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Research Article

Prevention and Control of COVID-19 in Indian Perspective

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A B S T R A C T

The COVID-19 was first identified as the cause of an outbreak of respiratory illness in Wuhan, Hubei Province, China beginning in December 2019 resulting in high morbidity and mortality. This epidemic had spread to almost all the countries of the globe with 202 countries affected with corona virus reporting 722401 cases and 34007 deaths (till 29.3.2020). A total of 159,102 have been reported as recovered. The World Health Organization declared it as a Public Health Emergency of International Concern. The Medical fraternity is struggling hard to gather latest updates and better understanding of the epidemiology, causes, clinical diagnosis, prevention and control of this virus. Studies thus far have shown origination in connection to a seafood market in Wuhan, but specific animal association has not been confirmed. The reported symptoms include fever, cough, fatigue, pneumonia, headache, diarrhea, hemoptysis, and dyspnea. Preventive measures such as masks, hand hygiene practices, avoidance of public contact, case detection, contact tracing and quarantines are effective for reducing the transmission. There is no specific treatment or vaccine which has been proven quite effective. Therefore, infected people are primarily given symptomatic treatment and supportive care with proper isolation and quarantine. Such public health emergencies in the form of pandemic need to be managed with strict social distancing and not allowing Stage 3, which is community transmission. Proper planning of infra-structure, resources, capacity building need be in places under such crucial period to avoid the chances of transmission and mortality.

Keywords: COVID-19, 2019-nCoV, Virus, Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) Coronavirus

Introduction

COVID19 was first identified as the cause of an outbreak of respiratory illness in Wuhan, Hubei Province, China beginning in December 2019 and resulting in high morbidity and mortality. This epidemic had spread to almost all the countries of the globe with 202 countries affected with corona virus reporting 722401 cases and 34007 deaths. Coronavirus belongs to the family of virus that causes viral pneumonia including fever, breathing difficulty, and lung infection.[1] These viruses are common in animals worldwide, but very few cases of them are known to affect humans. The World Health Organization (WHO) used the term 2019 novel coronavirus (2019-nCoV) to refer to the

coronavirus that was diagnosed from the lower respiratory tract of patients with pneumonia in Wuhan, China on 29 December, 2019.[2-3]

It was reported that the human infection of the virus originated from the local Huanan South China Seafood Market in Wuhan, Hubei Province, China. The WHO reported that the outbreak of the coronavirus epidemic was associated with the marketplace, but no specific animal association has been identified,[4] Scientists immediately started to research the source of coronavirus. The first genome of 2019-nCoV was published by the research team led by Prof. Yong-Zhen Zhang, on January 10, 2020.5 Within one month, this virus spread quickly throughout China and globally during the Chinese New Year when there is high level of human mobility among Chinese. Although it is still early to predict the susceptible population, early patterns have shown a similar trend with Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) coronavirus, showing associations with age, biological sex and other health conditions.[6] 2019-nCoV has now been declared as Public Health Emergency of International Concern by WHO.[7]

CORONA: Crown or Coronary Artery

Virus has an RNA core and belongs to the corona virus family. 'Corona' means crown or the halo surrounding the sun. The arteries supplying oxygen to the heart are also called coronary arteries, because the heart is considered the crown. In electron microscope, it is round in shape with spikes poking out from its periphery. The three deadly human respiratory coronaviruses so far are:

- Severe acute respiratory syndrome coronavirus (SARS-CoV)
- Middle East respiratory syndrome coronavirus (MERS-CoV])
- COVID-19 (The virus is 75% to 80% identical to the SARS-CoV and labeled as SARS-CoV 2).

COVID-19 is a type of virulent corona virus with high contagiousness and low mortality. As per WHO and CDC it is already declared pandemic. WHO said, outbreak is "getting bigger," can spread worldwide and is "literally knocking at the doors?" On 21st Feb CDC said that it is a Pandemic Alert and a tremendous Public Health Threat. Initially, WHO said, "… we are concerned about the number of cases with no clear epidemiological link, such as travel history to China or contact with a confirmed case."

There were reports of community spread and cases were detected in Singapore, South Korea, Taiwan, Vietnam, Hong Kong and Japan in community without knowing the source of infection. By Feb 29, WHO raised Global Risk from Coronavirus to the highest level of alert "*We have now increased our assessment of the risk of spread and the risk of impact of COVID-19 to very high at global level*," "*If we don't act... that may be a future that we have to experience*," *"a lot of the future of this epidemic is in the hands of ourselves*?"

The WHO defines a pandemic as "the worldwide spread of a new disease." It's also defined by a lack of available treatment, a lack of human immunity, and an ability to spread from person to person. A pandemic disease spreads across "several countries or continents, usually affecting a large number of people," according to the US Centers for Disease Control and Prevention (CDC).

Virus outbreaks can be characterized as a pandemic if the disease is "markedly different from recently circulating strains" and if "humans have little or no immunity" to it, according to the UK's Health and Safety Executive. A disease becomes a pandemic when it can infect many humans over a large area, be transferred from person to person, and cause clinical illness.

Disease Profile

It causes mild illness in 82%, severe illness in 15%, critical illness in 3% and death in 2.3 % cases. About 6% of patients were admitted to an intensive care unit, required mechanical ventilation, or died. People with mild cases recover in about 2 weeks, while those who are sicker can take anywhere from 3 to 6 weeks. It caused death in 15% of admitted serious cases. 71% deaths are in patients with comorbidity. Trend of Corona cases in other Countries as compared to India:

The first case of the 2019-20 coronavirus pandemic in India was reported on 30 January 2020, originating from China. As of 27 March 2020, the Indian Council of Medical Research and Ministry of Health and Family Welfare have confirmed a total of 1478 cases and 35 deaths in the country (till 1.4.2020). The infection rate of COVID-19 in India was reported to be 1.7, significantly lower than in the worst affected countries.[8]

The outbreak has been declared an epidemic in more than a dozen states and union territories, where provisions of the Epidemic Diseases Act, 1897 have been invoked, and educational institutions and many commercial establishments have been shut down. India has suspended all tourist visas, as a majority of the confirmed cases were linked to other countries.[9]

On 22 March 2020, India observed a 14-hour voluntary public curfew at the instance of the prime minister. The government followed it up with lockdowns in 75 districts where COVID cases had occurred as well as all major cities. Further, on 24 March, the prime minister ordered a nationwide lockdown for 21 days, affecting the entire 1.3 billion population of India.[10]

In India, the trend of corona cases is not much as per the

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reports as compared to most affected countries namely USA, Italy, Spain, Germany and France (Figure 1). There can be a number of factors or arguments which are responsible that India is not much affected so far. There are issues for not conducting enough number of tests. But, ICMR opined that only 30% of the capacity of their testing laboratories have been utilized based on the samples collected from the clinical cases suspected of corona. There have been efforts to stop/delay/interrupt community transmission by the govt.

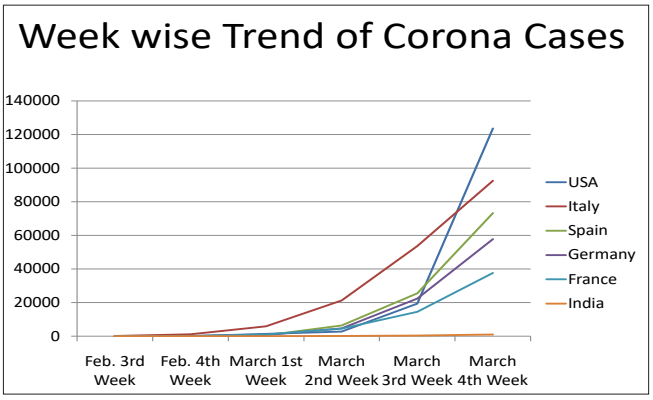

Figure 1

Presently, clusters have been identified in Maharashtra, Kerala and Bhilwara with the local transmission. However, there is sudden report of corona episode at Nizamuddin in Delhi. There is report of 9 deaths (6 in Telangana and one each in Srinagar, Tamil Nadu and Karnataka), 9 confirmed cases in Andaman and Nicobar Islands and 18 confirmed cases in Delhi. There was a religious mass gathering hosted by Tabligh-e-Jamaat held in Markaz, where more than 1548 people were evacuated with 24 positive cases confirmed with COVID-19 and more than 700 people were quarantined. The event was attended by nearly 250 foreign nationals, who later travelled to other states in the country. Over 450 have developed symptoms including fever, cough and heavy breathing.

COVID-19 was declared as PHEIC on 30th Jan 2020 which means it is mandatory to report to WHO each human and animal case. Prior to this also, there were 5 PHEIC's i.e. 26th April 2009-10th August 2010 Swine flu; May 2014 Polio: resurgence of wild polio; August 2014 Ebola: It was the first PHEIC in a resource-poor setting; Feb 1, 2016 to 18 Nov 2016 Zika; 2018–20 Kivu Ebola.

Case fatality of other Viruses

- MERS 34% (2012, killed 858 people out of the 2,494 infected)
- SARS 10% (Nov. 2002-Jul. 2003, originated from Beijing, spread to 41 countries, with 8,096 people infected and 774 deaths)
- Ebola 50%
- Smallpox 30%-40%
- Measles 10%-15% developing countries
- Polio 2%-5% children and 15%-30% adults
- Diphtheria 5%-10%
- Whooping cough 4% infants < 1yr, 1% children < 4 years
- Swine flu < 0.1%-4 %
- Seasonal flu 0.01%
- Number of flu deaths every year: 290,000 to 650,000 (795 to 1,781 deaths per day)

Li Wenliang, a 34-year-old doctor widely regarded as a hero in China for blowing the whistle on the threat posed by the disease, then targeted by police. Perhaps, while treating patients, he was exposed to a large blast of the virus. Some people-especially the elderly and the sick-may have an immune response that is dangerous. It is called a "cytokine storm," when immune cells are overproduced and flood into the lungs, causing pneumonia, inflammation and shortness of breath.

Incubation Period

Variable incubation period of 2 to 14 days (mean 3 based on 1,324 cases, 5.2 days based on 425 cases, 6.4 days in travelers from Wuhan). An outlier of a 24 days incubation period has been observed. WHO said it could reflect a second exposure rather than a long incubation period. Hubei Province local government on Feb. 22 has reported a case with an incubation period of 27 days. **Mean time to symptoms usually takes** 5 days, for **pneumonia 9** days and mean time to death 14 days. Number of persons infected by one infected person in COVID 19 is 3 to 4.

Zoonotic Disease?

COVID-19 is implicated as zoonotic and linked to Huanan Seafood Wholesale Market as 55% with onset before January 1, 2020 were originated there but only 8.6% of the subsequent cases. The Chinese government has banned the wildlife trade until the epidemic passes.

Linked to bats?

It is closely related to several bat coronaviruses. Bats are the primary reservoir for the virus. SARS-CoV was transmitted to humans from exotic civet animals in wet markets, whereas MERS-CoV is transmitted from camels to humans. In both cases, the ancestral hosts were probably bats. Snakes and pangolins have been thought to be the intermediate host. One thing is clear from the observations that the origin is from a mammal.

Modes of Transmissions

Droplets, large > 5-micron originated from the sneezing or coughing of infected persons may carry organisms such as flu, corona. However, it is unlikely that the corona is transmitted by Air borne, < 5-micron where organisms such as TB, chicken pox, measles may be transmitted,

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Contact on the surface: COVID-19, SARS, Flu (It may be possible that a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes).

Case Definition

1. Fever (subjective or confirmed)

- OR signs/symptoms of lower respiratory illness (cough or shortness of breath)
- PLUS, any person, including health care workers, who has had close contact with a laboratory-confirmed COVID-19 patient within 14 days of symptom onset.

2. Contact means: Being within approximately 6 feet (2 meters) or within the room or care area of a COVID-19 case for a prolonged period of time while not wearing recommended personal protective equipment (gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection); close contact can include caring for, living with, visiting, or sharing a health care waiting area or room with a COVID-19 case OR having direct contact with infectious secretions of a COVID-19 case (e.g., being coughed on) while not wearing recommended personal protective equipment.
3. Fever and signs/symptoms of lower respiratory illness (cough or shortness of breath) PLUS a history of travel from Hubei Province, China, Italy, Iran, or any other country where COVID-19 is epidemic within 14 days of symptom onset.

Case Definition

Suspect Case

A. Patients with severe acute respiratory infection (fever, cough, and requiring admission to hospital), AND with no other etiology that fully explains the clinical presentation AND at least one of the following:

- A history of travel to or residence in the city of Wuhan, Hubei Province, China in the 14 days prior to symptom onset
- Patient is a health care worker who has been working in an environment where severe acute respiratory infections of unknown etiology are being cared for.

B. Patients with any acute respiratory illness AND at least one of the following:

- Close contact with a confirmed or probable case of COVID-19 in the 14 days prior to illness onset
- Visiting or working in a live animal market in Wuhan, Hubei Province, China in the 14 days prior to
- Symptom onset, or
- Worked or attended a health care facility in the 14 days prior to onset of symptoms where patients with hospital-associated COVID-19 infections have been reported.

Probable Case

A suspect case for whom testing for COVID-19 is inconclusive or for whom testing was positive on a pan-coronavirus assay.

Confirmed Case

A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.

SARI Definition

- An ARI with history of fever or measured temperature ≥38 C° and cough; onset within the last ~10 days; and requiring hospitalization
- Absence of fever does NOT exclude viral infection

Close Contact

- Health care associated exposure, including providing direct care for COVID-19 patients, working with health care workers infected with COVID-19, visiting patients or staying in the same close environment of a COVID-19 patient
- Working together in close proximity or sharing the same classroom environment with a with COVID-19 patient
- Traveling together with COVID-19 patient in any kind of conveyance
- Living in the same household as a COVID-19 patient
- The epidemiological link may have occurred within a 14-day period before or after the onset of illness in the case under consideration

Clinical Presentation

- Clinically all patients have fever (subjective or evident). No fever no corona.
- 75% have cough
- 50% weakness
- 50% breathlessness
- Low total white count
- Deranged liver enzymes
- 20% need ICU care and 15% of them are fatal. Those cases categorized as critical have the highest fatality rate-at 49.0 per cent.

Treatment

There is no proven antiviral treatment. Treatment is symptomatic though chloroquine, anti-viral and anti-HIV drugs have shown some efficacy.

Environment of Corona anxiety among Community

There is sudden fear of uncertainty and anxiety in an individual and among community as a whole about the immediate threat of transmission through one person to another for COVID-19. The sudden lock down by the govt.

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for 21 days is going to stop/ break the chain of COVID-19 transmission in a given area, provided all the individuals adhere to the instructions of the government. However, with the non-reporting of cases by the individuals to the healthcare providers about their proximity or contact having the history of cold, cough, temperature and difficulty in breathing shall find a difficult way for the govt. to isolate or quarantine such cases, which act as a cluster and may explode the situation of community transmission. The medical doctors, para-medical health workers, technicians, police, sanitation staff are the frontline warriors, who are exposed and remain at the risk of getting transmission.

The Case Fatality is Lower than SARS, MERS and EBOLA

As per the statistics available, it is observed that mortality rate during COVID has been 2% (earlier thought to be 3%) compared to MERS 34%, SARS (out of 5327 cases) 10%, Ebola 50%, small pox 30-40%, measles 10-15% developing countries, polio 2-5% children and 15%-30% adults, diphtheria 5%-10%, Whooping cough 4% infants < 1yr, 1% children < 4 years AND Swine flu < 0.1-4 %. The case fatality rate with seasonal flu is less than 0.01% (1 death per every 10,000 cases).[8]

It's Zoonotic but it is Unlikely to Spread through Seafood in India

It is closely related to several bat coronaviruses. Bats are the primary reservoir for the virus. SARS-CoV was transmitted to humans from exotic animals in wet markets, whereas MERS-CoV is transmitted from camels to humans. In both cases, the ancestral hosts were probably bats.

The virus has been traced to snakes in China, so, it is unlikely to spread in India through sea food. Snakes often hunt for bats in wild. Reports indicate that snakes were sold in the local seafood market in Wuhan, raising the possibility that the 2019-nCoV might have jumped from the host species-bats-to snakes and then to humans at the beginning of the outbreak. However, it remains a mystery as to how the virus could adapt to both the cold-blooded and warm-blooded hosts.

Symptoms

One-third landed up in the intensive care unit; and as many as 15% of these succumbed to the infection. Almost all patients presented with fever, more than two-thirds had cough and almost 50% suffered from weakness or muscle ache. More than half complained of shortness of breath. 2019-nCoV not unlike other virus disease presents with low white cells and reduction in lymphocyte count, and raised liver transaminase levels. Most infected patients experience milder symptoms, but about 1 in 5 people have severe illness, including pneumonia and respiratory failure.

Contagiousness

The reproduction number-R0 or "r naught"-simply refers to the number of additional people that an infected person typically makes sick. A more recent study is indicating a R0 as high as 4.08. This value substantially exceeds WHO's estimate (made on Jan. 23) of between 1.4 and 2.5, and is also higher than recent estimates between 3.6 and 4.0 and between 2.24 to 3.58. Preliminary studies had estimated R0 to be between 1.5 and 3.5. Based on these numbers, on average every case of the novel coronavirus would create 3 to 4 new cases. An outbreak with a reproductive number of below 1 will gradually disappear. The R0 for the common flu is 1.3 and for SARS it was 2.0.

Containment Measures by Govt. of India

A cluster-containment strategy is mainly being adopted and social distancing for breaking the chain of transmission was implemented. 71 labs across India led by the NCDC & ICMR are involved in testing for the virus. In addition, 65 labs were named capable for testing for the virus. Besides, antibody rapid test kits have also been approved now by ICMR to be used for buffer zones near hot spots, clusters and mass gathering, etc.

Initially, the labs tested samples collected only from those persons with clinical symptoms with a travel history to 12 countries designated as high-risk, or those who have come in contact with anyone testing positive for the coronavirus, or showing symptoms as per the government guidelines. On 20 March, the government decided to also include all pneumonia cases, regardless of travel or contact history after the country saw a sharp increase in the number of cases. The first and second confirmatory tests for the virus have been made free by the government. According to ICMR that only 30 per cent of test capacity has been utilized per day claiming that the amount of tests were enough. In mid-March, the government authorized accredited private labs to test for the virus.

Prevention and Control: Pro-active Surveillance, timely diagnosis and proper treatment are the fundamental principle of dealing with any communicable disease. The following preventive and control activities were undertaken during onset of COVID-19 to deal with the situation:

1. Surveillance: Case based Screening and diagnosis at the International airports/ports from the international passengers:
2. Treatment and isolation for confirmed cases and quarantine for other persons for 14 days.
3. Arrangement of Isolation wards / COVID-19 Hospitals
4. Strengthening of testing laboratories
5. Public Health teams for tracking the contacts and sample collections thereby ensuring proper quarantine procedure.

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6. Control room/helpline for community guidance and awareness.
7. Advisories to the states / UTs
8. Development of IEC/BCC guidelines and material
9. Strict adherence to universal precautions:

- Wash your hands often with soap and water for at least 20 seconds. If soap and water are not available, use an alcohol-based hand sanitizer.
- Avoid touching your eyes, nose, and mouth with unwashed hands.
- Avoid close contact with people who are sick.
- Stay home when you are sick.
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
- Clean and disinfect frequently touched objects and surfaces.

By taking all precautions and lesions learnt from the COVID-19 affected countries, the Government observed one day Janta curfew on 22.3.2020 and thereafter, declared 21 days lockdown w.e.f. 24th midnight 2020 in the whole country barring to the supply of essential services. This is going to hold the breakdown the COVID transmission and further spread in the community. There is definite need to maintain social distancing, observe frequent hand hygiene, timely reporting of cases to the health facilities, strict cluster based screening approach with proper augmentation of COVID -19 Hospitals, quarantine centers, PPEs, testing kits, ventilators, ICUs and sufficient stock of medicines. There has been a rapid day-to-day update in the knowledge on the epidemiology of COVID19 being new of its kind, its fast and rapid spread from person to person and absence of any proper treatment or vaccine. However, rapid action has been undertaken based upon the experienced gained going across in different countries. The health machinery has been quite proactive in terms of gearing up surveillance at point of entries, testing, isolation and quarantine at the international airports and seaports. Round the clock monitoring, guidance and support to the states is being provided in terms of testing facilities, essential medicines, masks, sanitizers, ventilators, etc. with timely protocols and advisories. Under the emerging situation, social distancing and quarantine are the only viable approaches/ strategies to contain this contagious disease in the community.

The best strategy would be to trace and track the active cases, test the active cases and isolate and treat the active cases under the present scenario of this contagious disease.

Conclusion

Coronaviruses (CoV) belong to the genus Coronavirus in the Coronaviridae. All CoVs are pleomorphic RNA viruses characteristically containing crown-shape peplomers with 80-160 nM in size and 27-32 kb positive polarity. With its high mutation rate, Coronaviruses are zoonotic pathogens that are present in humans and various animals with a wide range of clinical features from asymptomatic course to requirement of hospitalization in the intensive care unit; causing infections in respiratory, gastrointestinal, hepatic and neurologic systems.[11-12] They were not considered as highly pathogenic for humans until they have been seen with the Severe Acute Respiratory Syndrome (SARS) in the Guangdong state of China for the first time in 2002 and 2003. Before these outbreaks, there were the two most known types of CoV as CoV OC43 and CoV 229E that have mostly caused mild infections in people with an adequate immune system.[13-14] Approximately ten years after SARS this time, another highly pathogenic CoV, Middle East Respiratory Syndrome Coronavirus (MERS-CoV) has emerged in the Middle East countries.[15] In December 2019, novel Coronavirus (nCoV), which is another public health problem, has emerged in the Huanan Seafood Market, where livestock animals are also traded, in Wuhan State of Hubei Province in China and has been the focus of global attention due to a pneumonia epidemic of unknown cause. Chinese authorities announced on January 7, 2020 that a new type of Coronavirus (novel Coronavirus, nCoV) was isolated.[16] This virus was named as COVID-19 by WHO on January 12 and COVID-19 on 11 February 2020.

In Indian perspective, though there are reports of COVID-19 from some hotspots/clusters thereby increasing the disease trend, i.e., Bhilwara, Jaipur (Rajasthan), Nizammudin (Delhi), Noida (UP), Mumbai, Pune (Maharashtra), Telangana, Tamil Nadu and other. However, this is said to be at stage 2 as community transmission has been contained due to all out efforts of the respective state governments due to strict isolation and quarantine processes. However, there are some individuals not disclosing the real facts of their contacts/ history of travel with the COVID affected area or person, which may lead to outburst of transmission. All out efforts are needed now to intensify and augment the testing facilities of all suspects, strengthening COVID-19 hospitals with sufficient beds, PPEs, ventilators, ICUs and required medicines. Social distancing, regular hand washing with soap/ sanitizers, use of proper PPEs, timely testing, quarantine and isolation are the best solutions under the present circumstances to contain or prevent further COVID-19 transmission.

Conflict of Interest: None

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