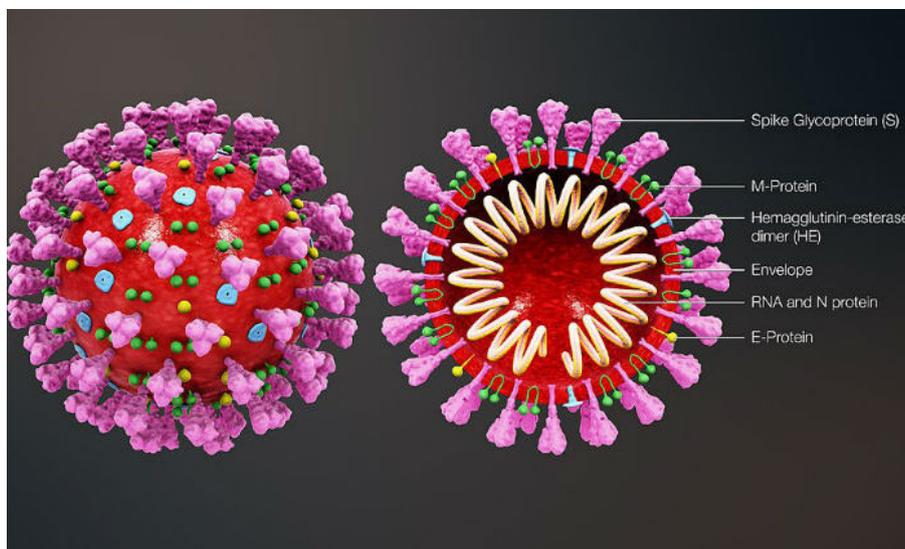


“Fear is the lengthened shadow of ignorance”

- Arnold Glasow

Understanding the Pandemic

COVID-19



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What are viruses?

Viruses are an enigma. They are less than a living organism but more than an inert collection of organic molecules. A virus has only one function similar to a living organism i.e. to replicate and multiply itself by invading a living cell whether animal or plant. Viruses are parasites, which need a living host to reproduce and survive and cannot survive outside for a long time. They are much smaller (1/10,000 of an mm) than bacteria and can only be seen by electron microscopes.

What is a corona-virus?

Corona-virus is a family of viruses made up of a single strand of RNA. They have fatty envelopes with several protein spikes, which gives an appearance of radiating Sun (Corona in Latin). There are seven different types of corona-viruses that affect humans. Notable ones are SARS-CoV, which caused an outbreak called severe acute respiratory syndrome or SARS in 2003 and MERS-CoV which caused Middle East respiratory syndrome or MERS in 2012. The common cold is also caused by some types of corona-viruses.

What is COVID-19?

COVID-19 is a respiratory disease caused by a novel (new) corona-virus named as SARS-CoV-2 that is genetically related to the previous generation of corona-

virus which caused the SARS epidemic in 2003. It has evolved naturally, and being new no one has specific immunity against it. Therefore, it is wreaking havoc across the globe.

How do people get COVID-19?

People can get COVID-19 from others who have the virus. The disease can spread from person to person through small droplets from the nose or mouth when a person with COVID-19 coughs, sneezes or speaks. People can catch COVID-19 if they breathe in these droplets from a person infected with the virus. These droplets can land on objects and surfaces around the person such as tables, doorknobs and handrails. People can become infected-by touching these objects or surfaces, then touching their eyes, nose or mouth. There is a theoretical possibility of the virus getting transmitted airborne beyond 6 feet, but it is highly improbable to happen in real world settings.

An infected person can shed the virus between 2 to 14 days. Even asymptomatic people (people who are infected, but don't show any symptoms) do infect others. Hence, a non-infectious person may get infected if he/she gets in close contact with the infected person during the viral shedding period. The chance of getting infected increases with the duration and closeness of contact with the infected person.

Can a person catch COVID-19 from non-respiratory body fluids of an infected person?

Although virus particles has been detected in blood, stool and semen of infected persons, it is not yet known whether non-respiratory body fluids from an infected person including vomit, urine, breast milk, or semen can contain viable, infectious SARS-CoV-2.

What are the symptoms of COVID-19?

The most common symptoms of COVID-19 are fever, tiredness, and dry cough. Some patients may have aches and pains, nasal congestion, runny nose, sore throat, or diarrhoea. These symptoms are usually mild and begin gradually. Some people become infected but don't develop any symptoms (asymptomatic) or they merely feel unwell. Most people (about 80%) recover from the disease without needing special treatment. Older people, and those with underlying medical problems like high blood pressure, heart problems, or uncontrolled diabetes etc., are more likely to develop serious illness. **People with fever, cough, and difficulty in breathing should seek medical attention.**

Do we have treatment for COVID-19?

At present, there is no specific treatment for COVID-19 either in modern medicine or in the complementary and alternative system of medicines such

as Siddha, Ayurveda, and Homeopathy. In fact, for many viral infections (e.g. Dengue), there are no specific treatments. Most people will get only mild symptoms and spontaneously recover from COVID-19 because of the action of their immune system. However, elderly people aged above 65 and with some underlying disease conditions, might get serious complications which require hospitalisation for management. Studies on COVID-19 across the world have shown that the majority (60 to 80%) of people who got infected were asymptomatic. Only a small proportion, about 5%, of the population who were exposed to the virus got a severe disease, which required hospitalisation and critical care and for some fraction among them it proved fatal. In other words, the virus is not that virulent. Each country defines/reports COVID-19 cases differently, hence, globally a lot of variability is observed in COVID-19 death percentages. As of now, the death rate is estimated to be less than 1% among the infected if one considers a large fraction of the untested and asymptomatic population. Children do get infected, but almost all of them get a mild form of the disease.

Why should we be concerned about contracting COVID-19?

The virus SARS-CoV-2 which causes COVID-19 is a brand new virus and hence, none of us have a specific

immunity against this virus. If a new virus is introduced into a community, there would be a large number of patients in a short time as everyone has the same chance of getting infected when there are no control measures in place. Initially, the number of infected will start increasing gradually and at one stage the number will increase exponentially and at that stage, many people will die as the hospitals cannot handle the increased number of patients with serious illness. We have seen this happening in Wuhan (China), Lombardy (Italy), and Indore (Madhya Pradesh, India). What initially happened in all these places was that many patients thronged the hospitals in a very short period and the hospitals were not equipped well with sufficient number of beds, ventilators, and treating doctors. Hence, many lives that could have been saved were unfortunately lost. Thus, if the speed at which the virus spreads is not controlled, it can wreak havoc, even if the virus is not very virulent.

Epidemiologists have determined that the speed at which the virus spreads can be measured by a parameter called basic reproduction number, denoted as R_0 (pronounced as R naught). There are three factors that determine the value of R_0 : a) infectivity of the virus, b) the duration of infectivity of the virus, and c) the number of uninfected people who are in contact with the virus at a given time. The first two factors are virus dependent

and hence, non-modifiable. In other words, we don't have control over it until we find a medicine or vaccine against it. But, the third factor is a human dependent which can be controlled so that the number of susceptible people who are in contact with an infected person can be reduced at a given point in time to stop the virus spreading at a breakneck speed. As far as the COVID-19 virus is concerned, it's R_0 has been estimated to be around 2.5 to 3 when there are no control measures in place, which means an infected person, on average, would transmit the virus to about 3 persons in a vulnerable community. Although this does not produce a serious disease in the majority of the people, it is still a highly contagious one. So when uncontrolled, it can affect all of us and the vulnerable would succumb to the disease.

How can we avoid getting affected by COVID-19?

Since the disease is mostly spread through droplet infection, keeping a physical distance of more than 6 feet away from an infected person is the first step in preventing the spread of the virus. However, it may not be always possible to identify an infected person as many infected persons are asymptomatic. Therefore, it is advisable to keep physical distance with everyone we encounter in our day to day life. We can also catch the virus through indirect contacts by handling objects

harbouring the virus. It is a human tendency to touch objects and then unknowingly touch our faces with the same hands. In a closed environment, especially where already an infected person is there, the chance of presence of the virus on the surface of any object would be higher. Hence, it is advised to keep all surfaces clean and disinfected as far as possible. We are also advised to wash our hands as frequently as possible with soap or alcohol based hand sanitizer. Since SARS-CoV-2 has an outer layer made up of lipids, soap and alcohol can destroy the lipid envelop making the virus inactive. Finally, one can wear a facial mask to protect oneself from contracting COVID-19. However, most masks can only reduce the virus load. **Thus, wearing a mask combined with physical distancing and proper hand washing would alone give better protection against catching COVID-19.** Also wearing a mask in public places will reduce the chance of spreading COVID-19 to others in case he/she is infected but do not have symptoms.

What is called breaking the chain and flattening the curve?

When uncontrolled, any viral infection would spread exponentially as no one in the community is immune to the virus. However, after a few months, the number of new infections will come down with the same speed with

which it had started after infecting a substantial proportion of the population. This happens without any intervention such as medication or vaccination because the virus does not have enough unimmunised people to catch (exhaustion of susceptible persons). The substantial proportion varies with each viral infection. For example, the H1N1 (Swine flu) in 2009 had infected 40% of the people before it subsided in the first wave. Diseases like measles would infect a greater proportion of people, over 80% before it dies down. Similarly, it is estimated that the current COVID-19 epidemic would infect about 40-60% of people before it stops. However, if unchecked, during the transmission phase it would kill thousands of people, as noticed in China and Italy. Therefore, we must try to flatten the curve by reducing the speed of the transmission. This is achieved by not allowing people to get closer to each other, by keeping a safe distance, so the chances of the virus to spread from one person to another is decreased (See Figure 1 below) thereby effectively reducing the speed of transmission (denoted as R_t). This is called breaking the chain. Remember, this process does not allow the virus to go extinct. The virus will still be there spreading slowly in the community. However, as the speed of the transmission is greatly reduced, the virus will take many more months to affect the required number of people before it spontaneously stops and thus flattening the curve. This process reduces the number of

people infected at any given point in time thereby decreasing the load on hospitals during the time the infection is spreading in the given community (See Figure 1 below).

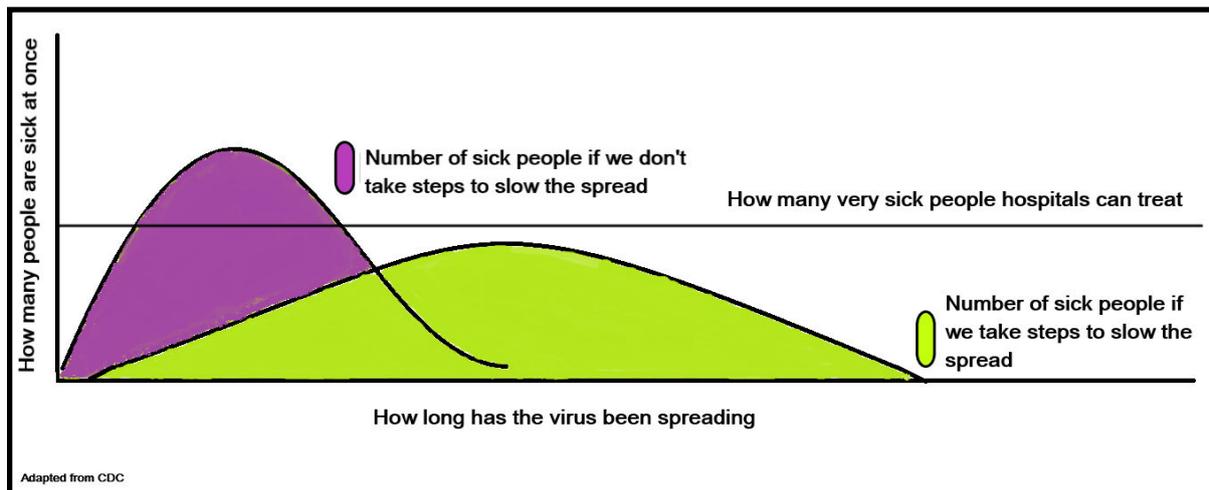


Figure 1: Flattening the curve

What is herd immunity?

As discussed, all the infectious disease epidemics spontaneously stop after the pathogen has affected a substantial proportion of the population. Once a particular community attains this threshold stage then it is called that community acquired herd immunity. In other words the community as a group has got the resistance to the epidemic spread of that infectious disease. People who got the infection in this process, including the asymptomatic ones, will be immune to the pathogen, meaning they will not be affected by the same pathogen again, lifelong or for a long period. Immunity to a particular pathogen can also be attained by

vaccination. During vaccination either a live attenuated or killed pathogen is injected into a person's body. Since the pathogen is deactivated, it cannot produce the disease. Yet, it can induce our bodies to produce antibodies against it. The presence of antibodies against a particular pathogen means that the person has attained immunity. Generally, for viral infections, the acquired immunity through natural infection is stronger than vaccine-induced immunity and it may even be life-long.

How can we use herd immunity to our advantage?

Herd immunity is the natural/induced process and the epidemic spontaneously stops once this stage has arrived. For COVID-19, since there is no vaccination available, eventually about 40-60% of the population (depending on the population density of the area) has to get infected naturally to acquire the herd immunity for the epidemic to die down in the first wave. Even with proper physical distancing in place, this will have to eventually happen, albeit slowly. Therefore, herd immunity is a natural process and it is not a strategy to overcome epidemics. However, we can make use of this natural process to our advantage. The strategy is to keep our elderly and other vulnerable people away from catching the virus and the rest of the population can resume work, of course, with proper physical distancing in office and home spaces. Here, we should consider that

about 85% of the people in India are below the age of 60 years. By this strategy, the young and the healthy individuals will gradually get the infection and over a course of time, they will exclusively contribute to building the herd immunity while the vulnerable are protected. Remember, the chance of getting a severe disease increases with age and most of the young persons below the age of 60 years will be asymptomatic or get a mild disease. Even if few of the young fall sick with a severe disease they can be saved by proper medical attention. It will become only unmanageable when everybody, both young and old, gets exposed to the virus in a shorter period. If we follow this strategy, we will have less number of deaths and yet we will overcome the epidemic. Obviously, this is a long process, but this is the only best way forward in the absence of a vaccine or medicine for a foreseeable future and we cannot keep the country under indefinite lockdown.

Other frequently asked questions

1. What are the advantages and disadvantages of the lockdown?

Lockdown slows down the speed of the disease transmission in the country so that we can better equip ourselves to face the epidemic. It buys time from the disease but it does not eradicate the disease. Countries like India cannot remain under lockdown for an extended

period of time as the damage that it will cause would have a more severe impact on our people's health as well as on our economy.

2. We don't have that much space and how can we keep safe physical distancing from our elderly parents from catching the virus?

This has to be worked out at each family level. The more distance that young people maintain with the elderly, lesser the chance for them to contract the virus. For example, allocate a chair exclusively for the elderly father/grandparent and request no one in the family to use that; during summer one can sleep outside of the home, etc.

3. Why in India we don't have that many deaths as compared to many developed countries?

This disease produces serious problems and death among the elderly and that too with co-morbid conditions. India is a very young country. More than 50% (70 crores) of our population is below the age of 30 years and only about 8% (10 crores) is above the age of 65 years. In developed countries about 20% of people are above the age of 65. So obviously they have more deaths compared to us. Moreover, in many European countries and in America, the epidemic spread very fast due to increased air travel within and between the countries, whereas in India, the air traffic is relatively low. Also, we

announced the lockdown early as compared to many developed countries. In India, the many under-developed districts have not yet got the epidemic; mostly the large cities which have contributed to the disease burden. However, there are few states where the overall mortality is already above 5% (Gujarat, Madhya Pradesh and West Bengal) among the tested population, as on the middle of May, which is at par with the developed country statistics. Research has shown that the death rate among the elderly can be as high as 3.28% (Verity et al., The Lancet), which if extrapolated to our population of elderly, will have more deaths, if they are not protected. Therefore, we cannot be complacent.

4. Can a person cured of COVID-19 get re-infected?

As of now there is no evidence that the cured person will get re-infected from the same virus. There were initial reports from South Korea that some of the persons who were believed to be cured from the disease got re-infected. But, later it was clarified that either the previous test was false negative or the second test picked up the dead viral particles present in the sample of the cured person's body as positives.

5. Can a person cured of COVID-19 continue transmitting the virus?

No. Once the person is completely cured of the disease he/she will not have an active viral load in his/her body.

However, a person has to be tested twice and both the tests should be negative for the person to be labelled as cured.

6. Yesterday, when I was buying vegetables in the nearby shop someone unknowingly came very close to me. Should I worry?

No. Although people catch the virus from their contacts, causal contacts like this will not spread the disease. Epidemiological researches showed that disease transmission occurs in people who have reported sustained close contact for a longer period of time in closed or crowded places. In fact, in United Kingdom, a study has found that casual talking in an open or semi-open space did not lead to disease transmission.

7. Should vegetables and milk-packets be washed with soap before using it?

It is always advisable to wash vegetables in running water. But, washing them in soap water is not advisable as this may produce other unwanted side effects. In Chennai, Koyambedu a largest whole sale market for vegetables, fruits, and flower, recently became a hot spot for COVID-19 spread. Thousands of persons from faraway places (few even from Kerala) who are associated with the market such as vendors and load men got infected, but the contact tracing did not produce a single case that was spread through the vegetables sold in

the market. So, there is a theoretical possibility of the virus spreading through vegetables, but there is no epidemiological evidence for it.

8. Can COVID-19 spread from newspapers, coins, bank notes, or ATM cards?

So far there is no such epidemiological evidence. Therefore, one need not be too alarmed. However, it is always sensible to take precautions like washing hands with soap as frequently as possible.

9. Does BCG vaccination protect against COVID-19?

There is no clear evidence that BCG will protect us from COVID-19. The non-peer reviewed study which proposed this hypothesis had several scientific weaknesses. However, a recent study, with better methodology, found that the risk of contracting the disease among both BCG vaccinated and unvaccinated group remain the same. Therefore, one need not give much importance to this proposition.

10. Indians have a lot of innate immunity. Will it protect us from COVID-19?

Initially, there were a number of claims, which after observing low number of cases in India said that Indians have innate immunity against COVID-19. They called it as Indian paradox: since we are special, COVID-19 will

not affect us. The reason they believed so was that Indians are already afflicted with lots of infectious diseases and hence, we must have developed some immunity against COVID-19. But, now they are proven wrong that we are not special and in this regard we are like other people in the world. On the contrary, the fact that India has so many infectious diseases reflects India's poor state of public health!

11. Is the virulence factor of the virus low in India and hence, we don't see many deaths in India?

Although viral mutations do happen in the middle of the pandemic, they are not that strong enough to produce a different result in the virulence or infectiveness of the virus. Also one cannot (and should not) blindly compare cases and deaths in different countries in the middle of the pandemic, because there are several factors which determine them, such as different phases of the epidemic in different countries, difference in demography, local environment and people's behaviour in each country, how governments implement control and mitigation strategies and most importantly how each country defines and counts cases and deaths.

12. Will the summer heat protect us from COVID-19?

Although temperature and humidity affect the transmission of the virus to some extent, it is not the

primary factor that determines the spread of the disease in a given community. It is how people behave during cold and hot months, which primarily determines the spread. During winter months, people prefer to stay indoors which favours the disease spread. However, during hot summer days, majority of Indians, especially men, tend to sleep outside in an open or semi-open environment which negatively affects the disease transmission.

13. Can I take Siddha/Ayurveda/Homeopathy medicine or hydroxyl-chloroquine, to prevent or get cured from COVID-19?

Nothing is wrong in taking these medicines under the supervision of a qualified doctor. But there is no proven medicine either to prevent or cure COVID-19. Moreover, majority of the infected persons will spontaneously recover, irrespective of whether they take any medication or not.

14. What is the risk of getting COVID-19 from packages delivered through the postal system?

The presence of virus on cardboards for 24 hours has been established in experimental setting under controlled environments. In practice, however, there is no evidence of the infection ever being transmitted through contaminated packages that are exposed to different environmental conditions and temperatures.

15. Can air conditioning spread the corona virus?

Respiratory infections can be transmitted through droplets of different sizes: when the droplet particles are $> 5-10 \mu\text{m}$ in diameter they are referred to as respiratory droplets, and when they are $< 5\mu\text{m}$ in diameter, they are referred to as droplet nuclei. Droplets, due to their heaviness, quickly settle down, but droplet nuclei can remain in the air for long periods of time and prone for airborne transmission over distances greater than 1 m. According to current evidence, SARS-CoV-2 virus is primarily transmitted between people through respiratory droplets and direct contact. However, a possibility for airborne transmission exists in clinical care settings when procedures or support treatments that generate aerosols are performed. In non-clinical settings, the possibility of such aerosol generation generally does not exist, and hence airborne transmission is unlikely.

Sensing the plausibility of air borne transmission, various Heating Ventilation and Air Conditioning (HVAC) federations/societies of different countries, including India, have come up with guidelines on HVAC operations during the COVID-19 pandemic. For residential air conditioners recirculation of cool air must be accompanied by outdoor air intake through slightly opened windows. This guideline is applicable if someone in the home is infected and she/he is in an isolation room

fitted with an A/c. For public spaces with centralised air-conditioning, if the A/c is fitted with the provision of fresh air intake, it should be operated. If fresh air intake provision is not inbuilt in the centralised air conditioning system, it is recommended to actively open operable windows.

However, these operational guidelines of HVAC will be effective when it is combined with the more reliable prevention measures such as physical distancing, frequent hand washing, mask wearing at personal level, and sanitization of the flooring in office and public places.

16. How to handle the dead body of a person who died of COVID-19?

As the dead body does not have any physiological function, such as coughing and sneezing, the chance of getting infected from droplets is absent. Only the lungs of dead COVID patients, if handled during an autopsy, can be infectious. Moreover, the clothes of the dead body might harbour the virus. In this regard, refer to ministry of HFW guidelines.

Useful resources

1. World Health Organisation, Geneva:
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub>
2. World Health Organisation, Geneva: Myth busters:
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters>.
3. Ministry of health and family welfare, GoI:
<https://www.mohfw.gov.in/pdf/FAQ.pdf>
4. Centre for Disease Control & prevention, CDC, Atlanta, Georgia, USA: <https://www.cdc.gov/coronavirus/2019-ncov/index.html>
5. European Centre for Disease Prevention and Control:
<https://www.ecdc.europa.eu/en/COVID-19/questions-answers>
6. Verity et al. Estimates of the severity of coronavirus disease 2019: a model-based analysis. The Lancet March 2020;
[https://doi.org/10.1016/S1473-3099\(20\)30257-7](https://doi.org/10.1016/S1473-3099(20)30257-7).
7. Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE) -
https://ishrae.in/mailler/ISHRAE_COVID-19_Guidelines.pdf
8. MoHFW – COVID-19 guidelines on dead body management -
https://www.mohfw.gov.in/pdf/1584423700568_COVID19GuidelinesonDeadbodymanagement.pdf