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Review Article

A Review on 2019-nCoV (SARS-CoV-2) in India

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A B S T R A C T

Background: The outbreak of the novel coronavirus, COVID-19, has been declared a pandemic by the WHO on March 11th of 2020. Novel Coronavirus infection mediated pandemic started in China in December 2019 and is still killing 1000s of people throughout the world. The second most populous country, India too is fighting against this infectious disease. The country is taking effective measures to curb the pandemic by exerting extensive campaigning on sanitation and strict social distancing measures to quell the explosion of the infection rate.

Treatment: No drugs are currently approved for Coronavirus Disease-2019 (COVID-19), although some have been tried. In view of recent studies and discussion on tested drugs on COVID-19 patients of India, I aimed to review existing literature and relevant websites regarding these drugs used in India including allopathic, plasma therapy, Ayurvedic and homeopathic medication.

Key words: *Coronaviridae, Nidovirale,* management of stroke, situated patients, allopathic treatment.

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INTRODUCTION

Novel coronavirus (2019-nCoV), officially known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the etiological agent of the (Corona Virus Disease 2019) COVID-19, emerged in Wuhan, Hubei province, China. On 11th March 2020, The World Health Organization (WHO) declared this disease as pandemic[1].Coronaviruses (CoVs) are enveloped nonsegmented positive-sense RNA viruses, belonging to the family *Coronaviridae*and the order *Nidovirales*, and are broadly distributed in humans and other mammals[2].CoVs is four types as follow

- Alphacoronavirus
- Deltacoronavirus
- Beta coronavirus
- Gamma coronavirus

ICTV (International Committee on Taxonomy of Viruses) announced "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" as the new name of the 2019 novel corona virus on 11 February 2020. This name was chosen because the virus is genetically related to the coronavirus responsible for the SARS outbreak of 2003. While related, the two viruses are different. WHO announced "COVID-19" as the name of this new disease on 11 February 2020 caused by SARS-CoV-2.[4]

The symptoms resulting from SARS-CoV-2 or the 2019-nCoV infection at the prodromal phase include fever, dry cough, and malaise specifically. The basic symptoms of COVID-19 as portrayed in Figure 2.

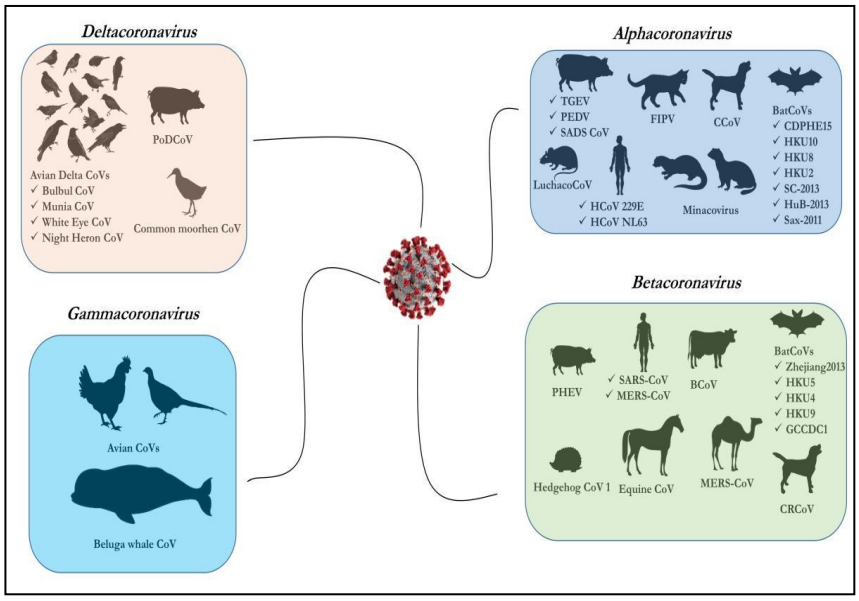

Figure 1: Depiction of different coronaviruses under four Genus (Alpha, Beta, Gamma and Deltacoronavirus) found in a diverse group of Mammalian and avian species[3]

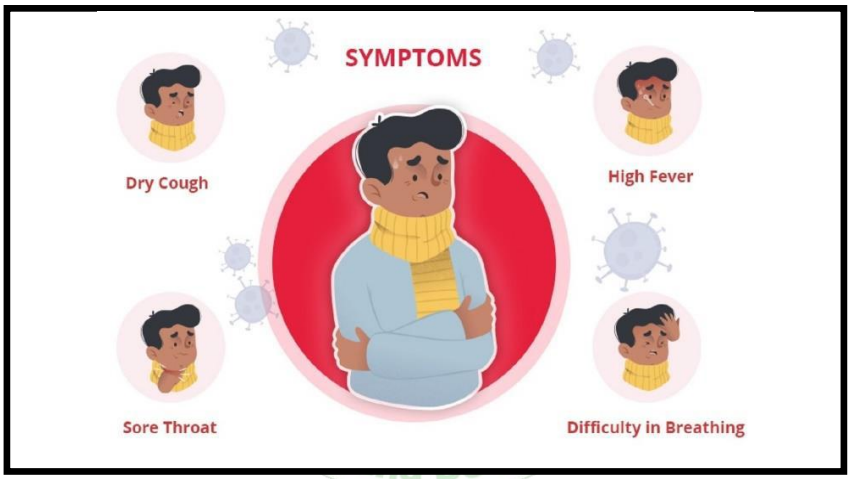

Figure 2: Schematic of COVID-19 symptoms[5]

The most essential factors in preventing the spread of the virus through these means are to empower the citizens with the right information regarding the disease, teaching them the appropriate cough and sneeze etiquette and taking precautions as per the advisories. It is also imperative that financial and majorly psychological support is provided to the citizens.

Figure 3: Schematics of how 2019-nCoV is spread and preventive measures of COVID-19[5]

In India, the first laboratory-confirmed case of COVID-19 was reported from Kerala on January 30, 2020. Subsequently, two more caseswere reported from Kerala. All cases had recentlyreturned from Wuhan, PR China, had mild illnessand were managed symptomatically. More such casescan be expected amongst individuals travelling fromChina, and Wuhan in particular, and amongst their close contacts[6].The first case was three persons travelled from Wuhan, China to Kerala, India which is now considered as the epicenter of the pandemic. Later throughout India, the people who met travelers from infected countries contracted with the disease. First

COVID-19 death in the country was reported on March 13th, 2020. Although being a country of 1.2 billion and a neighbor of China, India has fairly contained the spread of COVID-19 infection to date[7].Several thousand individuals are on surveillance in India due to reasons of fever, recent travel to China and concordant entries in the relevant surveillance questionnaires.[8]

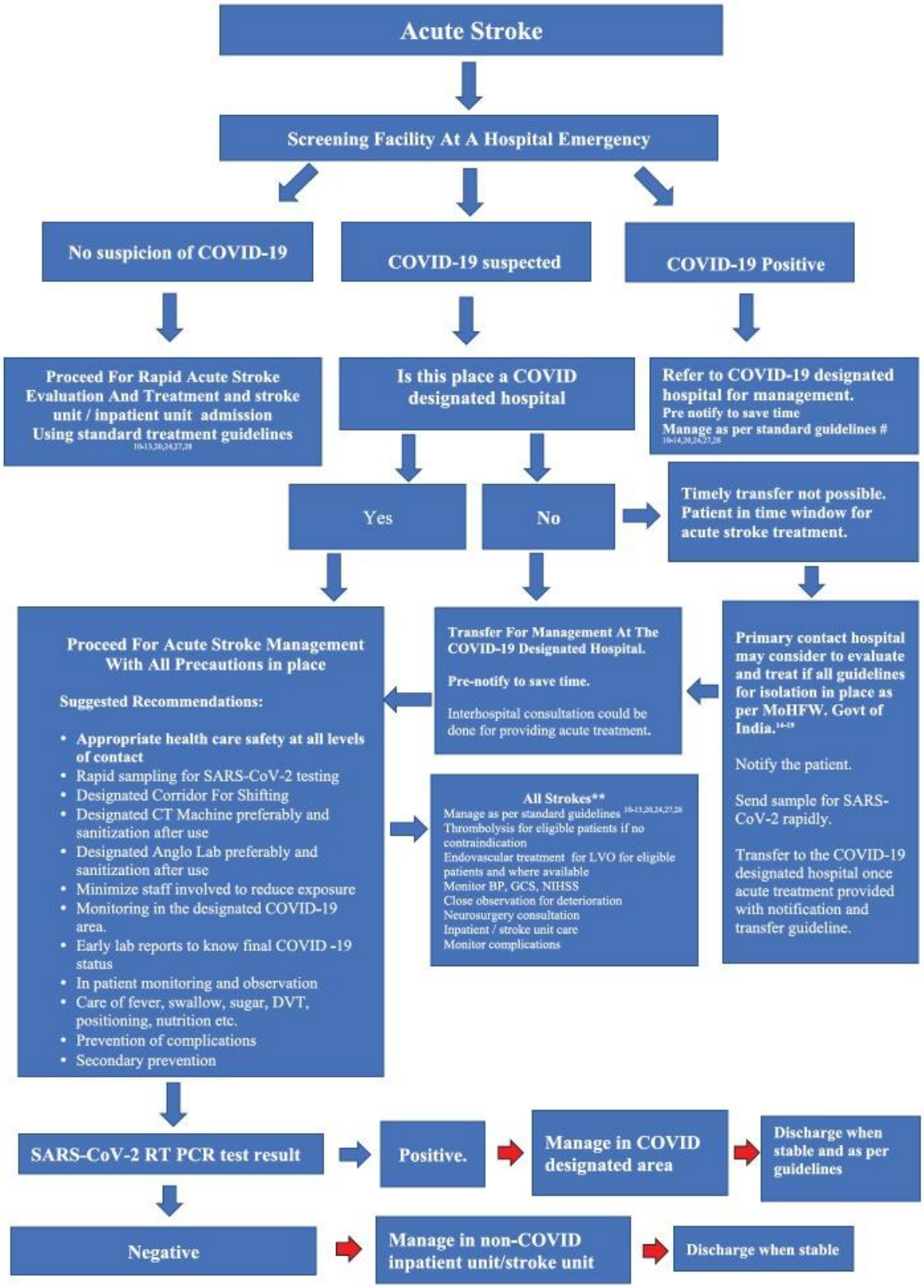

Figure 4: Suggested pathway in the management of stroke during the COVID-19 pandemic. COVID-19: Corona virus associated disease 2019, ** Ischemic stroke, intracerebral hemorrhage and cerebral venous thrombosis commonly, # In seriously ill COVID-19 patients treatment decision may be individualised, GCS: Glasgow coma scale, NIHSS: National institute of health stroke scale, BP: Blood pressure, DVT: Deep vein thrombosis, MoHFW: Ministry of Health and Family Welfare, Govt of India. SARS-CoV-2: Severe acute respiratory distress, corona virus 2[9].

Table: 1 Situated Patients In India[10]

S. No.	Name of State/ UT	Total Confirmed Cases*	Cured/Discharge/Migrated	Deaths**
1	Andaman and Nicobar Islands	33	33	0
2	Andhra Pradesh	2823	1856	56
3	Arunachal Pradesh	1	1	0
4	Assam	378	55	4
5	Bihar	2587	702	13
6	Chandigarh	238	186	3
7	Chhattisgarh	252	67	0
8	Dadar Nagar Haveli	2	0	0
9	Delhi	13418	6540	261
10	Goa	66	19	0
11	Gujarat	14056	6412	858
12	Haryana	1184	765	16
13	Himachal Pradesh	203	63	3
14	Jammu and Kashmir	1621	809	21
15	Jharkhand	370	148	4
16	Karnataka	2089	454	42
17	Kerala	847	521	4
18	Ladakh	52	43	0
19	Madhya Pradesh	6665	3408	290
20	Maharashtra	50231	14600	1635
21	Manipur	34	4	0
22	Meghalaya	14	12	1
23	Mizoram	1	1	0
24	Odisha	1336	550	7
25	Puducherry	41	12	0
26	Punjab	2060	1898	40
27	Rajasthan	7028	3848	163
28	Sikkim	1	0	0
29	Tamil Nadu	16277	8324	111
30	Telengana	1854	1090	53
31	Tripura	191	165	0
32	Uttarakhand	317	58	3
33	Uttar Pradesh	6268	3538	161
34	West Bengal	3667	1339	272
	Cases being reassigned to states	2642		
	Total#	138845	57721	4021
*(Including foreign Nationals)				
**(more than 70% cases due to comorbidities)				
#States wise distribution is subject to further verification and reconciliation				
#Our figures are being reconciled with ICMR				

TREATMENT OF COVID-19 IN INDIA

1. Allopathic treatment:

1) Lopinavir/ritonavir combination therapy:[11]

No antiviral treatment for SARS-CoV-2 infection has been proven to be effective. A few historical control studies or case reports indicate the effectiveness of combination of lopinavir/ritonavir against SARS-CoV and MERS-CoV infections. Ritonavir-boosted lopinavir was approved for

use amongst HIV-infected individuals in September 2000 by the U.S. Food and Drugs Administration. Lopinavir is always used with ritonavir to reduce the dose of lopinavir and increase the plasma levels of lopinavir as ritonavir inhibits CYP3A isoenzyme. Lopinavir and ritonavir are antiretroviral protease inhibitors used in combination as a second-line drug for the treatment of HIV-1 infection in children and adults and have limited side effects. As per the NACO (National AIDS Control Organization) guidelines, lopinavir/ritonavir is used as a second-line drug in the treatment of HIV in combination with nucleoside reverse transcriptase inhibitors (NRTIs).

Dosage of lopinavir/ritonavir:

1. Lopinavir/ritonavir 200 mg/50 mg - two tablets every 12 h for 14 days or for seven days after becoming asymptomatic, whichever is earlier.
2. For patients who are unable to take medications by mouth, 400 mg lopinavir /100 mg.
3. ritonavir 5 ml suspension every 12 h for 14 days or seven days after becoming asymptomatic whichever is earlier, *via* a nasogastric tube.

2) Chloroquine and Hydroxychloroquine (HCQ):

Experimental studies have also demonstrated that chloroquine has potent anti-SARS-CoV-1 effects in vitro, primarily attributable to a deficit in the glycosylation receptors at the virus cell surface, so that it cannot bind to the angiotensin-converting enzyme 2 (ACE2) expressed in lung, heart, kidney and intestine. Since SARS-CoV-2 utilizes the similar surface receptor ACE2, it is believed that chloroquine can also interfere with ACE2 receptor glycosylation thus prevents SARS-CoV-2 attachment to the target cells[12-15]. Chinese researchers who studied the effect of chloroquine in vitro (using Vero E6 cell line infected by SARS-CoV-2) found chloroquine to be highly effective in reducing viral replication that can be easily achievable with standard dosing due to its favorable penetration in tissues including the lung[12, 16].

Since the structure and mechanism of action of chloroquine and hydroxychloroquine (HCQ) are exactly same except an additional hydroxy moiety in one terminal in HCQ, both act as a weak base that can change the pH of acidic intracellular organelles including endosomes/lysosomes, essential for the membrane fusion. It is believed that both the agents could be effective tools against SARSCoV-1 and SARS-CoV-2.[16, 17]

However, an important question that still remains is whether HCQ has a similar effect on SARS-CoV-2 infection. Some data show HCQ effectively inhibited both the entry, transport and the post-entry stages of SARS-CoV-2, similar to the chloroquine and one study found HCQ to be a more potent agent than chloroquine in inhibiting SARS-CoV-2 in vitro[18,19]

Dosage of chloroquine/hydroxychloroquine:

i. Chloroquine 500 mg orally per day.
ii. Hydroxychloroquine400 mg orally per day for 7 to 10 days.

2. Plasma Therapy:

Encouraging observational reports in small numbers of patients have aroused wide-spread interest in the use of convalescent plasma for severely ill COVID-19 patients on ventilators. Randomized controlled clinical trials have commenced with this treatment approach. In general, in viral illnesses antibody response is much brisker in those who have a clinical illness than in those with asymptomatic or subclinical illness. Patients with clinically diagnosed COVID-19 syndrome may be the ones with the highest titers of antibodies. Utilizing the syndromic approach may help identify potential plasma donors in resource poor settings. Since those with the clinical syndrome will be the larger number than those with PCR-proven SARS-CoV-2 infection, a physician can select willing individuals who have recovered from the clinical syndrome for checking on antibody titers prior to plasma pheresis and, thus, reduce costs.[20]

3. Ayurvedic treatment:[21]

Table 1: Ayurvedic preventive measures including the government declared options for apparently healthy individual with no sign and symptom of COVID-19(n=110).

Ayurveda medicaments	Dose	No. of practitioners with positive response
Decoction of Sunthi, Lavang, Pippali, Maricha, cinnamon bark, tej patra	2 gm each in 200mlwater reduced to 50ml-50 ml twice empty stomach	75
Haridra milk or Cow ghee (Emulsified fat)-10 ml with rice/roti	5 gm Haridra boiled in250 ml of milk and reduced to 200 ml	110
Hyawanprash Avaleha	10gm once before break fast	110
Aswagadha tablet -250mg	2 tab twice after food	59
Amalaki Churna	10 gm at night along with Luke warm water	57
Dhopana of house by Resin of saal (Sarjjarasa), Neem leaves, coconut shell andhingu	Morning and evening Fumigation Smoke allergic patients should avoid	110
Pranayama	10-10 min twice	110

Table: 2: Ayurvedic preventive measures for High risk group/geriatric person/those have history of immigration to other country/who declared self-isolation or quarantine/ pre-symtometic phase of COVID-19 (n=110).

Ayurveda medicaments	Dose	No. of practitioners with positive response
Sudarsanaghanavati -250mg	2 tab twice daily after food	75
Gudduchi tablet /SamsamanaVati -250mg	2 tab twice after food	110
Nitya Rasayana Haridramilk or Cow ghee(Emulsified fat) - 10mlwith rice/roti	5 gm Haridra boiledin 250 ml of milk and reduced to 200 ml,Twice a daily	110
Chyawanprash Avaleha/ Fortified Chauvanprash with Gold andsilver particle	10gm once before break fast	99
Dhupana of house byResin of saal (sarjjarasa), Neem leves, coconut shell and hingu.	Morning and evening Fumigation Smoke allergic patients should avoid	110
Pranayama	10-10 min twice	110

Table: 3 Ayurvedic preventive measures for asymptomatic positive cases/A ebrile with only chills and respiratory symptoms in early stage of infection without Dyspnea and hypoxemia phase of COVID-19(n=110).

Ayurveda medicaments	Dose	No. of practitioners with positive response
Sudarsanaghana vat	2 tab twice dailyafter food	110
Gudduchi tablet/SamsamanaVati	2 tab twice afterfood	110
NityaRasayana-Haridra milk or Cow ghee (Emulsified fat)- 10 ml with rice/roti	5 gm Haridraboilein 250 ml of milkand reduced to 200ml, Twice a daily	110
Vyagriharitaki	10gm twice daily with luke warm water before food	59
KusmandaAvaleh	10gm twice daily with luke warm water before food	76
Agathiharitaki	10gm twice dailywith luke warm water before food	62
Bilvadigulika -125mg	2 tab twice dailywith luke warm water before food	73
Siddha Makaradwaja-125mg	1 tab with 2-4 drop of honey in morning empty stomach	78
Kaphaketu rasa -125mg	2tabs with one spoon of fresh tulsi juice	82
Saubhgyavati -125mg	2tabs with one spoon of fresh parijata leave juice	90
Talisadichurna	10gm twice before with honey /luke warm water	72
Arogyavardhini Rasa-250 mg	1 tablet twice daily with water after food	67

Table: 4 Ayurvedic preventive measures for uncomplicated COVID-19 infected patients having temperature > 37^0c without dyspnea and hypoxemia (n=110).

Ayurveda medicaments	Dose	No. of practitioners with positive response
Sudarsanaghanavati	2 tab twice daily after food	110
Amrutadikasayam	20ml twice with 20 ml luke warm water before food	110
Sanjeevanivati -125mg	1 tablet before food	80
SuvrnnaVasantaMalati Rasa -125mg	1tabs twice with one spoon of fresh parijata leave juice	110
SadangaPaneeya	Quantity sufficient as required when felt thirst	92
Sammera Parnaga Rasa -60 mg tab	One tablet twice with honey when kaphapredominant more	65

Vyagriharitaki	10gm twice daily with luke warm water before food	99
Ayush -64-250 mg cap	2 capsule twice with water	66
Agathiharitaki	10gm twice daily with luke warm water before food	92
Bilvadigulika -125m	2 tab twice daily with luke warm water before food	73
Purnachandra Rasa125mg	1 tab with 2-4 drop of honey in morning empty stomach	78
Kaphaketu rasa -125mg	2tabs with one spoon of fresh tulsi juice	82
Saubhgyavati -125mg	2tabs with one spoon of fresh parijata leave juice	90
Talisadichurna	10gm twice before with honey /lukewarm water	72
Arogyavardhini Rasa -250 mg	1 tablet –twice daily with water after food	62

4. Homeopathic treatment:[22]

In homeopathy, arsenic at very low concentration is considered beneficial for several diseases including viral infections. Recently, Directorate of AYUSH, New Delhi, India issued an order dater on January 30, 2020, to take prophylactic medicine to avoid coronavirus infection. The directorate suggested taking 4 pills of Arsenic Album-30 medicine once daily in empty stomach for 3 days. Arsenic Album-30 is highly diluted arsenic trioxide and work as homeopathic prophylaxis.

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