

Four human corona-viruses produce symptoms that are generally mild, even though it is contended they might have been more aggressive in the past: ^[92]

1. Human corona-virus OC43 (HCoV-OC43), β -CoV
2. Human corona-virus HKU1 (HCoV-HKU1), β -CoV
3. Human corona-virus 229E (HCoV-229E), α -CoV
4. Human corona-virus NL63 (HCoV-NL63), α -CoV

Three human corona viruses produce potentially severe symptoms:

1. Severe acute respiratory syndrome Corona-virus (SARS-CoV), β -CoV
(identified in 2003)
2. Middle East respiratory syndrome-related Corona-virus (MERS-CoV), β -CoV
(identified in 2012)
3. Severe acute respiratory syndrome Corona-virus 2 (SARS-CoV-2), β -CoV
(identified in 2019)

These cause the diseases commonly called SARS, MERS, and COVID-19 respectively.

Corona-viruses constitute the subfamily **Orthocoronavirinae**, in the family Coronaviridae, order Nidovirales and realm Riboviria.^{[3][4]} They are enveloped viruses with a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry.^[5] The genome size of corona-viruses ranges from approximately 26 to 32 kilobases, one of the largest among RNA viruses.^[6] They have characteristic club-shaped spikes that project from their surface, which in electron micrographs create an image reminiscent of the solar corona, from which their name derives.^[7]

Many people are concerned about just how long the vaccines will last – whether they offer lifelong protection, like the mumps vaccine, or they’ll need occasional boosters, like the flu vaccine.

The answer to this question is not simple and is still being investigated, with many factors, like number of participants, timing of studies, and participant health, all affecting research outcomes.

But data is increasingly demonstrating more detailed efficacy numbers for all five of the vaccines that are being administered around the world.

Here’s a look at what data says about how long the most widely administered COVID-19 vaccines last.

The HSBC report said that last year's budget had a lot of positives including "transparent accounts, credible estimates, high-quality spending, gradual consolidation, and tax policy stability" and sticking to these can go a long way.

A government expert panel has recommended regular market approval for Serum Institute of India's (SII) Covishield and Bharat Biotech's Covaxin, news agency PTI reported on Wednesday quoting official sources.

SII and Bharat Biotech had earlier submitted applications to the Drugs Controller General of India (DCGI) seeking regular market authorization for their respective Covid-19 vaccines Covishield and Covaxin.

Alongside, effective implementation of some already announced reforms – fiscal, financial, and manufacturing – could help set the stage for strong growth once pent-up demand fades, it added.

It observed that recent trends in domestic goods demand show that after reaching pre-pandemic levels it has stagnated. The production-linked incentive (PLI) schemes were meant to enable firms to cater to global demand, but rising import tariffs are coming in the way. Further, sticky inflation is likely to elicit an RBI response and tighter liquidity could impact capital market excesses.

“At a time of heightened exogenous shocks, government policy can be a source of stability and predictability, prerequisites for investment revival. And it could start with the budget on 1 February,” it said.

How long do each of the COVID-19 vaccines last?

Knowing how long the vaccine you received will provide protection can help you feel more confident in making long-term plans, such as returning to a physical workspace or classroom, as well as attending public events.

Moderna (mRNA-1273)

The Moderna vaccine was approved for use in the United States on December 18, 2020. It's also been approved for use in many other countries and throughout the European Union.

The Moderna vaccine is recommended for people 12 years and older, having received FDA emergency use authorization (EUA) for 12 to 17-year-olds in August 2021.

However, during last week's meeting, the panel had sought more data and documents from Serum and Bharat Biotech following which the companies recently had submitted a response along with more data and information.

Over 100 crore Covishield doses been given in India and abroad which is a testimony of its safety and efficacy, Serum is said to have informed the DCGI and expert panel which had sought more data for granting full marketing approval to the Covid vaccine.

Covaxin and Covishield were granted Emergency Use Authorization (EUA) in January 2021.

“The Subject Expert Committee (SEC) on Covid-19 of the Central Drugs Standard Control Organization (CDSCO) which reviewed SII and Bharat Biotech’s application for the second time on Wednesday has recommended granting regular market approval to Covishield and Covaxin subject to certain conditions,” the agency source said.

To slow the spread of the unprecedented COVID-19 pandemic, groundbreaking vaccines have been developed to protect people from the SARS-CoV-2 virus that causes COVID-19.

There are currently three different vaccines approved by the Food and Drug Administration (FDA) for use in the United States:

- Moderna (mRNA-1273)
- Pfizer-BioNTech (Comirnaty)
- Johnson & Johnson (Janssen)

Additional vaccines not yet approved for use in the United States include:

- Oxford-AstraZeneca
- Novavax

The Pfizer-BioNTech vaccine was approved for use in the United States on December 11, 2020. It's also available in the European Union under the name Comirnaty, and in many other countries worldwide. The vaccine is currently recommended for anyone over 12 years old.

Here are some key facts and figures about how effective the Pfizer-BioNTech vaccine is and how it works.

To test for the COVID-19 virus, a health care provider takes a sample from the nose (nasopharyngeal swab), throat (throat swab) or saliva. The samples are then sent to a lab for testing. If you're coughing up sputum, that may be sent for testing.

The EDA has authorized at home tests for the COVID-19 virus. These are available only with a doctor's prescription.

Your health care provider will likely recommend that you stay in home isolation for a period of time except to get medical care. Your health care provider will likely follow up with you regularly. Follow guidelines from your health care provider and local health department about when you can end home isolation.

If you're very ill, you may need to be treated in the hospital.

COVID-19. Convalescent plasma with high antibodies may be used to treat some hospitalized people ill with COVID-19 who are either early in their illness or who have weakened immune systems.

Many people with COVID-19 may have mild illness and can be treated with supportive care. Supportive care is aimed at relieving symptoms and may include:

- Pain relievers (ibuprofen or acetaminophen)
- Cough syrup or medication
- Rest
- Fluid intake

There is no evidence that ibuprofen or other non-steroidal anti-inflammatory drugs (NSAIDs) need to be avoided.

If you have mild symptoms, your health care provider will likely recommend that you recover at home. You may be given special instructions to monitor your symptoms and to avoid spreading the illness to others. You'll likely be asked to isolate yourself as much as possible from family and pets while you're sick, wear a mask when you're around people and pets, and use a separate bedroom and bathroom.

Your health care provider will likely recommend that you stay in home isolation for a period of time except to get medical care. Your health care provider will likely follow up with you

The Oxford-AstraZeneca vaccine isn't approved for use in the United States, but it's currently distributed in the United Kingdom, Canada, Australia, the European Union, and dozens of other countries worldwide.

In some countries, the vaccine is distributed under the name Vaxzevria. It's recommended for adults 18 and older.

Here are some key facts and figures about how effective the Oxford-AstraZeneca vaccine is against COVID-19.

The Johnson & Johnson vaccine was approved for use in the United States on February 27, 2021.

In April 2021, concerns about the vaccine causing blood clots caused a pause in distribution. But, on April 23, 2021, the FDA stated that the vaccine was still considered safe for most recipients and could continue being administered.

This vaccine is widely approved for use in adults 18 and older, including in the European Union under the name Janssen.

Here are some key facts and figures about the Johnson & Johnson vaccine's efficacy and how it works.

Treatment

Currently, only one medication has been approved to treat COVID-19. No cure is available for COVID-19. Antibiotics aren't effective against viral infections such as COVID-19. Researchers are testing a variety of possible treatments.

The FDA has approved the antiviral drug remdesivir (Veklury) to treat COVID-19 in hospitalized adults and children who are age 12 and older in the hospital. It's given through a needle in the skin (intravenously).

The FDA has authorized a drug called Paxlovid that includes nirmatrelvir – a drug that blocks the activity of a specific enzyme needed for the virus that causes COVID-19 to replicate – and an antiviral drug called ritonavir that helps slow the breakdown of nirmatrelvir. Paxlovid is authorized to treat mild to moderate COVID-19 in people age 12 and older who are at higher risk of serious illness. The medications are taken by mouth as pills.

The FDA has authorized another drug called molnupiravir to treat mild to moderate COVID-19 in adults who are at higher risk of serious illness and who aren't able to take other treatment options. The medication is taken by mouth as a pill.

The FDA has authorized the rheumatoid arthritis drug baricitinib (Olumiant) to treat COVID-19 in some cases. Baricitinib is a pill that seems to work against COVID-19 by

If you develop symptoms of corona-virus disease 2019 (COVID-19) or you've been exposed to the COVID-19 virus, contact your health care provider. Also let your health care provider know if you've had close contact with anyone who has been diagnosed with COVID-19

Factors used to decide whether to test you for the virus that causes COMIR.19 may differ depending on where you live. Depending on your location, you may need to be screened by your clinic to determine if testing is appropriate and available.

In the U.S., your health care provider will determine whether to conduct tests for the virus that causes COVID-19 based on your signs and symptoms, as well as whether you have had close contact with someone diagnosed with COVID-19. Your health care provider may also consider testing if you are at higher risk of serious illness or you are going to have a medical procedure. If you have had close contact with someone with COVID-19 but you've had COVID-19 in the past three months, you don't need to be tested. If you've been fully vaccinated and you've had close contact with someone with COVID-19, get tested 5 to 7 days after you've had contact with them.

Having COVID-19 or caring for someone with the disease can cause stress and anxiety. If stress is affecting your daily life after several days, contact your health care provider and consider requesting a referral to a mental health professional.

Related information

COVID-19 and your mental health

Preparing for your appointment

To be treated for COVID-19. You may start by seeing your primary care doctor or other health care provider. Or you may be referred immediately to a doctor trained in treating infectious diseases. If you think you have COVID-19, tell your health care provider before going in. The health care provider and medical team can then:

- Contact infection prevention and control and public health officials
- Prepare to move you to a room quickly
- Have a mask ready for you

Here's some information to help you get ready for your appointment.

Coping and support

It's common to feel fearful and anxious during the COVID-19 pandemic. You're probably worried that you or those you love will get sick. You may be concerned about taking care of yourself or others who are ill.

During this time, remember to take care of yourself and manage your stress.

- Eat healthy meals.
- Get enough sleep.
- Get physical activity.

Try relaxation exercises such as deep breathing, stretching and meditation.

Avoid watching or reading too much news.

Connect with friends and family, such as with phone or video calls.

Do activities you enjoy, such as reading a book or watching a funny movie.

If you're ill with COVID-19, it's especially important to:

- Get plenty of rest.
- Drink fluids.

Let your health care provider know right away if your symptoms worsen.

The FDA has authorized the rheumatoid arthritis drug baricitinib (Olumiant) to treat COVID-19 in some cases. Baricitinib is a pill that seems to work against COVID-19 by reducing inflammation and having antiviral activity. The EDA states baricitinib may be used in people who are hospitalized with COVID-19 who are on mechanical ventilators or need supplemental oxygen.

Several monoclonal antibody medications are available. These include sotrovimab, a combination of bamlanivimab and etesevimab, and a combination of two antibodies called casirivimab and imdevimab. These drugs are used to treat mild to moderate COVID-19 in people who have a higher risk of developing serious illness due to COVID-19. Treatment involves a single intravenous infusion given in an outpatient setting. To be most effective, these medications need to be given soon after COVID-19 symptoms start and prior to hospitalization.

The U.S. National Institutes of Health has recommended the corticosteroid dexamethasone for people hospitalized with severe COVID-19 who is on supplemental oxygen or need mechanical ventilation. Other corticosteroids, such as prednisone, methylprednisolone or hydrocortisone, may be used if dexamethasone isn't available.

The FDA has also authorized convalescent plasma therapy with high antibody levels to treat COVID-19. Convalescent plasma is blood donated by people who've recovered from COVID-19. Convalescent plasma with high

- What tests do I need?
- What course of action do you recommend?
- Are there restrictions I need to follow?
- Should I see a specialist?

What to expect from your doctor

- Your health care provider is likely to ask you several questions, such as:
- When did your symptoms begin?
- Where have you traveled recently?
- Who have you been in close contact with?
- How severe are your symptoms?

This review focused on the use of plant-based foods for enhancing the immunity of all aged groups against COVID-19. In humans, corona-viruses are included in the spectrum of viruses that cause the common cold and, recently, severe acute respiratory syndrome (SARS). Emerging infectious diseases, such as SARS present a major threat to public health. The novel corona-virus has spread rapidly to multiple countries and has been declared a pandemic by the World Health Organization. COVID-19 is usually caused a virus to which most probably the people with low immunity response are being affected. Plant-based foods increased the intestinal beneficial bacteria which are helpful and make up of 85% of the immune system. By the use of plenty of water, minerals like magnesium and Zinc, micronutrients, herbs, food rich in vitamins C, D and E, and better life style one can promote the health and can overcome this infection. Various studies investigated that a powerful antioxidant glutathione and a bioflavonoid quercetin may prevent various infections including COVID-19. In conclusion, the plant-based foods play a

protect the body from any infectious agents that attempt to enter, or if they do, they fight them.

According to Centre for Disease Control and Preventative, hydration often plays a major role in monitoring your body temperature. However, if you have a fever, if it is a side effect of Covid-19 or some other infection or disorder in the body, drinking plenty of water is really important. Drinking enough water is essential, for a lot of reasons, as shown in a Harvard Health report, and keeping the risk of disease lowered is one of them. Staying hydrated also enables to transmit nutrients to all parts of the body and helps to maintain all body functions and organs working potentially to decrease body infection. Dryness in the bodies can be caused by the drugs we take if we have a virus infection – such as common cold, and flu. As well, when we are sick, we start losing much of the body's water in the form of mucus, and that is the way our body removes the infection-causing pathogens from the body. Until we drink too much water, we remain hydrated, and we can remove more mucus (along with germs) from our bodies.

What you can do

When you make the appointment, ask if there's anything you need to do in advance. Make a list of:

- **Your symptoms**, including any that seem unrelated to the reason for your appointment
- **Your recent travels**, including any international travels
- **Key personal information**, including major stresses, recent life changes and family medical history
- **All medications, vitamins or other supplements** you take, including the doses
- **Questions to ask** your doctor

Take a family member or friend along; if possible, to help you remember the information you're given. Avoid bringing more than one or two people. Check before you go to the appointment, as your hospital or clinic may have visitor restrictions.

Some basic questions to ask your health care provider include:

How likely it is that COVID-19 is causing my symptoms?

What are other possible causes for my symptoms?

membranes moist which can further lower the chances of cold and flu. If they do not sense thirst that much, then they can prepare soup for them or have coconut water, milk, green tea, and even some homemade fruit juice will be helpful. There is currently no evidence of COVID-19 virus survival in sewage or drinking water.

The COVID-19 virus' morphological characteristics and chemical composition are similar to other human surrogate corona-viruses on which data are available to both sustainability in the environment and efficient coagulation measures (WHO, 2020).

A myth that potable water must keep corona-virus at bay each fifteen minutes had been running in the headlines around the world a few days before. Although drinking water does not ensure that you would not contract the corona-virus, remaining hydrated can improve your health and make sure the immune system can defeat the virus if it is transferred to you. The drinking water works to help your cells to oxygenate. Cells can compete at their best if they get enough oxygen that helps them protect the body from any infectious agents

the production of anti-inflammatory cytokines by macrophages and their references. Vitamin D is an effective immunity modulator; 1,25(OH)₂D₃ stimulates responses induced by T-helper type of cell 1 (Th1), primarily by trying to suppress inflammatory cytokine production IL-2 and interferon gamma (INF γ). In addition, 1,25(OH)₂D₃ encourages the development of cytokine by the T-helper type 2 (Th2) cells, which helps to improve the indirect inhibition of Th1 cells by supplementing this with actions influenced by a variety of cell types (Wei & Christakos, 2015). In addition, 1,25(OH)₂D₃ facilitates activation of T regulatory cells and thus inhibits inflammation processes. Concentrations of serum 25(OH)D continue to decline with age that may be significant for COVID-19 as case fatality rates (CFRs) raise with age; reasons are including insufficient time spent in the sunlight, and decreased vitamin D production due to lower skin levels of 7-dehydrocholesterol. Furthermore, certain prescription medications by stimulating the pregnane-X receptor decrease serum 25(OH)D concentrations are also regulated. These include anti-neoplastic, anti-epileptics, anti-

antimicrobial activity by a variety of microbes including Gram-negative and Gram-positive bacteria, encased and un-enveloped viruses, and fungus. Such host derived compounds destroy the foreign pathogens by destroying their membranes and thus can suppress the endotoxin's biological activities. Like mentioned therein, they have so many more functions. In a mouse model, LL-37 decreased replication of the influenza A virus. From another laboratory study, 1,25(OH)₂D minimized rotavirus replication by another method, both in vivo and in vitro. A clinical study stated that vitamin D supplementation with 4,000 IU/d reduced infection with the dengue virus. Vitamin D also improves cellular resistance, by raising the cytokine storm that the innate immune system causes. As found in COVID-19 patients, the innate immune system develops both anti inflammatory and pro-inflammatory cytokines in response to bacterial and viral infectious diseases. Vitamin D may decrease the development of pro-inflammatory Th1 cytokines, known as tumor necrosis factor α and interferon γ (Hewison, 2012). Vitamin D administration decreases the production of pro-inflammatory cytokines and enhances

complexes that genetically and epigenetically participate in transcriptional production modifications. Some well-known role of calcitriol is just to help manage the serum calcium concentrations, although it does in such a parathyroid hormone (PTH) feedback loop, which has many significant roles in the organism itself. Various reports discuss how vitamin D decreases the risk of viral diseases. Vitamin D has several pathways by which the danger of viral infection and mortality is reduced. A study of the importance of vitamin D in decreasing the common cold risk categorizes these elements in three categories: adaptive immunity, physical barrier, and natural cellular immunity. Vitamin D helps to promote gap junctions, junctions of tight, and junctions of adherents (e.g., by E-cadherine). Several studies addressed how viruses damage the integrity of the junction, growing virus contamination as well as other micro-organisms. Vitamin D improves cellular innate immunity in part by inducing 1,25-dihydroxyvitamin D into antimicrobial peptides, like human cathelicidin, LL-37, and defensins (Beard, Bearden, & Striker, 2011). Cathelicidins demonstrate strong

conclusion, the plant-based foods play a vital role to enhance the immunity of people to control of COVID-19.

1 INTRODUCTION

Covid-19 attacks people with low immune systems and people especially people of under and over ages. The immune system is built on beneficial live bacteria that live in the gut which protect the human body from various diseases. When the immune system response is low, weak, or damaged, it becomes an open invitation for infections such as corona-virus or other diseases like diabetes, heart disease, or cancer. Plant-based foods increase and help the intestinal beneficial bacteria, and the overall gut micro biome health which makes up to 85% of the body's immune system. On the other hand, excess of animal foods deplete the body from good bacteria, promote inflammation, and are the underlying cause of diabetes, chronic obstructive pulmonary disease cardiovascular diseases, hepatitis B, cancer, and chronic kidney diseases.

Patients of corona-virus must have plenty of water, as that will keep their mucous membranes moist which can further lower

also a 52 year-old man who did not need hospitalization.^[130] In São Paulo, the

Secretariat of Health announced that its state had 110 cases of flurona in 2021.^[131]

Flurona infections have also been reported in the United States, the Philippines and

Hungary.^[128]

The best way to prevent the transmission of the virus is to avoid or limit contact with people who are showing symptoms of COVID-19 or any respiratory infection.

The next best thing you can do is practice good hygiene and physical distancing to help prevent bacteria and viruses from being transmitted.

Prevention tips

- Wash your hands frequently for at least 20 seconds at a time with warm water and soap. How long is 20 seconds? About as long as it takes to sing your “ABCs.”
- Do not touch your face, eyes, nose, or mouth when your hands are dirty.

- Do not go out if you're feeling sick or have any cold or flu symptoms.
- Stay at least 6 feet (2 meters) away from people. Avoid crowds and large gatherings.
- Cover your mouth with a tissue or the inside of your elbow whenever you sneeze or cough. Throw away any tissues you use right away.
- Wear a mask or face covering in public places.
- Clean any objects you touch a lot. Use disinfectants on objects like phones, computers, and doorknobs. Use soap and water for objects that you cook or eat with, like utensils and dishware.

Domestic pets

Corona-viruses infect domestic pets such as cats, dogs, and ferrets.^[135] There are two forms of feline corona-virus which are both members of the species *Alphacoronavirus 1*.^[141] Feline enteric corona-virus is a pathogen of minor clinical significance, but spontaneous mutation of this virus can result in feline infectious peritonitis (FIP), a disease with high mortality.^[132] There are two different corona-viruses that infect dogs. Canine corona-virus (CCoV), which is a member of the species, *Alphacoronavirus 1*,^[141] causes mild gastrointestinal disease.^[132] Canine respiratory corona-virus (CRCoV), which is a member of the species *Betacoronavirus 1* and related to HCoV-OC43,^[144] cause respiratory disease.^[132] Similarly, there are two types of corona-virus that infect ferrets.^[145] Ferret enteric corona-virus causes a gastrointestinal syndrome known as epizootic catarrhal enteritis (ECE), and a more lethal systemic version of the virus (like FIP in cats) known as ferret systemic corona-virus (FSC).^{[146][147]}

transmitted by aerosol and food contaminated by feces. Different vaccines against IBV exist and have helped to limit the spread of the virus and its variants.^[132]

Infectious bronchitis virus is one of a number of strains of the species *Avian corona-virus*.^[138] Another strain of avian corona-virus is **turkey** corona-virus (TCV) which causes enteritis in turkeys.^[132]

Corona-viruses also affect other branches of animal husbandry such as pig farming and the cattle raising.^[132] Swine acute diarrhea syndrome corona-virus (SADS-CoV), which is related to bat corona-virus HKU2, causes diarrhea in pigs.^[139]

Porcine epidemic diarrhea virus (PEDV) is a corona-virus that has recently emerged and similarly causes diarrhea in pigs.^[140]

Transmissible gastroenteritis virus (TGEV), which is a member of the species *Alphacoronavirus 1* ^[141] is another corona-virus that causes diarrhea in young pigs.

^{[142][143]} In the cattle industry bovine corona-virus (BCV), which is a member of the species *Betacoronavirus 1* and related to HCoV- OC43,^[144] is responsible for severe profuse enteritis in young calves. ^[132]

Laboratory animals

Corona-viruses infect laboratory animals.^[132] Mouse hepatitis virus (MHV), which is a member of the species *Murine coronavirus*,^[148] causes an epidemic murine illness with high mortality, especially among colonies of laboratory mice.^[149] Prior to the discovery of SARS-CoV, MHV was the best-studied corona-virus both *in vivo* and *in vitro* as well as at the molecular level. Some strains of MHV cause a progressive demyelinating encephalitis in mice which has been used as a murine model for multiple sclerosis.^[134] Sialodacryoadenitis virus (SDAV), which is a strain of the species *Murine coronavirus*,^[148] is highly infectious corona-virus of laboratory rats, which can be transmitted between individuals by direct contact and indirectly by aerosol. Rabbit enteric corona-virus causes acute gastrointestinal disease and diarrhea in young European rabbits.^[132] Mortality rates are high.^[150]

Corona-viruses vary significantly in risk factor. Some can kill more than 30% of those infected, such as MERS-CoV, and some are relatively harmless, such as the common cold.^[49] Corona-viruses can cause colds with major symptoms, such as fever, and a sore throat from swollen adenoids.^[90] Corona-viruses can cause pneumonia (either direct viral pneumonia or secondary bacterial pneumonia) and bronchitis (either direct viral bronchitis or secondary bacterial bronchitis).^[91] The human corona-virus discovered in 2003, SARS-CoV, which causes severe acute respiratory syndrome (SARS), has a unique pathogenesis because it causes both upper and lower respiratory tract infections.^[91]

Six species of human corona-viruses are known, with one species subdivided into two different strains, making seven strains of human corona-viruses altogether.

A number of vaccines using different methods have been developed against human corona-virus SARS-CoV-2.^{[151][152]} Antiviral targets against human corona-viruses

have also been identified such as viral proteases, polymerases, and entry proteins.

Drugs are in development which target these proteins and the different steps of viral replication.^{[153][152]}

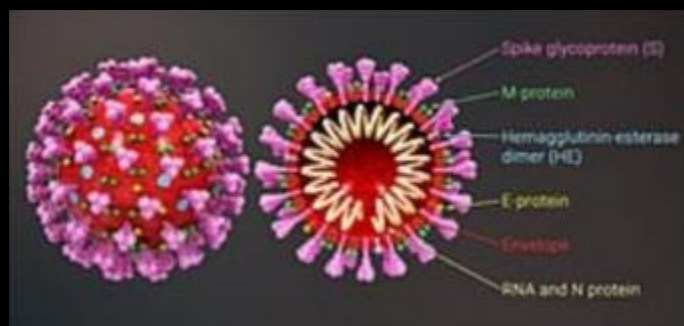
Vaccines are available for animal corona-viruses IBV, TGEV, and Canine CoV, although their effectiveness is limited. In the case of outbreaks of highly contagious animal corona-viruses, such as PEDV, measures such as destruction of entire herds of pigs may be used to prevent transmission to other herds.^[49]

Common cold

Main article: Common cold

Although the common cold is usually caused by rhinoviruses,^[93] in about 15% of cases the cause is a corona-virus.^[94] The human corona-viruses HCoV-OC43, HCoV-HKU1, HCoV-229E, and HCoV-NL63 continually circulate in the human population in adults and children worldwide and produce the generally mild symptoms of the common cold.^[87] The four mild corona-viruses have a seasonal incidence occurring in the winter months in temperate climates.^{[95][96]} There is no preponderance in any season in tropical climates. ^[97]

Corona-virus diseases are caused by viruses in the corona-virus subfamily, a group of related RNA viruses that cause diseases in mammals and birds. In humans and birds, the group of viruses causes respiratory tract infections that can range from mild to lethal. Mild illnesses in humans include some cases of the common cold (which is also caused by other viruses, predominantly rhinoviruses), while more lethal varieties can cause SARS, MERS and COVID-19.^{[2][3]} As of 2021, 45 species are registered as corona-viruses,^[4] whilst 11 diseases have been identified, as listed below.



Structural view of a corona-virus

Corona-viruses are known for their shape resembling a stellar corona, such as that of the Sun visible during a total solar eclipse; *corona* is derived from the Latin word *corōna*, meaning ‘garland, wreath, crown.’^[5] It was coined by Tony Waterson (professor of virology at St Thomas’ Hospital)^{[6][7][8]} in a meeting with his colleagues June Almeida

recently, alpaca corona-virus and human corona-virus 229E diverged sometime before 1960.^[77] MERS-COV emerged in humans from bats through the intermediate host of camels.^[78] MERS-CoV, although related to several bat corona-virus species, appears to have diverged from these several centuries ago.^[79] The most closely related bat corona-virus and SARS-CoV diverged in 1986.^[80] The ancestors of SARS-CoV first infected leaf-nose bats of the genus *Hipposideridae*; subsequently, they spread to horseshoe bats in the species *Rhinolophidae*, then to Asian palm civets, and finally to humans.^{[81][82]}

Unlike other betacoronaviruses, bovine corona-virus of the species *Betacoronavirus 1* and subgenus *Embecovirus* is thought to have originated in rodents and not in bats.^{[74][83]} In the 1790s, equine corona-virus diverged from the bovine corona-virus after a cross-species jump.^[84] Later in the 1890s, human corona-virus OC43 diverged from bovine corona-virus after another cross-species spillover event.^{[85][84]} It is speculated that the flu pandemic of 1890 may have been caused by this spillover event, and not by the influenza virus, because of the related timing,

Corona-virus disease 2019 (COVID-19)

Main article: COVID-19

In December 2019, a pneumonia outbreak was reported in Wuhan, China.^[118] On 31 December 2019, the outbreak was traced to a novel strain of corona-virus,^[119] which was given the interim name 2019-nCoV by the World Health Organization,^{[120][121][122]} later renamed SARS-CoV-2 by the International Committee on Taxonomy of Viruses

As of 18 January 2022, there have been at least 5,547,768^[103] confirmed deaths and more than 331,009,268^[103] confirmed cases in the COVID-19 pandemic. The Wuhan strain has been identified as a new strain of Betacoronavirus from group 2B with approximately 70% genetic similarity to the SARS-CoV.^[123] The virus has a 96% similarity to a bat corona-virus, so it is widely suspected to originate from bats as well.^{[124][125]}

Amid rising concerns over the highly transmissible Omicron variant of coronavirus, the government has also approved vaccination drive for the age group of 15-18 years from 3 January.

Notably, only Bharat Biotech's indigenously-made shot 'Covaxin' used for vaccinating this age group.

According to a note sent by the Union health ministry to all states and Union territories, additional doses of Covaxin will be sent to the states for administering the vaccine to this population category.

As many as 3, 70, 32, 672 doses have been administered in the 15-18 age group so far in the country.

Symptoms of COVID-19 are variable, but often include fever,^[9] cough, headache,^[10] fatigue, breathing difficulties, and loss of smell and taste.^{[11][12][13]}

Symptoms may begin one to fourteen days after exposure to the virus. At least a third of people who are infected do not develop noticeable symptoms.^[14] Of those people who develop symptoms noticeable enough to be classed as patients, most (81%) develop mild to moderate symptoms (up to mild pneumonia), while 14% develop severe symptoms (dyspnea, hypoxia, or more than 50% lung involvement on imaging), and 5% suffer critical symptoms (respiratory failure, shock, or multi-organ dysfunction).^[15] Older people are at a higher risk of developing severe symptoms. Some people continue to experience a range of effects (long COVID) for months after recovery, and damage to organs has been observed.^[16] Multi-year studies are underway to further investigate the long-term effects of the disease.^[16]

COVID-19 transmits when people breathe in air contaminated by droplets and small airborne particles containing the virus. The risk of breathing these in is highest when people are in close proximity, but they can be inhaled over

The most recent common ancestor (MRCA) of all corona-viruses is estimated to have existed as recently as 8000 BCE, although some models place the common ancestor as far back as 55 million years or more, implying long term co-evolution with bat and avian species.^[72] The most recent common ancestor of the alphacoronavirus line has been placed at about 2400 BCE, of the betacoronavirus line at 3300 BCE, of the gammacoronavirus line at 2800 BCE, and the deltacoronavirus line at about 3000 BCE. Bats and birds, as warm-blooded flying vertebrates, are an ideal natural reservoir for the corona-virus gene pool (with bats the reservoir for alphacoronaviruses and betacoronavirus and birds the reservoir for gammacoronaviruses and deltacoronaviruses). The large number and global range of bat and avian species that host viruses have enabled extensive evolution and dissemination of corona-viruses.^[73]

Many human corona-viruses have their origin in bats.^[74] The human corona-virus NL63 shared a common ancestor with a bat corona-virus (ARCoV.2) between 1190 and 1449 CE.^[75] The human corona-virus 229E shared a common ancestor with a bat corona-virus (GhanaGrp1 Bt Cov) between 1686 and 1800 CE.^[76] More

recommended in public settings to minimize the risk of transmissions. While work is underway to develop drugs that inhibit the virus, the primary treatment is symptomatic. Management involves the treatment of symptoms, supportive care, isolation, and experimental measures.

Corona-viruses are a group of related RNA viruses that cause diseases in mammals and birds. In humans and birds, they cause respiratory tract infections that can range from mild to lethal. Mild illnesses in humans include some cases of the common cold (which is also caused by other viruses, predominantly rhinoviruses), while more lethal varieties can cause SARS, MERS and COVID-19, which is causing an ongoing pandemic. In cows and pigs they cause diarrhea, while in mice they cause hepatitis and encephalomyelitis.

close proximity, but they can be inhaled over longer distances, particularly indoors. Transmission can also occur if splashed or sprayed with contaminated fluids in the eyes, nose or mouth, and, rarely, via contaminated Surfaces. People remain contagious for up to 20 days, and can spread the virus even if they do not develop symptoms.^{[17][18]}

Several testing methods have been developed to diagnose the disease. The standard diagnostic method is by detection of the virus's nucleic acid by real-time reverse transcription polymerase chain reaction (RT-PCR), transcription-mediated amplification (TMA), or by reverse transcription loop-mediated isothermal amplification (RT-LAMP) from a nasopharyngeal swab.

Several COVID-19 vaccines have been approved and distributed in various countries which have initiated mass vaccination campaigns. Other preventive measures include physical or social distancing, quarantining, ventilation of indoor spaces, covering coughs and sneezes, hand washing, and keeping unwashed hands away from the face. The use of face masks or coverings has been recommended in public settings to minimize

neurological symptoms, and unknown causative agent of the pandemic.^[86] Besides causing respiratory infections, human corona-virus OC43 is also suspected of playing a role in neurological diseases.^[87] In the 1950s, the human corona-virus OC43 began to diverge into its present genotypes.^[88] Phylogenetically, mouse hepatitis virus (*Murine coronavirus*), which infects the mouse's liver and central nervous system,^[89] is related to human corona-virus OC43 and bovine corona-virus. Human corona-virus HKU1, like the aforementioned viruses, also has its origins in rodents.^[74]

father, who became ill after a visit to Qatar and Saudi Arabia. Despite this, it appears the virus had trouble spreading from human to human, as most individuals who are infected do not transmit the virus.^[113] By 30 October 2013, there were 124 cases and 52 deaths in Saudi Arabia.^[114]

After the Dutch Erasmus Medical Centre sequenced the virus, the virus was given a new name, Human Coronavirus-Erasmus Medical Centre (HCoV-EMC). The final name for the virus is Middle East respiratory syndrome coronavirus (MERS - CoV). The only U.S. cases (both survived) were recorded in May 2014.^[115]

In May 2015, an outbreak of MERS-CoV occurred in the Republic of Korea, when a man who had traveled to the Middle East, visited four hospitals in the Seoul area to treat his illness. This caused one of the largest outbreaks of MERS-CoV outside the Middle East. As of December 2019, 2,468 cases of MERS-CoV infection had been confirmed by laboratory tests, 851 of which were fatal, a mortality rate of approximately 34.5%.^[117]

Confirmed cases	2494	8096 ^[102]	331,009,268
Deaths	858	774 ^[102]	5,547,768 ^[102]
Case fatality rate	37%	9.2%	1.68% ^[103]

Symptoms

Fever	98%	99 – 100%	87.9% ^[104]
Dry cough	47%	29 – 75%	67.7% ^[104]
Dyspnea	72%	40 – 42%	18.6% ^[104]
Diarrhea	26%	20 – 25%	3.7% ^[104]
Sore throat	21%	13 – 25%	13.9% ^[104]
Ventilatory use	24.5% ^[105]	14 – 20%	4.1% ^[106]

Notes

- a. ^ Based on data from Hong Kong
- b. ^ data as of 18 January 2002

V T E

In 2003, following the outbreak of severe acute respiratory syndrome (SARS) which had begun the prior year in Asia, and secondary cases elsewhere in the world, the World Health Organization (WHO) issued a press release stating that a novel corona-virus identified by

several laboratories was the causative agent for SARS. The virus was officially named the SARS corona-virus (SARS-CoV). More than 8,000 people from 29 different countries and territories were infected, and at least 774 died.^{[107][68]}

Middle East respiratory syndrome (MERS)

Main article: Middle East respiratory syndrome

In September 2012, a new type of corona-virus was identified, initially called Novel Corona-virus 2012, and now officially named Middle East respiratory syndrome corona-virus (MERS-CoV).^{[108][109]} The World Health Organization issued a global alert soon after.^[110] The WHO update on 28 September 2012 said the virus did not seem to pass easily from person to person.^[111] However, on 12 May 2013, a case of human-to-human transmission in France was confirmed by the French Ministry of Social Affairs and Health.^[112] In addition, cases of human-to-human transmission were reported by the Ministry of Health in Tunisia. Two confirmed cases involved people who seemed to have caught the disease from their late father, who became ill after a visit to Qatar and

Coronavirus HuPn-2018

Main article: Canine coronavirus HuP-2018

During a surveillance study of archived samples of Malaysian viral pneumonia patients, virologists identified a strain of canine corona-virus which has infected humans in 2018.

Flurona

Main article: Twindemic

On 1 January 2022, Israel reported, for the first time, a case of flurona, a rare mixture of COVID-19 and influenza infections.^{[126][127][128][129]} In Brazil, four cases of the double infection have been identified, including a 16 year-old male from Rio de Janeiro. Having a fever and runny nose, he decided to take a test on 29 December 2021, which came back positive to the two diseases. His mother, doubting the result, had the boy tested in another laboratory, which confirmed again the double infection. In Fortaleza of Ceará state, two children, including a 1 year-old child tested positive without complications and also a 52 year-old man who did not need hospitalization.^[130] In São Paulo, the

virology at St Thomas' Hospital)^{[6][7][8]} in a meeting with his colleagues June Almeida and David Tyrrell, the founding fathers of corona-virus studies, and was first used in a Nature article in 1968, with approval by the International Committee for the Nomenclature of Viruses three years later.^[10]

The first corona-virus disease was discovered in the late 1920s, however, the most recent common ancestor of corona-viruses is estimated to have existed as recently as 8000 BCE Human corona-viruses were discovered in the 1960s, through a variety of experiments in the United States and the United Kingdom.^[12] A common origin in human corona-viruses are bats.^[13]

Corona-viruses form the subfamily *Orthocoronavirinae*,^{[2][3][4]} which is one of two sub-families in the family *Coronaviridae*, order *Nidovirales*, and realm *Riboviria*.^{[42][69]} They are divided into the four genera: *Alphacoronavirus*, *Betacoronavirus*, *Gammacoronavirus* and *Deltacoronavirus*. Alphacoronaviruses and betacoronaviruses infect mammals, while gammacoronaviruses and deltacoronaviruses primarily infect birds.^{[70][71]}

Severe acute respiratory syndrome (SARS)

Main article: Severe acute respiratory syndrome

Characteristics of zoonotic coronavirus strains

MERS-CoV, SARS-CoV, SARS-CoV-2, and related diseases

	MERS-CoV	SARS-CoV	SARS-CoV
Disease	MERS	SARS	COVID-19
Outbreaks	2012, 2015, 2018	2002-2004	2019-2021 Pandemic

Epidemiology

Date of first identified case	June 2012	November 2002	December 2019 ^[98]
Location of first identified case	Jaddah, Saudi Arabia	<u>Shunde</u> , China	Wuhan, China
Age average	56	55 ^{[99][a]}	56 ^[100]
Sex ratio (M:F)	3.3:1	0.8:1 ^[101]	1.6:1 ^[100]