



# Strategies and Guidance to Combat Novel Corona Virus (Covid-19) Disease

**Bhavna K\*, Singhal M, Idris FH, Bhargava S and Ojha A**

Department of Pharmacy, Dehradun Institute of Technology, India

**\*Corresponding author:** Bhavna Kumar, Associate Professor, Faculty of Pharmacy, DIT University, India, Tel: +917500367740; Email: bhavnano@gmail.com

## Mini Review

Volume 4 Issue 3

Received Date: July 17, 2020

Published Date: July 30, 2020

DOI: 10.23880/oajpr-16000208

## Abstract

The emergence of SARS-CoV-2 outbreak which is presently reported as pneumonia of unknown etiology in a cluster of patients in Wuhan province in china has led to epicenter of pandemic of covid-19. The disease has infected >150 countries worldwide and arised as the biggest pandemic till date. The spread of this virus has raised concern as it is rapidly spreading among humans through respiratory droplets and the management of the disease has very limited options as social distancing, isolation, and quarantine. Many scientists, researches, pharmaceutical companies are working on the treatment of COVID 19 disease by either developing a vaccine or drug therapy, or by any other therapy, although some already existing drugs have already worked on for and used to manage the symptoms of the disease. In the current report the authors have compiled some strategies and guidance for combating COVID 19 diseases.

**Keywords:** Coronavirus; Covid-19; Quarantine; Vaccines; Management

## Introduction

Coronavirus a broad spectrum viral infection which occurs in both human and animals are known to cause respiratory tract infections and gastroenteritis [1]. The novel human corona virus, a severe acute respiratory syndrome coronavirus (SARS-CoV-2) according to WHO it was first originated from Wuhan Hubei china in December 2019 [2] WHO declared it as a global pandemic on Wednesday 11<sup>th</sup> march 2020 due to the rapid transmission from human to human through respiratory droplets of infected person as reported by several studies [3] on 11<sup>th</sup> February SARS-CoV-2 was named COVID-19 after discovering its similarity to SARS-CoV and MERS-CoV, belonging to the coronavirus family which are having crown like spikes on their surface [4].

## Emergence and Prevalance

In the mid-1960s, the human corona virus was discovered. Human CoV-229E (HCoV-229E) and Human CoV-

OC43 (HCoV-OC43) were first identified with symptoms of common cold in human [5]. SARS coronavirus (CoV) begins with mild respiratory symptoms and high fever which progresses to pneumonia within a short period of time [6]. MERS which emerged in the late 2012 affected several patients from 27 countries around the world and has highest number reported in Saudi Arabia as WHO reports .The main source of coronaviruses are bats although MERS-CoV have been traced to dromedary camels. SARS-CoV-2(COVID-19) cause serious respiratory flu-like problems [5-7]. SARS-CoV-2 also known as covid-19 is a beta-coronavirus and its relation to the SARS-CoV is clear [8]. As of now, the novel coronavirus has affected 213 existing countries and territories in the world, including 2 international conveyances which have shown in figure 1 & 2.

## Incubation Period, Signs and Symptoms

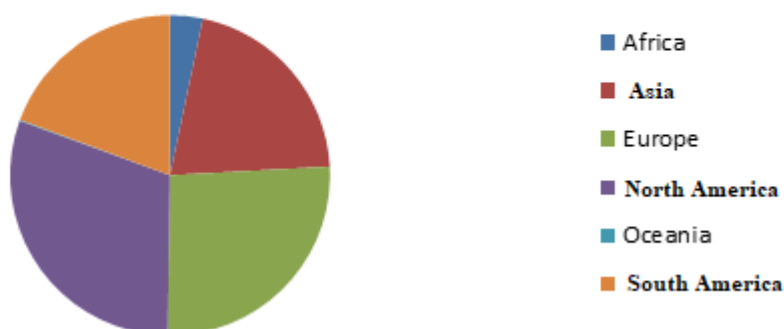
After the data collection on the basis of exposure, onset time of illness, hospital admission and death, study showed that the mean incubation period is 5 days and 95<sup>th</sup> percentile

of incubation is 10-14 days, indicates a total quarantine period which should be less than 14 days [9].

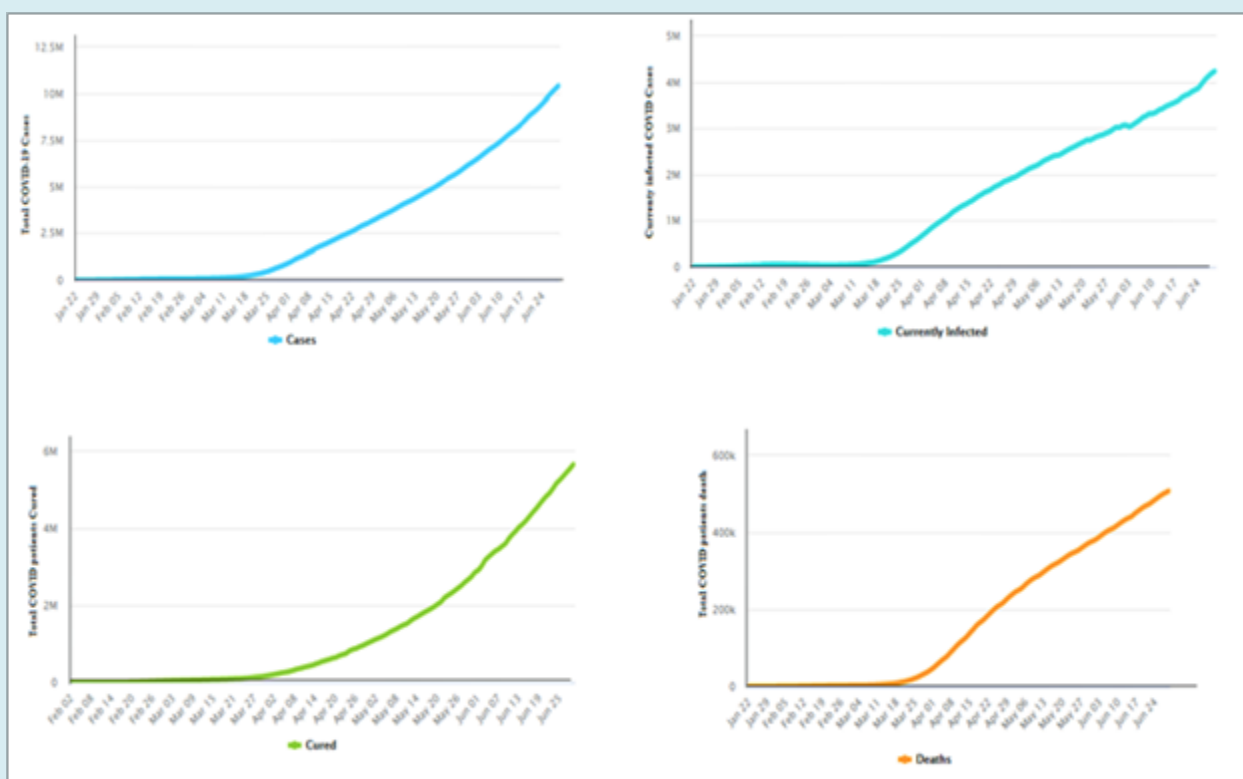
The commonly reported signs and symptoms of COVID-19 are given in table 1. It produces symptoms like cough, shortness of breath, fever which may appear 2-14 days after exposure [10]. According to WHO; some patients

may experience nasal congestion, runny nose, pains and aches, sore throat and diarrhea [11]. The Centre for Disease Control gave list of emergency warning signs like trouble breathing, persistent pain in chest and bluish lips or face. The new symptoms reported with COVID-19 patients are loss of taste and loss of smell [10].

### Geographical distribution of Covid-19 cases by Continents



**Figure 1:** Geographical distribution of Total cases [13].



**Figure 2:** Current total COVID-19 cases, active cases, cured and death prevalence growth chart [13].

Signs and symptoms	Cold	Flu (influenza)	Covid-19
Fever	Mild if present	Often	Often
Fatigue	Occasional, mild	Common	Occasional
Sneezing	Common	Infrequent	Infrequent
Body aches	Common	Common	Occasional
Headaches	Very frequent	Common	Occasional
Sore throat	Common	Occasional	Occasional
Cough	Mild	Dry cough	dry cough, often severe
Shortness of breath	No	Rare	With mild infection
Difficulty in breathing	No	In severe infections	Common in severe cases

**Table 1:** Signs and symptoms of common viral infections compared with COVID-19 [12].

## Prevention and Control

### Hygiene and Social Distancing

The best preventive measure is to avoid coming in contact to the virus, and the first step to take is personal and environmental hygiene which includes washing of hands with soap/hand wash and water, using hand sanitizer containing at least 60% of alcohol, proper use of face mask as well as properly disposing it as per WHO guidelines, covering the mouth while coughing and sneezing with the help of tissue paper and disposing it in a proper manner [14].

To avoid further spread of disease; travel restrictions have being imposed in Corona infected countries. Any person having history of travel in the past 14 days to countries having high cases of covid-19 is monitored and self-isolation and surveillance is mandatory [15].

### Treatment and Management

The rapid spread of covid-19 has created a matter of concern to develop a treatment approach relates to drug development or vaccine development as shown in table 2.

Drug & Dosage form	Class	Action in COVID	Reference
Chloroquine (Oral)	Anti-malarial	Chloroquine was found to block SARS-CoV-2 infection at low micromolar concentration. Chloroquine with azithromycin needs careful monitoring, and can be used only in hospital and clinical settings only.	[20]
Interferon - $\alpha$ (Inhalation)	Anti-viral	a broad-spectrum antiviral that is usually used to treat hepatitis, though it is reported to inhibit SARS-CoV reproduction in vitro.	[23]
Lopinavir / Ritonavir (Oral)	Antiretroviral	It has anti-SARS-CoV activity in vitro and in clinical studies, but no clinical trials available to support use in Covid-19	[24]
Ribavirin (IV infusion)	Antiviral	It can prevent the replication of RNA and DNA viruses by suppressing the activity of inosine monophosphate dehydrogenase, which is required for the synthesis of guanosine triphosphate (GTP)	[27]
Arbidol (Oral)	Antiviral	Arbidol can effectively inhibit SARS-CoV-2 infection at a concentration of 10-30 $\mu$ M in vitro.	[25,26]
Favipiravir (Oral)	Anti -viral	Favipiravir is capable of blocking the replication of flavi-, alpha-, filo-, bunya-, arena-, noro-, and other RNA viruses.	[ 28]
Remdesivir (IV - infusion)	Antiretroviral	The <i>in vitro</i> study showed that remdesivir potently blocked SARS-CoV-2 infection at low-micromolar concentrations and showed a high selectivity index.Reduced the duration of hospital stay in Covid-19 patients	[25,29]
Ivermectin	anti-parasitic agent	A FDA-approved anti-parasitic previously shown to have broad-spectrum anti-viral activity <i>in vitro</i> , is an inhibitor of the causative virus (SARS-CoV-2), with a single addition to Vero-hSLAM cells 2 h post infection with SARS-CoV-2 able to effect ~5000-fold reduction in viral RNA at 48 h.	[30]

**Table 2:** Current Status of Drugs In Management Of Covid-19 Disease.

Till date, no drug or vaccine has been approved as anti covid-19 drug, but some drugs can be used as an emergency treatment for management of the disease together with some traditional methods [16] and benefits to the body to develop natural immune response which plays a significant role in fighting of viral infection either by the adaptive immune response or T-cell response [17].

The initial strategy to treat the symptoms of COVID- 19 are with either use of interferons- $\alpha$  nebulization, broad-spectrum antibiotics, and anti-viral drugs which can reduce the viral load. [18-20].

However the use of a broad spectrum nucleotide analog antiviral drug remdesivir has revealed promising effect against the virus. The use of remdesivir alone or in combination with chloroquine or interferon beta significantly blocked the SARS-CoV-2 replication and patients were stated as clinically recovered [20-22].

Lopinavir -Ritonavir are drugs that have showed preliminary effect against Covid-19, the results suggested that this combination showing little to no benefit treatment beyond standard care which may be due to the late treatment time in patients [23,24].

While the results from the adaptive Covid-19 treatment trials revealed that patients administered with remdesivir showed 31% faster recovery rate than those given the

placebo [25,26].

## Vaccines

There are several approaches in the development of vaccine, the recombinant subunit vaccine is said to have more advantages than other vaccines as it has less side effects. Clover biopharmaceuticals together with GSK have made an announcement of improving the body's response to immunity by bringing together their S-Trimer and GSK's adjuvant. Inovio and Applied DNA sciences are on the preclinical stage of developing a vaccine focused on S protein [31,32].

The use of mRNA is a new technological approach in combating the infectious diseases and can be a potential vaccine candidate, the mRNA based vaccine (mRNA-1273) by Moderna and Vaccine Research Centre NIH has successfully completed phase 1 clinical trial after having shown success in animal models. The other companies working in clinical trials of vaccines are China's casino vaccine which has progressed to second stage of trials, Vaccine by AstraZeneca plc. And Oxford University started trials in the month of April [32] as shown in table 3. The vaccine by Indian Council of Medical Research (ICMR) and Bharat Biotech International Limited (BBIL) came to the phase 1 and 2 clinical trials in July 2020 as per the permission granted by Drug controller general of India. The other institutes as Wuhan institute of biological products, Sinovac, Pfizer-BNTECH vaccine working persistently for the vaccine development.

Company/Sponsor	Vaccine Candidate	Status
Moderna	mRna-1273	phase 2 clinical trials
Oxford and AstraZeneca	AZD1222	advanced stage of trial phase 2/3
Pfizer and BNTech	BNT162	phase 1 and 2 trials
Inovio pharmaceuticals	INO-4800	phase 1 trials
CoronaVac	SinoVac	phase 1and 2 trials
University of Melbourne and Murdoch children's research institute, Radboud university medical center; Foustman lab at Massachusetts General Hospital	BCG live attenuated vaccine	phase 2and 3 trials

**Table 3:** Latest research on covid-19 vaccines [32].

## Indian Senario for Covid -19 Investigations

As the COVID-19 pandemic inception started in India,

Indian Council of Medical research (ICMR) is working for the evaluation of molecules, regimens by AYUSH ministry, products/technologies/ diagnostic kits, etc. (Table 4)

Investigational technologies/ products /diagnostic devices	Indian Research Institutions/Labs			
	DST	DBT	CSIR	ICMR
Synthetic molecules/ drugs-repurposed drugs	IACS, Kolkata JNCASR, Bengaluru	ICGEB, New Delhi RCB, Faridabad ILS, Bhubaneswar THSTI, Faridabad RGCB, Kerala	IICT, Hyderabad NCL, Pune CDRI, Lucknow NIIST, Thiruvananthapuram IIIM, Jammu NEIST, Jorhat	NIV, Pune NARI, Pune
Synthetic molecules/ drugs- New molecules	IACS, Kolkata JNCASR, Bengaluru	ICGEB, New Delhi RCB, Faridabad ILS, Bhubaneswar THSTI, Faridabad RGCB, Kerala	IICT, Hyderabad	NIV, Pune NARI, Pune
Nano particles	IACS, Kolkata JNCASR, Bengaluru	ICGEB, New Delhi ILS, Bhubaneswar THSTI, Faridabad RGCB, Kerala	NCL, Pune NIIST, Thiruvananthapuram	-----
Plant extracts (Crude extracts/oils/ purified products)	ARI, Pune JNCASR, Bengaluru	RCB, Faridabad ILS, Bhubaneswar IBSD, Manipur THSTI, Faridabad RGCB, Kerala ICGEB, New Delhi	IICB, Kolkata NBRI, Lucknow IIIM, Jammu	-----
Herbal formulations	National Innovation Foundation, Gandhinagar JNCASR, Bengaluru	RCB, Faridabad ILS, Bhubaneswar IBSD, Manipur THSTI, Faridabad RGCB, Kerala ICGEB, New Delhi	IIIM, Jammu NBRI, Lucknow NIIST, Thiruvananthapuram	-----
Ayurveda based formulations	JNCASR, Bengaluru	RCB, Faridabad ILS, Bhubaneswar THSTI, Faridabad RGCB, Kerala ICGEB, New Delhi	IIIM, Jammu	-----
Siddha based formulations	JNCASR, Bengaluru	RCB, Faridabad RGCB, Kerala ICGEB, New Delhi	TKDL, New Delhi	-----
Homeopathy based formulation	JNCASR, Bengaluru	RGCB, Kerala ICGEB, New Delhi	TKDL, New Delhi	-----
Surface Disinfectants	SCTIMST, Thiruvananthapuram IACS, Kolkata, JNCASR, Bengaluru	-----	-----	-----
Hand sanitizers	ARCI, Hyderabad IACS, Kolkata ARI, Pune JNCASR, Bengaluru	IBSD, Manipur	-----	-----
Diagnostic/ventilators/ supportive devices etc	SCTIMST, Thiruvananthapuram ARI, Pune	THSTI, Faridabad (only in vitro diagnostics) RGCB, Kerala	NAL, Bengaluru CMERI, Durgapur CSIO, Chandigarh	-----
UV based equipment's/ small portable unity ozone based units/ Ion generator	SCTIMST, Thiruvananthapuram ARCI, Hyderabad IACS, Kolkata	-----	CMERI, Durgapur CSIO, Chandigarh	-----

PPE-Fabrics, Masks, Gloves	ARCI, Hyderabad IACS, Kolkata JNCASR, Bengaluru	-----	NAL, Bengaluru NCL, Pune CMERI, Durgapur	-----
AI-Health tools	JNCASR, Bengaluru	-----	IGIB, New Delhi CEERI, Pilani	-----
Mobile applications (Apps)	IACS, Kolkata JNCASR, Bengaluru	-----	IGIB, New Delhi CEERI, Pilani	-----

**Table 4:** List of Indian Research Institutions and Labs working for products/technologies/ diagnostic kits [33].

## Conclusion

Due to the spreading of COVID-19 pandemic, scientists around the world are actively exploring various treatments, therapies, diagnosis that would be potentially effective in combating COVID-19. Generally, till date there are no finally verified antivirals specific to COVID-19 treatment at present. Hence, the safety and efficacy of drug candidate used in the treatment of COVID-19 need to be confirmed in further preclinical and clinical trials.

## Conflict of Interest

No conflict of interest has been declared by the author.

## References

- Zhu Y, Li C, Chen L, Xu B, Zhou Y, et al. (2018) A novel human coronavirus OC43 genotype detected in mainland china. *Emerg Microbes Infect* 7(1): 1-4.
- Lauer SA, Grantz KH, Bi Q, Jones FK, Zeng Q, et al. (2020) The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: Estimation and application. *Ann Intern Med* 172(9): 577-582.
- Lai CC, Shih TP, Kos WC, Tang HJ, Hsueh PR, et al. (2020) Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and corona virus disease -2019 (COVID-19): the epidemic and the challenges. *Int J Antimicrobial Agents* 55(3): 105924.
- Khan S, Siddique R, Shereen MA, Ali A, Liu J, et al. (2020) The emergence of a novel coronavirus (SARS-CoV-2) their biology and therapeutic options. *J Clin Microbiol* 58(5): 1-11.
- Ashour HM, Elkhatab WF, Rahman MM, Elshabrawy HA (2020) Insights into the recent 2019 novel coronavirus (SARS-CoV-2) In light of past Human Coronavirus Outbreaks. *Pathogens* 9(3): 186.
- Zhong NS, Zheng BJ, Li YM, Poon LLM, Xie ZH, et al. (2003) Epidemiology and cause of severe acute respiratory syndrome (SARS) in Guangdong, People's Republic of China. *Lancet* 362(9393): 1353-1358.
- Mubarak A, Alturaiki W, Hemida MGS (2019) Middle East Respiratory Syndrome Coronavirus (MERS-CoV): Infection, Immunological Response, and Vaccine Development. *J Immunol Res*, pp: 1-11.
- Velavan TP, Meyer CG (2020) The COVID-19 epidemic. *Trop Med Int Health* 25(3): 278-280.
- Linton NM, Kobayashi T, Yang Y, Hayashi K, Akhmetzhanov AR, et al. (2020) Incubation Period and Other Epidemiological Characteristics of 2019 Novel Coronavirus Infections with Right Truncation: A Statistical Analysis of Publicly Available Case Data,. *J Clin Med* 9(2): 538.
- CDCP (2020) Symptoms of Coronavirus. Center for Disease Control and Prevention.
- WHO (2020) Q&A on coronaviruses (COVID-19), World Health Organization.
- (2020) Covid19 Vs. common flu Vs. cold. *Medicine Net*.
- (2020) Corona virus update live.
- Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, et al. (2020) Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review. *Infect Dis Poverty* 9(1): 29.
- Wu YC, Chen CS, Chan YJ (2020) The outbreak of COVID-19: An overview. *J Chin Med Assoc* 83(3): 217-220.
- Li H, Zhou Y, Zhang M, Wang H, Zhao Q, et al. (2020) Updated approaches against SARS-CoV-2. *Antimicrobial Agents and Chemotherapy* 64(6): 1-7.
- (2020) Update 24 immunity and clinical manifestations.
- Ng CS, Kasumba DM, Fujita Luo TH (2020) Spatio-temporal characterization of the antiviral activity of the XR1-DCP1/2 aggregation against cytoplasmic RNA viruses to prevent cell death. *Cell Death Differ* 27: 2363-



- 2382.
19. Wang BX, Fish EN (2019) Global virus outbreaks: Interferons as 1st responders. *Semin Immunol* 43: 101300.
  20. Wang M, Cao R, Zhang L, Yang X, Liu J, et al. (2020) Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) *In vitro*. *Cell Res* 30: 269-271.
  21. Agostini ML, Andres EL, Sims AC, Graham RL, Sheahan TP, et al. (2018) Coronavirus susceptibility to the antiviral remdesivir (GS-5734) is mediated by the viral polymerase and the proofreading exoribonuclease. *MBio* 9(2): 221-318.
  22. Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, et al. (2020) First case of 2019 novel coronavirus in the United States. *N Engl J Med* 382(10): 929-936.
  23. NIH (2020) COVID-19 Treatment Guidelines Panel. Coronavirus Disease 2019 (COVID-19) Treatment Guidelines, National Institutes of Health.
  24. Chu CM, Cheng VCC, Hung IFN, Wong MML, Chan KH, et al. (2004) Role of lopinavir/ritonavir in the treatment of SARS: Initial virological and clinical findings. *Thorax* 59(3): 252-256.
  25. Dong L, Hu S, Gao J (2020) Discovering drugs to treat coronavirus disease 2019 (COVID-19). *Drug Discov Ther* 14(1): 58-60.
  26. NIH (2020) Pursuing safe and effective antiviral drug for covid-19. National Institute of Health.
  27. Jones BM, Ma ES, Peiris JS, Wong PC, Ho JCM, et al. (2004) Prolonged disturbances of in vitro cytokine production in patients with severe acute respiratory syndrome (SARS) treated with ribavirin and steroids. *Clin Exp Immunol* 135(3): 467-473.
  28. Delang L, Abdelnabi R, Neyts J (2018) Favipiravir as a potential countermeasure against neglected and emerging RNA viruses. *Antiviral Res* 153: 85-94.
  29. NIH (2020) NIH clinical trials show Remdesivir accelerates recovery from advanced covid-19.
  30. Caly L, Druce JD, Catton MG, David AJ, Wagstaff KM (2020) The FDA-approved drug ivermectin inhibits the replication of SARS-CoV-2 *in vitro*. *Antiviral Research* 178: 104787.
  31. Cohen J (2020) Vaccine designers take first shots at COVID-19. *Science* 368(6486): 14-16.
  32. (2020) COVID-19 vaccine tracker. *Regulatory Focus*.
  33. ICMR (2020) Guidance for evaluation of novel applications for COVID-19.

