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Covid - 19: Government Intervention and Post Covid Complications in India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Most discussing topic in the year 2020 is nCovid-19, popularly known as Covid-19 in which most anticipated debates are going on for concluding the justification of lockdown. Present work reveals that India where large population lives in very dense localities are still struggling for improving its healthcare facilities. From very beginning government of India has taken many important steps to protect the country from this pandemic. The Government has taken the decision of lock down and face criticism for imposing lock down. But now we can understand that at very initial stage where the modern science and technology failed to explain all aspects of this pandemic, in that situation the lockdown was a good decision, It provided sufficient time for government and healthcare departments to be ready to deal with this pandemic. This paper is also explain the post Covid-19 complications.

Keywords: Covid-19; pandemic; lockdown; RT-PCR; treatment; vaccine; Mucormycos.

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1. INTRODUCTION

From the last two decades, viral epidemics have caused serious public health issues [1]. The recent in the list is "Novel Corona virus Disease 2019" (COVID-19). Its unexpected advent has wreaked havoc in everyone's personal as well as professional lives. This virus belongs to subfamily of Corona virineae and is a fast spreading communicable disease caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), a beta corona virus [2,3]. 79,051,432 cases have been reported (as of December 24, 2020) from more than 200 countries and territories, since it was first identified in December 2019 in Wuhan, capital of Hubei province in China, causing approximately 1,737,518 deaths: 55,645,258 people have recovered [4,5]. WHO declared the 2019-2020 corona virus outbreak a Public Health Emergency of International Concern (PHEIC) on 30 January 2020 and a pandemic on 11 March 2020 [6,7].

As of now, the only possible method to avoid transmission of COVID-19 and to treat its symtoms is preventive care: social distancing, following basic etiquettes while coughing and sneezing, and washing and sanitizing hands frequently [8,9]. Currently many countries are claiming for development of vaccines for treatment of COVID-19. But still the only treatment available is treating the symptoms by isolation of the patient, supportive care, and medications like corticosteroids, vasodilators, antivirals, and immune therapies [10,11,12].

2. TRANSMISSION

As of now, this virus is found to be transmitted primarily due to close contact with people and through respiratory droplets, though airborne transmission is not yet justified [13,14]. COVID-19 is also found to get transmitted by coming in contact, directly or indirectly, with a surface or an object containing virus infused droplets and then touching ones face. One of the major problems with this virus is that it could be asymptomatic in some people and they become the mode of transmission of the virus. A study carried out by scientists in University of California, Los Angeles, published in the *New England Journal of Medicine,* discovered that the virus is detectable for up to three hours in aerosols, up to four hours on copper, up to 24 hours on cardboard and up to two to three days on plastic and stainless steel [13,14,15]. The transmission range of virus was assumed to be about 1 metre, but in a recent study carried out by Lidiya Bourouiba, a scientist and an associate professor in Massachusetts Institute of Technology (MIT), Boston, USA, she revealed that the pathogen-bearing droplets of all sizes can travel upto a distance range of **23 to 27 feet** [15,16,17]. Fig. 1 shows Stages of COVID-19 Transmission.

3. COVID-19 SYMPTOMS, MANAGEMENT

Initial symptoms of COVID -19 resemble to that of pneumonia or common flu. These include dry cough, fever, sputum production, and congestion in respiratory tract. Severe conditions may result in symptoms like muscle pain, sore throat, abdominal pain, diarrhea, and in worst cases, mutli-organ failure [16,17]. The duration of onset of symptoms of this viral disease is about 2 to 14 days and it is most contagious within first 3 days of its symptoms' onset [13,18,19].

The standard method for diagnosis of this infection is by reverse transcription polymerase chain reaction (rRT-PCR) from a nasopharyngeal swab. It can also be diagnosed by scrutinizing combination of symptoms or by CT scan of the chest cavity [20,21].

4. IMPACT OF COVID-19 OUTBREAK IN INDIA

India encountered its first case of COVID-19 on 30 January 2020 in Kerala, which rose to 3 by February 3, all being students who had returned from Wuhan, the epicenter of outbreak. The number of cases in India escalated due to transmission from people having a travel history to affected countries. As of April 5, the confirmed COVID-19 cases in India have crossed 3000 and a death toll of over 70 [22,23]. The root cause of spread of this virus in India is transmission by people who have had a travel history to affected countries or by people who came in contact with an affected person during their travel, and then visited India. Mostly, the people found positive of corona had a travel history to counties like China, Thailand, Italy, Spain, USA, Iran, and UAE. They came in contact with the localites thus, leading to start of stage 2 of virus spread. This led to a rapid increase in the number of corona positive cases in India, eventually leaving the government with no other option but lockdown of entire nation.

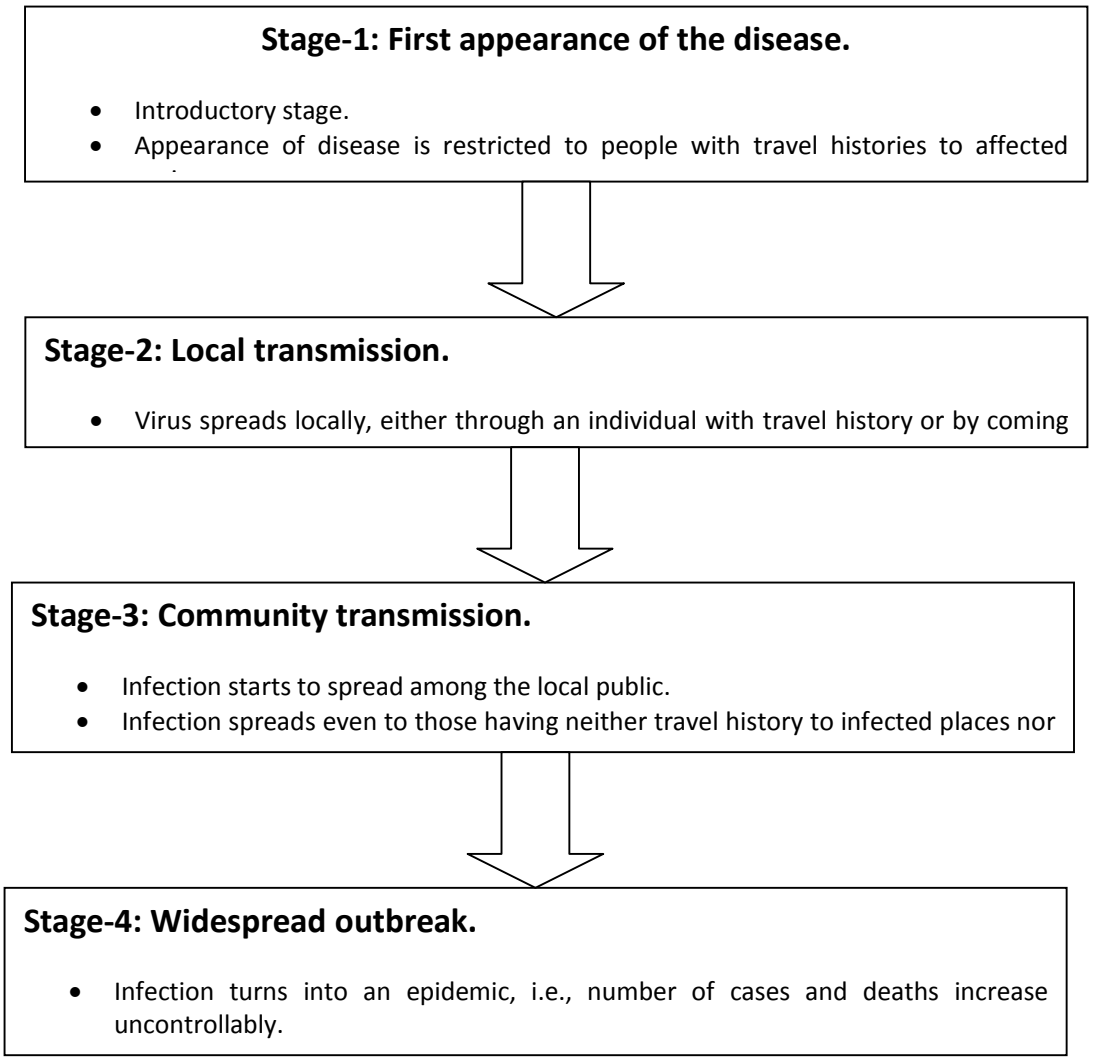

Fig. 1. Flow chart describing the stages of COVID-19 transmission [24]

The State and local governments announced shut down of many local instituituons, schools, universities, and also suspended all tourist visas around mid of March. On 22 March 2020, the country observed a 14 hour voluntary lockdown, "janata curfew" (people's curfew) from 7 am to 9 pm at the instance of Prime Minister Narendra Modi. Followed by this, on March 24, the PM ordered a nationwide 21 days lockdown, affecting the entire population as well as economy of the country [25-28].

On 14 Februrary 2020, the then only 3 cases of coronavirus in Kerala, India, fully recovered [29].

On 14 April, the Prime Minister extended the ongoing nationwide lockdown till 3 May. As of 14 April, the MoHFW confirmed a total of 10,815 cases and 353 deaths in the country [30].

At the end of all lockdown there was total 190668 positive cases including 5407 deaths. Many of major cities like Hydrabad, Indore, Bhopal, Delhi, Chennai, Kolkata, Ahmadabad, Jaipur are identifies as hotspot for COVID-19. On mid of july India becomes third most infected country. From july we found exponential growth in COVID-19 cases. In current scenario 10099308 cases are found positive. The active, cured/discharged, deaths and total confirmed cases have been tabulated (Table-1). This revels good control on COVID-19 transmission, during the lockdown period and the cases are exponentially increases after unlock as shown in Fig. 1. Date wise data of COVID-19 cases in India.

Table 1. Date wise data of COVID-19 cases in India (as of May 10) [29]

S.No.	Date (2020)	Number of cases reported	Total number of cases	Total number of people succumbed
1	30 January	1	1	0
2	2 February	1	2	0
3	3 February	1	3	0
4	9-14 March	75	78	2
5	15-22 Marc	290	368	7
6	23-28 March	541	909	19
7	29 March - 5 April	2668	3577	83
8	6-12 April	4870	8447	273
9	13-19 April	7669	16116	519
10	20-26 April	10801	26917	826
11	27-3 May	13346	40263	1306
12	4-10 May	22676	62939	2109

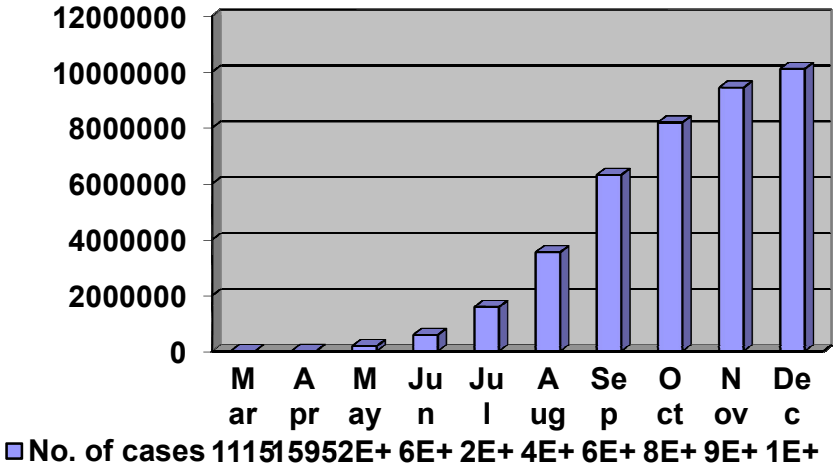

Fig. 2. Graph depicting number of corona virus cases with respect to time period in India

4.1 Social Impact of COVID-19

The worldwide outbreak of COVID-19 has compelled everyone to practice social distancing. It involves avoiding public gatherings, functions, and any such activities which involve a social meeting.

Man is a social animal and socializing is very important for ones mental health and personal development. Due to the outbreak of this pandemic, social relationships are deeply affected leading to a state of anxiety, loneliness, stress, monotony, depression, and many other mental as well as physical disorders. It has created as sense of fear among individuals worldwide. On the other hand, if we ponder at the positive aspects of this situation, as a whole, it has united the society and made it mentally stronger. It has brought individuals closer to their families and friends. Moreover, it has given our mother nature time to self heal, as human interventions in nature's phenomena have greatly reduced [31,32,33].

Some measures advised by WHO to ameliorate people's mental health:

- Avoid listening, watching, and reading of news which create a sense of fear. Be

aware only of the information which is necessary and do not over think on it.
- Minimize the use of social media and all the other things which hinder your peace of mind [3].

4.2 Economic Impact of COVID-19

The COVID-19 outbreak has proved to be a catastrophe for the whole world. All the major economically contributing countries of the world are facing an unprecedented shut down of business markets, malls, factories, schools and colleges, and flights and tourism. This has devastated the world economic and share market. The Organization for Economic Co-operation and Development (OECD) has estimated that the global economic growth could fall to as low as 1.5%. According to an estimation by economic times, "India faces a huge decline in government revenues and growth of the income for at least two quarters as the Corona Virus hits economic activity of the country as a whole." [31-34].

5. COVID-19 OUTBREAK MEASURES TAKEN BY INDIAN GOVERNMENT AT A GLANCE

5.1 Decision of Lock Down

Still world is facing unexpected and most critical problem of the century. That pandemic is creating most burden to highly populated countries like India where the people's lives in very dense localities and still struggling for improving its healthcare facilities. Even at many places it is found after lock down the social distancing was not possible due to the dense population of that area. From very beginning government of India has taken many important steps to protect the country from this pandemic. The Government has taken the decision of lock down and face criticism for imposing lock down but now we can understand at very initial stage where the modern science and technology were failed to explain all aspects of this pandemic so in this situation the lockdown was a good decision. This provided sufficient time to government and healthcare departments to be ready to deal with this pandemic.

5.2 Rules and Laws Imposed as Preventive Measures

Table 2. Table showing some of the preventive measures taken by Indian

Date (2020)	Rules imposed
31 January	• Initiation of preparative measures- diagnostic, public awareness, preparedness at hospitals and nursing homes, and infection control. • Screening at 21 airports initiated by Ministry of Health and Family Welfare (MoHFW). • Surveillance at various entry points and issuing of travel advisory guidelines. • Establishment of 12 more labs across various states. • Advised states to activate control room services and help line numbers.
6 February	• Indian Council of Medical Research (ICMR), Pune assigned as the Nodal Centre. • Established 11 more labs. • Strict screening of passengers at airports and passengers returning from China to be quarantined. • Suspension of visas for people travelling from China to India. • Emergency and risk communication systems strengthened.
13 February	• Passengers arriving from China, Hong Kong, Japan, Korea, Singapore and Thailand were screened at various airports. • About 16,000 passengers home quarantined, 497 suspected cases kept in isolation, 645 passengers evacuated from Wuhan quarantined at ITBP campus, and1725 samples tested.
21 February	• 13 VRLD labs were established for screening. • All passengers arriving after 15 February will be quarantined for 14 days.
28 February	• Further restriction on people travelling from Iran, Italy, and Republic of Korea. • Screening was further expanded to people arriving from Indonesia, Kathmandu, Malaysia, and Vietnam.

Date (2020)	Rules imposed
	• Passengers were kept at community surveillance Integrated Disease Surveillance Programme (IDSP) network everyday. • 119 Indian citizens and 5 from Sri Lanka, Nepal, South Africa, and Peru were evacuated from Japan and quarantined at Princess Cruise Ship in Yokohama. • Initiated exchange of information updates on COVID-19 with ICMR and WHO.
3 March	• Suspension of all visas belonging to citizens of Italy, Iran, South Korea, and Japan.
9 March	• Installed 57 more labs and equipped hospitals with equipments needed for treatment in association with the private sector. • Mobile caller tune was launched by every telecom company to give basic preventive measures of virus. • Training program for trainees was organized by MoHFW.
14 March	• Government of India declared COVID-19 a serious disaster and announced relief fund for infected people. • Except diplomatic, official, UN/International Organizations, employment, project visas, all other visas suspended till 15 April, 2020. • All passengers required to fill self declaration forms and undergo universal health screening at assigned counters. • 1171061 passengers screened from 10876 flights and 42,296 passengers were monitored under community surveillance, out of which 2,559 were symptomatic and 522 hospitalized.
22 March	• Voluntary 14 hours "Janata Curfew" declared on 22 March, 2020. • Suspended all flights and train services till 31 March, 2020. • Trainings on COVID-19 conducted in more than 564 districts. • State Rapid Response team and Epidemic act activated in all states. • Closure of educational institutes/ cinema halls in all states. • Mock drill conducted in 10 states. • Mass quarantine facilities identified in 25 states.
25 March	• 21 days lockdown declared by Government of India.
14 April	• Lockdown extended till 3 May.
1 May	• Lockdown extended till 17 may
17 May	• Lockdown extended till 31 may
Unlock I	• 1 June 2020 – 30 June 2020 (30 days)
Unlock II	• 1 July 2020 – 31 July 2020 (31 days)
Unlock III	• 1 August 2020 – 31 August 2020 (31 days)
Unlock IV	• 1 September 2020 - 30 September 2020 (30 days)
Unlock V	• 1 October 2020 - 31 October 2020 (31 days)
Unlock VI	• 1 November 2020 - 30 November 2020 (30 days)
Unlock VII	• 1 December 2020 - 31 December 2020 (24 days)

5.3 Government Efforts to Fight COVID-19. [35-43].

5.2.1 Infrastructure and other facilities

- Installation of one lakh isolation beds and 12,000 ICU beds in 602 hospitals nationwide.
- 197 government labs and 82 private labs in action for testing of coronavirus.
- Conversion of train coaches to isolation wards.
- As of 18 April, 31 real-time PCR kits, for detection of SARS-CoV-2 RNA, have been validated by ICMR validation centres and 23 antibody based rapid tests have been validated at NIV Pune.
- A team of 21 specialized doctors and techies appointed as the special task force to wholly combat COVID-19.
- Large scale production and distribution of N95 masks and sanitizers.
- Appointment of about 8,500 doctors from all three defence departments

and also of 25,000 NCC cadets [44,45].

6. CURATIVE AND TREATMENT MEASURES

The various drugs used in treatment of COVID-19 mainly include antivirals. Following are the medications being used:

6.1 **Entry inhibitors**- These are antiretrovirals used in combination therapy for treatment of HIV infections. Examples are maraviroc, enfuvirtide, and Ibalizumab.

6.2 **Replication inhibitors**- Potential nucleoside analogues, which inhibit viral RNA genome repliocation, are used as antivirals in treatment of infections like SARS-CoV-2, ebola, and pneumonia. Nucleoside analogue anti-HIV drugs used are zidovudine, stavudine, zalcitabine, emtricitabine, lamividine, alovudine.

6.3 **Remdesivir** is a nucleotide adenosine analogue antiviral drug, used for ebola, has now been found to be effcetive againt COVID-19 as well.

6.4 Nucleoside analogues which are **DNA synthesis inhibitors** are also found effective in treatment of SARS-CoV-2. These are tenofovir disoproxil, lamivudine and other related antivirals.

6.5 **Protease inhibitors**- These are antivirals involved in inhibition of protease enzymes which are involved in maturation of viral cell inside host cell. The lopinavir and ritonavir combination treatment have found to be effective in treating SARS-CoV-2 infections.

6.6 **Heterocyclic antivirals** such as Umifenovir, Galidesivir and Garunavir used as antiviral for HIV / H1N1 / H1N5 / SARS are actively pursued for evaluation for SARSCoV-2. Oseltamivir, a most widely used neuraminidase inhibitor for treatment of influenza has also been recommended for COVID-19 symptoms.

6.7 **Antimalarials-** chloroquine and hydroxychloroquine along with remdesivir have been found to be very effective in treatment of SARS-CoV-19.

6.8 In addition to heterocyclic antivirals, angiotensin-converting enzyme 2 (ACE2)-based peptide, 3CLpro inhibitor (3CLpro-1) and vinylsulfone protease inhibitor are believed to show and can be evaluated for potential antiviral activity against SARS-CoV-2.5.

6.9 Nano drug delivery systems and biological therapeutics (like antibodies) are being evaluated for future treatments [46-60].

7. CURRENT SCENARIO

7.1 Current Vaccine Status

In this year, the most awaited development in the field of medicine is vaccine of the deadly disease Covid -19. This will help our body the develop immunity against the virus without getting ill by producing memory t-and b- lymphocytes. Research is going on 3 types of vaccine- mRna vaccine, protein subunit vaccine and vector vaccine. According to WHO approximately 60 vaccine candidates are in clinical development stage and 170 approx in preclinical development. In present condition United Kingdom became first nation to approve vaccine developed jointly by the American drug company Pfizer and Germany's BioNtech. The vaccine has to be kept at ultra low temperature (-70 degree centigrade) and have to administered twice. USA also started vaccination by giving approval to Pfizer/ BioNtech vaccine and also vaccine developed by Moderna. Russia's Sputanik V vaccins is also in very last stage of clinical trials and hopefully it will get final approval soon. China's Sinovac is also in third phase trials. United Arab Emirates started vaccination of Pfizer/ BioNtech vaccine. In India Covaxin from Bharat Biotech and Oxford- Astrazeneca vaccine shows promising results and soon will be approved.

7.2 Post COVID-19 Complications

Mucormycos or black fungus which is known for causing infectious complications in immunodeficient individuals but now it is creating complications in post corona patients. As per the statement of Shree Ganga Ram Hospital, Delhi. "In the last 15 days, we have seen 13 cases of Covid-19-triggered mucormycosis. Five have dead. At least three patients have suffered vision loss and have had to undergo removal of the nose and jaw bone to prevent the spread of infection. According to Manish Munjal, senior ENT surgeon, at the hospital, "The frequency with which we are witnessing the occurrence of COVID-19-triggered mucormycosis with high morbidity and mortality has never been seen before and is shocking and alarming." Delhi is the capital of India and it is believed that capital have all possible advanced hospital facilities for

diagnosis and treatment but the COVID-19 is now spreads all over the country so a big challenge with COVID-19 Associated co-infections are they may be misdiagnosed as still there is lake of data related to Covid-19-triggered mucormycosis. Even ICMR has not given any advisory related to this COVID-19-triggered mucormycosis.

8. CONCLUSION

The year 2020 has posed many implications worldwide. The rise of Covid -19 features that the current information about human–creature boundaries and diseases caused by animals are not just sufficient as it also requires the need for an essential broad thorough research. Many people lost their lives due to disease; many lost their jobs due to lockdown, Education suffered, even the whole country suffered an economic back through. This covid year also disturbed mental wellbeing. But government tried all the preventative measures to end the pandemic. Now it is responsibility of all individuals to protect himself by following the rules imposed by government like wearing masks, social distancing and washing hands /sanitizing hands regularly. now the world is heading towards New Year with new hope to end this disease and to future preparedness for such type of conditions.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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