (38.1%), sputum production (33.4%), shortness of breath(18.6%), sore throat (13.9%), headache (13.6%), myalgia or arthralgia (14.8%), chills (11.4%)nausea or vomiting (5.0%), nasal congestion (4.8%), diarrhea (3.7%), and hemoptysis (0.9%)and conjunctival congestion (0.8%).

Generally 98% patients were having mild to moderate fever (*Jwara*), 76% were having cough (*Kasa*) and 44% were having myalgia (*Anga-marda*) and fatigue (*Tandra*). Among those developed pneumonia, 99% were having fever (*Jwara*), 70% were having fatigue (*Tandra*), 59% dry cough (*Vatika-kaasa*), 40% having anorexia (*Aruchi*), 35% having myalgia (*Anga-marda*), 31% having dyspnea (*Shwaasa*) and 27% were having sputum production (*Kaphaja-kaasa*) (Shastri and Chaturvedi, 2027). All these signs and symptoms has been considered in the purview of Ayurveda classics as well as the COVID-19 as a *Kapha-vata Samsargaja Jwara* with *Pitta* association in the beginning and hence indicating the status of *Sannipata Jwara* (Mishra, 2015; Tarkiba, 2052).

The proposal juxtaposes that due to compromised immunity (*Rogi-bala*), the coexisting *Pitta*, even mild is causing *Syandana* and *Shoshana* (Ojha et al., 1885) in the chest progressively, which can't be resisted by the body. This process can be technically described as a *Dhaatu-paaka*, a deregulated host response, from the context of *Sannipaataja Jwara* (Mishra, 2015). This results in the rapid instability of *Ojus* leading to sepsis and eventually septic shock. Because of the *Syandana* and *Shoshana* property of intervening *Pitta*, the *Jwara* may end up in the fatal forms of *Sannipaataja Jwara*; of which two special fevers worth mention- *Vata* predominant *Sannipaataja Jwara* titled as *Visphaarak* (Tripathi, 1999) and *Vata-kapha* predominant *Sannipaata Jwara* titled *Sheekhrakaari* (Shastri, 2018). Along with the change in the nature of *Jwara* and *Shwasa* which was previously a feature, later it becomes prominent as a complication (*Upadrava*).

COVID-19 like unknown diseases can be understood with Ayurveda in following three ways: *Vikara-Prakriti* (Natural history of Disease); *Adhistan* (Site of pathological process) and *Samuthaana Visesha* (etiological features) (Paradakara, 2011). In the same way the COVID-19 pathogenesis has been described as:

- Vikara-Prakriti* (Natural history of Disease): *Rakshasadi-Prakopa-janya Janapada-udhwamsa*.
- Adhistan* (Site of pathological process): Suspected as *Koshta* itself, but the manifestation happens in *Urah* (Ayurveda Campus-Institute of Medicine [AC-IOM], 2020).
- Samuthaana-Visesha* (etiological features):

*Pragyaparaadha*. Predisposing factors such as the old age and co-morbidities, deteriorated *Rogi-bala* and instability of *Ojus* (Department of ayurveda and alternative medicines [DoAaAM], 2020).

Proposal has referred COVID-19 as *Aagantuja-vikara* (derangement due to foreign factors) (Singh, 2011) and suggested its management along with *Nija-vikara* (derangement due to bodily factors). Derangement due to bodily factors is also managed along with *AagantujaVikara* (Acharya, 2000).

In Ayurveda complications of *Jwara* (Fever) are considered to be as *Swasa* (Difficulty in breathing), *Murcha* (unconsciousness), *Hikka* (Hiccough), *Kasa* (Cough), *Angamardha* (Body-ache) which are the symptoms of COVID-19 too. So, in the line of *Jwara-chikitsa* COVID-19 can be managed (Prasad, 2001). COVID-19 can also induce severe complications like bilateral lungs pneumonia and organ failure conditions which is considered as *Jwara-vyapada* indicating difficulty in the management (WHO-China, 2019).

On the basis of vigilant study of disease origin, progress along with its cardinal sign and symptoms treatment protocol for patient has been shaped. COVID-19 has been assumed to progress through following clinical stages (*Kriya-kaal*):

Stage I: *Kapha-vata Sannipata-jwara*

Stage II: Aggravation of the already existing situation

SatageIII: The stage of initiation of *Dhatupaka*, due to unchecked activity of the *pitta dosha*

Stage IV: *Dhatupaka* proceeds and *Swasa* coming forwards as an *Upadrava* and

Stage V: *Sannipatajwara* titled as *Vispharaka* or manifests and becomes fatal which needs technological support along with *Aatyayika-chikitsa* (emergency treatment) (AC-IOM, 2020).

Based on the symptoms of COVID-19, different types of *Sannipataja-jwara-awastha* (Tripathi, 1999) can be observed in the form of stages enlisted in the protocol. If the fever and the symptoms get relief in the duration indicated then the patient recovery is good but if the fever and symptoms persists even after the duration of 14, 18 and 22 days in each type the complication arise and the patient suffered by pneumonia and may die (Tripathi, 1999).

#### 4. COVID-19 curative protocol by GoN and GoI

Ayurveda is highly valued by Government of India (GoI) and Government of Nepal (GoN) in their campaign to contain and eradicate COVID-19. They though worthwhile to associate with other stakeholders in eliciting Ayurveda based public health response considering the strength and evidences of the system.

For it GoI and GoN has officially declared that Traditional System of Medicine (TSM) should be

used in combination with conventional medicine in the treatment of COVID-19 patients. Above that GoI has officially declared clinical trail on some herbs and drugs. GoN is also trying to move forward in the direction of clinical trial in respect to preventive and curative approach. Interdisciplinary AYUSH Research and Development Task Force has formulated and designed clinical research protocols for prophylactic studies and add-on interventions in COVID-19 positive cases thorough review and consultative process of experts of high repute from different organizations across the country for studying four different interventions viz. *Ashwagandha*, *Yashtimadhu* (*Mulethi*), *Guduchi* + *Pippali* (*Giloy*) and a poly herbal formulation. AYUSH ministry is to carry this research in collaboration with Council of Scientific and Industrial Research (CSIR) (Ministry of AYUSH, 2018).

Government of Nepal (GoN), Department of Ayurveda and Alternative Medicine in collaboration with Nepal Ayurvedic Medical Council (NAMC) and Ayurveda Campus and Teaching Hospital (ACTH) released 'Ayurveda and Alternative Medicine Guidelines of Preventive Measures and Management Protocol for COVID-19' on 26<sup>th</sup> April 2020 (DoAaAM, 2020). Similar Advisory from Ministry of AYUSH GoI was released on 24<sup>th</sup> March 2020 (Ministry of AYUSH, 2020).

The curative part of this protocol include the pragmatic advisory plan for interventions using Ayurveda Medicine. The protocols have graded response depending on the stage of infection and proximity with disease among individuals in a population is proposed.

Preventive and rehabilitative guidelines as well as other systems of medicines management protocol for COVID-19 are also advised in the advisory of GoN and GoI but the area of this study is only Ayurveda curative protocol.

The COVID-19 Curative protocol of GoN in different stages is as follows.

A. Stage 0: Patients with positive case of COVID-19 having no symptoms. *Trikatu-churna* 2 gm twice a day with lukewarm water or with *Dashmoola* or *Pathyadi-kwatha*. *Sudarshana-churna* 3 gm twice a day with lukewarm water, *Samsamni-vati* or *Giloyaghan-vati* 2 tablet twice a day with lukewarm water have been advised for 7 days.

In addition to this *Rasayana* treatment for 15-30 days is advised with the use of. *Ashwagandha* powder/capsule 3gm/1-2 tablet twice a day with lukewarm water, *Brahmi-vati*/ powder/ tablet 3gm/1-2 tab twice a day with lukewarm water, *Chyavanaprash* one tea spoon full twice a day (sugar free for diabetic patients) and use lukewarm water.

B. Stage 1. *Kapha-vata Sannipataj-jwara* (Patients with positive case of COVID-19 having mild symptoms: mild fever, mild cough, no breathlessness).

(I) For the management of *Ama-jwara* (Shastri, 2018), in primary stage with *langhana* by any one from following drugs; when symptoms persist from 5-7 days. *Shunthijal* whenever necessary, *Shadangpaniya* whenever necessary, *Chitrakadi-vati* two tablet twice a day with lukewarm water before meal.

Besides that *Trikatu-churna* 2gm twice a day with lukewarm water or with *Dashmoola* or *Pathyadi-kwatha*, *Sudarshana Churna* 3gm twice a day with lukewarm water, *Talisadi* or *Sitopladi-Churna* 2gm twice a day with lukewarm water, *Samsamni-vati* or *Giloyaghan-vati* two tablet twice a day with lukewarm water have been indicated for 7-15 days.

Also *Rasayana* therapy for 15-30 days has been suggested to apply. The drugs are *Ashwagandha-Churna/Capsule* 3gm/1-2 tablet twice a day with lukewarm water, *Chyavanaprash* one tea spoonful twice a day (sugar free for diabetic patients).

C. Stage 2: *Kapha-Vata Sannipaataja-jwara* (patients with positive case of corona virus including all symptoms of corona together with conventional treatment but not in ventilator) Advice for such patient management is on the basis of principles via *Jwara-shamana*, *Kapha-Shamana*, *Vata-anulomana* and protection of *Rogi-bala* in five different steps of treatment.

(II) Management of *Dosha-pachana* following treatment is stated which is to be started from beginning of the symptoms. *Trikatu-Churna* (Kaushik, 2018) 2 gm twice a day with lukewarm water or *Dashmoola* or *Pathyadi-kwatha* (Abraham et al., 2018), *Sudarshana-churna* (Shukla, 2020) 3gm twice a day with lukewarm water, *Samsamni-vati* or *Giloyaghan-vati* (Kapil and Sharma, 1997) 2 tablet twice a day with lukewarm water.

(III) After 7 days of symptoms, leading to *Madhya jwara*, following intake as its management is advised i.e, *Talisadi* (Bhut et al., 2017) (for dry cough) or *Sitopladi-churna* (for productive cough) (Makhija, 2011) 3-5 gm with *Yastimadhu-kwatha* (Singh, 2016) or appropriate *anupan* twice a day (warm decoction), Tablet *Shanjeevani-vati* (Sharma et al., 2018) 250mg twice a day with lukewarm water, Tablet *N. Laxmivilasa-rasa* (Quader et al., 2013) 60 mg twice a day with lukewarm water.

Additional drugs have also been considered in the treatment as *Mrigamadasav* (Tarkiba, 2052) for children 1-5 yrs 6-10 drops thrice a day and for adult 10-20 drops thrice a day with lukewarm water or honey, *Guduchi-kwath* (Tripathi, 1999) 40-80 ml twice a day, *Yashtimadu-kwath* (Ben-Shabat et al., 2019) 40-80 ml BD.

(IV) At *Pakwa Stage*: Aggravation of the already existing situation (COVID-19 positive with specific symptoms at moderate level)

Management Guideline is *Jwara-shamana*, *Kapha-shamana*, *Vata-anulomana*, protection of *Rogi-bala*, particularly important in geriatric and those with co-morbidities. Also *Kaphanissaraka* management is thought to be needed for 5 to 7 days with *Talisadi* (for dry cough) or *Sitopladi-churna* (for productive cough) 3-5 gm with *Yastimadhu-kwatha* or appropriate *anupan* twice a day (warm decoction), *Chitraka-haritaki* (Singh and Singh, 2015) or *Kantakari-avaleha* (Gupta and Prajapati, 2011) 1tea spoon full twice a day with lukewarm water, *Lavangadi-vati* (Shilpa and Prashanth, 2017) 1-2 tablet suck 4-6 times a day, *Amritarishta* (Shastri, 1993) 15- 30 ml twice a day with equal amount of water after meal.

Also some additional drugs can be adopted, *Kankasav* (Shastri, 1993) 15- 30 ml twice a day with equal amount of water after meal, *Tribhuvankirti-ras* (Shastri, 1993) 125-250 mg twice a day with lukewarm water, *Shatyadi-kwath* (Tripathi, 1999) (*Kachoor*, *Pushkarmool*, *Kantakarimool*, *Karkatshringi*, *Duralabha*, *Guduchi*, *Shunthi*, *Patha*, *Kirattikta*, *Kutaki* all in equal amount) 40- 80 ml twice a day, *Kirattikta* or *Mahasudarshan-kwath* 40-80 ml twice a day.

(V) For *Rasayana* therapy *Ashwagandha-churna/Capsule* (Suresh et al., 2006) 3gm/1-2 tab twice a day with lukewarm water; *Brahmi-vati* or *Churna/ Tablet* (Calabrese et al., 2008) 3gm/1-2 tab twice a day with lukewarm water; *Chyavanaprash* (Manjunatha et al., 2001) 1 tea spoon full twice a day (sugar free for diabetic patients).

D. STAGE 3: *Dhatu-paaka* and *Swasa* coming forwards as an *Upadrava* (Complications due to unchecked activity of the *Pitta Dosha*) (COVID-19 positive with severe symptoms with respiratory distress etc. and progressive towards fatality)

Management guideline is described as *Jwara-shamana*, medicines to stop *Dhatu-paaka*, medications for broncho-dilation and expectoration, protection of *Rogi-bala* in a more potent and aggressive manner. Special procedures enlisted in *Sannipataja-jwara-prakaran* need to be applied. *Kankasav* 15- 30 ml twice a day with equal amount of water after meal, *Tribhuvankirti rasa* 125-250 mg twice a day with lukewarm water, *Shatyadi-kwath* (*Kachoor*, *Pushkarmool*, *Kantakarimool*, *Karkatshringi*, *Duralabha*, *Guduchi*, *Shunthi*, *Patha*, *Kirattikta*, *Kutaki* all in equal amount) 40- 80 ml twice a day, *Kirattikta* or *Mahasudarshan-kwath* 40-80 ml twice a day are to be used.

*Rasayana* therapy based on *Kapha* in *Urasthana* or according to the age *Ashwagandha Churna/Capsule* 3gm/1-2 tablet twice a day with

lukewarm water, *Brahmi-vatior Churna/ Tablet* 3gm/1-2 tab twice a day with lukewarm water, *Chyavanaprash* 1 tea spoon full twice a day (sugar free for diabetic patients) is advised for 15-30 days.

E. Stage 4: *Dhatupaka* proceeds and *Shwasa* coming forwards as an *Upadrava*. Management guideline is suggested same as above, but in a more potent and aggressive manner.

F. Stage 5. *Sannipaataj-jwara* titled as *Vispharakaor* manifests and becomes fatal, is advised for technological support along with *Aatyayika-chikitsaa* (emergency support).

G. Apparently healthy individual for immunity improving drugs like *Dashmoola* or *Pathyadi-kwatha* 40-80 ml twice a day, Tab *Samsamni-vati* or *Gilowghan-vati* 1-2 tablet twice a day with lukewarm water, *Ashwagandha-churna/Capsule* 3gm/1-2 tab twice a day with lukewarm water are suggested for 7-15 days.

Similarly, Government of India (GoI) released an advisory from ministry of AYUSH for meeting the challenge arising out of spread of corona virus (COVID-19) in India.

The Ministry of AYUSH approach to manage the outbreak broadly comprises of preventive and prophylactic with *Samshamani-vati* 500 mg twice a day with warm water for 15 days. The medicine contains aqueous extract of *Tinospora cordifolia*. The symptomatic management of COVID-19 like illnesses with *AYUSH-64,2* tablets twice a day; *Agasthya-hareetaki* 5 gm twice a day with warm water and *Anu-taila/Sesame oil* 2 drops in each nostril daily in the morning. As add on interventions to the conventional care *AYUSH-642* tablets twice a day, *Agastya-hareetaki* 5 gm twice a day with warm water is advised (Ayush Ministry, 2020).

## 5. Clinical evidences of Ayurveda drugs

According to the recent clinical guidelines in China and the experiences in the treatment of SARS or Middle East Respiratory Syndrome (MERS) patients, Traditional System of Medicine (TSM), herbs and its extracts similar to that of Ayurveda medicines were used for the treatment of patients with infection of SARS-CoV-2 in China yield good results (Li and De, 2019; Liu et al. 2004; Li and Peng 2013).

A high-profile research published in the Lancet reported that *glycyrrhizin*, a major active constituent liquorice root which is the most frequently used herb in China, potently inhibited the replication of clinical isolates of SARS virus (Cinatl et al., 2003).

Another independent study confirmed the antiviral activity of *glycyrrhizin* by plaque reduction assays and this study found that another Chinese herbal compound *baicalin* also had the anti-SARS activity (Chen et al., 2004).

These evidences show Ayurveda drugs are effective in viral infection treatment. Therefore the treatment protocols developed by GoN and GoI on 6<sup>th</sup> March 2020 may bring expected results in the treatment of COVID-19.

## 6. Standardization and safety

Poly-herbal combinations have also proven lastingly effective than single herbs. In Ayurveda, most of the classical preparations are poly-herbal, with a combination of even more than 50 drugs involved. These constituents are combined accurately, in such a way that the formula is balanced and reproducible. One or two of the plants in these combinations are active and the others play a supporting role. Each supporting herbs have different actions, acts as catalysts to help proper absorption, transportation, and reduce toxicity. If an ideal combination is delivered, then the result can be excellent, but such outcomes are based on thorough knowledge and experience on plants (Kumar et al., 2017).

The qualitative and quantities standardization issue appears with Ayurvedic drugs. The potency (phyto-chemical constituents) of the medicinal herbs depends with several factors, which can infer the effectiveness of the drugs efficacy (Tavhare and Nishteswar, 2014). Quantitative standardization of 2 gram or 3 gram of powder for administration in divided dose may infer the efficacy of the drug and the entire protocol. Ayurveda drugs presents odd tests and smell either in decoction and powder form, which may not be patient compliance and effect the efficacy (Verma et al., 2019).

All Ayurveda drugs in the protocol are advised to take by oro-pharyngeal or naso-laryngeal route only and no drug reach directly to systemic circulation by intravenous so the bioavailability of even most intense drugs may decrease after passing through alimentary canal. However, phyto-chemicals obtained from medicinal herbs are less harmful than chemical drugs. Also systematically purified herbo-mineral based Ayurvedic medicines relatively induce less adverse effect than pure chemical drugs (Karimi et al., 2015). The curative protocols for COVID-19 are based on herbal and herbo-mineral drugs which will definitely have less adverse effect than the anti-viral, anti-malarial, anti-HIV and other chemical drugs and antibiotics being used for the through conventional system of medicine (Devaux et al., 2020).

## 7. Application opportunities and challenges

The protocols if implemented have enormous potentials to provide learning and innovative insights. One hundred and seventy members states of WHO acknowledged their use of Traditional,

Complementary and Alternative (T&CAM) Medicine since 2018. WHO traditional medicine strategy 2014–2023 has an objective to promote universal health coverage by integrating T&CAM services into health care service delivery and self-health care (WHO- international, 2014). After the productive application of presently advised protocol Ayurveda in managing COVID-19 will give global acceptance to Ayurveda medicine. Research arena in Ayurveda will ascend. Ayurveda will break its limit form non-communicable disease. Integration as future of medicine would come into effect.

Nepal and India is considered to be the native land of Ayurveda for which there is immense potential for Ayurveda education. Herbal resources of Nepal and India will be widely used and valued. Increased Ayurveda trade and business will highly contribute in gross domestic product (GDP) of Nepal specially. Many will get job opportunities in this sector contributing in the the countries to be prosperous (Pyakurel et al., 2019).

In the lack of virology laboratory and viral technology in Nepal, study of virology is quiet difficult and it will be a continuous process of research.. However application of Ayurveda protocol as substitute may not be difficult because of use of Ayurveda medicine is tradition in Nepal.

Nepal and India's common action plan for implementation of the protocol may further strengthen bilateral cooperation in health and research issues.

The protocols are more theoretically oriented and less on the proven previous similar researches. For the successful implementation a proper documentation is crucial. Documentation of key variables that are essential should be done on each case. Those variables should include age, gender, symptoms, geography, contact history, Ayurvedic diagnosis including *Roga* and *Rogi-bala* examination, improvement or worsening of symptoms, Ayurvedic medicine(s) with dosage, final outcome of the management, referral to secondary/tertiary care, symptoms controlled, cured, and mortality, if any. A follow-up advice upon discharge or stop of medications should also be documented (Rastogi et al., 2020).

Protocol is not only enough but a clear multi-sectorial cooperative implementation plan is required to put protocol into action in Nepal. In Nepal it is lacking but in India it is in priority. Ayurveda practitioners would require training in screening of the people for associated risk factors. They should also be equipped with modern personal protection equipment and access to diagnostic facilities.

Present system of health in Nepal and India is in domination of health professionals from conventional system of medicine. For the

implementation of the Ayurveda curative protocols for COVID-19 to bring unified policy will be needed. Application of Ayurveda curative protocol for pandemic like COVID-19 is very pioneer in Nepal and India for which basic set-ups as well as its promotion investment are required (Namburi et al., 2020).

Initially Ayurveda physicians should not treat any COVID-19 infected patient without safety precautions or without informing the local authorities. Further, should follow the guidelines prescribed by WHO, Ministry of Health and Ministry of AYUSH time to time for arresting the pandemic COVID-19 infection

## 8. Discussion

Unlike microbial etiology in modern medicine Ayurveda undertakes COVID-19 on the basis of *Dosha, Dhātu, Mala*, etc. and deploys management accordingly. All the symptoms of COVID-19 resembles to *Kapha-vata-samasargaj-jawara* with *Pitta* association (i.e. *Sannipataj Jawara*). As external cause, irrespective of the physical, dietary and psychological factor cause of COVID-19 is due to *Rakshayadi prakopa janya janapadoudhamsha*. Majority formulations suggested in pragmatic are polyherbal. Sensibly combined non systematic route administered Ayurveda formulations are less toxic than modern chemical anti-virals and antibiotics. SARS and MERS were effectively managed through TSM. Glycyrrhizin like active component of medicinal herbs potentially inhibit virus replication and bear antiviral property.

In COVID-19 management, good immunity is important factor for arresting or preventing the disease, which can be achieved by regular administration of *Rasayanas*. Further, some of the *Rasayana* drugs like *Guduchi* and *Pippali* etc. are proved to be having antiviral effect and may have its direct role in diseased condition. The physician should not treat any COVID-19 infected patient without safety precautions or without informing the local authorities. Further, should follow the guidelines prescribed by WHO, Ministry of Health and Ministry of AYUSH time to time for arresting the pandemic COVID-19 infection

Clinical researches on each individual herbs which have not been studied is necessary. Besides that poly herbal drugs in the protocol should be taken into series of clinical trials to test its effectiveness against COVID19 and discover the pharmaco-clinical evidences and establish among scientific community.

## 9. Conclusion

Bringing Ayurveda protocol for the management of COVID-19 is a step leap towards progress in

TSM in Nepal and India. Many challenges are there, however effort should be done step wise for its establishment among global scientific community. Clinical researches on each individual herbs prescribed in the protocol which have not been studied is to be done. Besides that poly herbal drugs in the protocol should be taken into series of clinical trials to test its effectiveness against COVID-19 and discover the pharmaco-clinical evidences and prove its effectiveness.

Immunity is vital factor for good outcome in the management of COVID-19 pandemic condition. The prevention /arrest of pandemic can be achieved by adopting proper food habits and life styles as well as regularly taking the *Rasayanas*. It is need of time to implement these principles in National health policies to make the Nation healthy. Further, numbers of herbo-mineral or mineral drugs mentioned in the classics of *Rasashatra*, which are practiced for various acute infections since ancient time. However, clinical trials need to be conducted on the basis of Ayurvedic parameters for generating scientific evidence on safety and efficacy of these drugs in COVID-19 infection for wider acceptance.

#### Authors' Contribution

RDP: manuscript drafting, RDP and RKS: editing, revising, and finalizing.

#### Conflicts of Interest

The authors declare no conflict of interest.

#### Ethical approval

Not applicable.

#### Availability of data and materials

Not applicable.

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