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REVIEW ON CORONA VIRUS DISEASE AND CHARACTERISTICS OF SARS – COV-2.

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ABSTRACT

A new epidemic of acute respiratory viral pneumonia was discovered in central China at the end of 2019. The complaint was given the name nimbus virus complaint 2019 (COVID- 19), and the virus that caused this complaint was known as severe acute respiratory pattern nimbus virus (SARS- CoV- 2). So far, individual system has been concentrated on viral gene discovery, the ultimate using RT- PCR being the most accurate approach. Bludgeons are known to be the primary beast force for nimbus viruses. In this paper, we present a summary of the COVID- 19 epidemic, clinical features and epidemiology. The emergence of a nimbus virus poses a serious global public health trouble and possibly carries the eventuality of causing a major epidemic outbreak in the naïve mortal population. The recent outbreak of COVID- 19, the complaint caused by SARS- CoV- 2, in Wuhan, Hubei Province, China has infected over36.5 million individualities and claimed over one million lives worldwide, as of 8 October 2020. Researchers have reported that the virus is constantly evolving and spreading through asymptomatic carriers, further suggesting a high global health trouble. To this end, current up- to date information on the nimbus virus Evaluation and SARS- CoV- 2 modes of transmission.

KEYWORDS: *Covid-19, SARS CoV2, Diagnosis, Pandemic, Epidemiology, Syndrome.*

INTRODUCTION

The World Health Organization declared an epidemic on January 30, 2020, following the outbreak of the SARS CoV- 2 virus in Wuhan, Hubei Province, China, and its rapid-fire spread to 25 countries. This happed just 1 month after the advertisement of the first case of the complaint on December 31, 2019.[1- 2] Corona viruses are positive single stranded RNA virus that belong to the nimbus virus family and are genetically classified into four rubrics α, β, γ and δ nimbus virus.[3-4] The basis of the SARS-CoV-2 coronavirus is in the beta-coronavirus genus. These viruses often infect animals such as birds and mammals and usually cause mild respiratory infections in humans. Due to the SARS CoV- 2 RNA content and its high potential for emergence, respiratory infections caused by the virus have recently led to deadly endemics in humans, such as SARS and measles. The causative agent of these two types of coronavirus diseases is zoonotic and belongs to the genus β-coronavirus of the coronaviridae family[5-6] Since December 2019, a new nimbus virus complaint had fleetly spread throughout China, leading to a global Outbreak and causing considerable public health concern. World Health Organization (WHO) blazoned the outbreak of COVID- 19 as a global public health exigency on 30 January 2020. In India, the first case of COVID- 19 was reported on January 27, 2020, in Kerala quarter. Since also, there's a wide variation in the reporting of cases across the country. The case reporting is grounded on the SARS- CoV- 2 antigen testing by Real- Time Rear Recap Polymerase Chain response (RT- PCR) or by Rapid Antigen Test (RAT).[7] Corona virus (CoV) is clustered under the viral family group that causes complaint in mammals and catcalls. An epidemic new Corona virus was named as ‘‘Corona Virus Disease 2019’’ (2019 nCoV) by World Health Organization (WHO) in Geneva, Switzerland. As its RNA pattern is near to SARS, the 2019 Corona virus is renamed as SARS CoV- 2 epidemic. It belongs to the subfamily ortho nimbus virinae inside the family Corona viridae, order Nido virales, and the realm Riboviria.[8] Corona viruses, belonging to the Corona viridae family, beget respiratory infection in mammals, similar as batons, camels and masked win civets, and in avian species.[9,10] Symptoms and towel tropism of Corona virus infection can vary across different host species.[11]

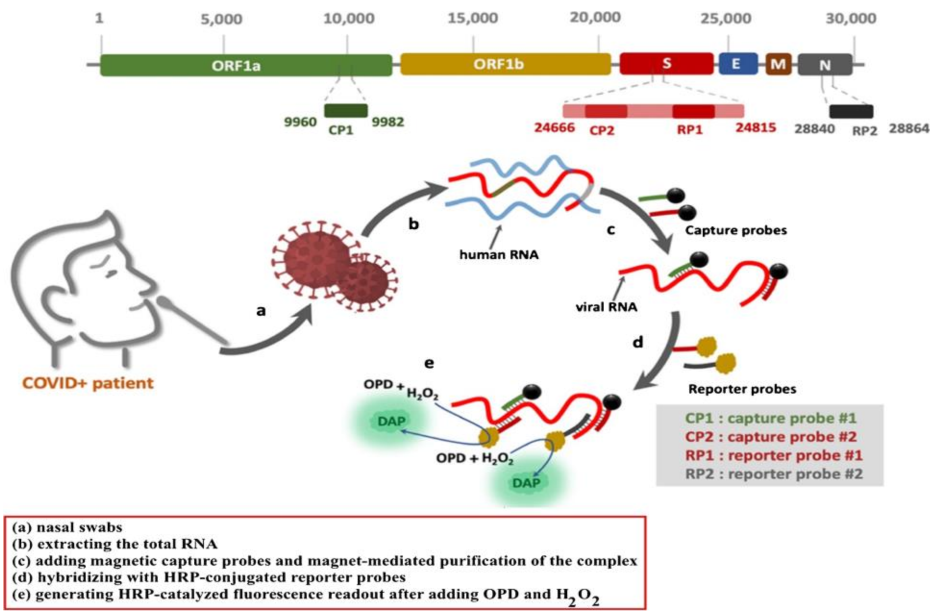


Fig. 1: The schematic depicts the step-by-step process for capturing and detecting viral RNA using magnetic probes and HRP-terminated reporters. Reproduced with permission from.[12]

What are corona viruses

Corona viruses are single- stranded, enveloped RNA viruses 80 – 120 nm in periphery and they're classified into four groups α, β, γ and δ. Prior to the identification of COVID- 19, only six types of Corona virus could infect humans, and COVID- 19, a member of the β- Corona virus family, was the seventh. Of these viruses, four Corona viruses, HCoV- OC43, HCoV- 229E, HCoV- NL63 and HCoVHKU1, they're less pathogenic and beget only mild respiratory conditions, but the two Corona viruses, SARS- CoV and MERS- CoV, are better than humans, independently. They transmitted two fatal pandemics. Meanwhile, the homology and pathogenesis medium of SARS- CoV is veritably analogous to COVID- 19. Due to the adaption of COVID- 19 in batons, which have a advanced temperature than the mortal body, this virus is more resistant to temperature than SARS- CoV.[13,14] Corona virus has four major structural proteins called S (Shaft), E (Envelope), N (Nucleocapsid) and M (Membrane) as shown in Fig. 1. COVID- 19 uses angiotensin converting enzyme- type- 2 (ACE2) as a receptor and infects cells with ACE2 via a receptor- binding sphere (RBD) in the shaft protein. The ACE2 receptor is set up in alveolar cells, myocytes and vascular endothelial cells due to the high affinity of COVID- 19 for ACE2. Genital pathology, including testes and ovaries, is also effective. COVID- 19 presumably affects sperm product and reduces its number, and also produces coitus hormones and can reduce sexual desire.[15,16]

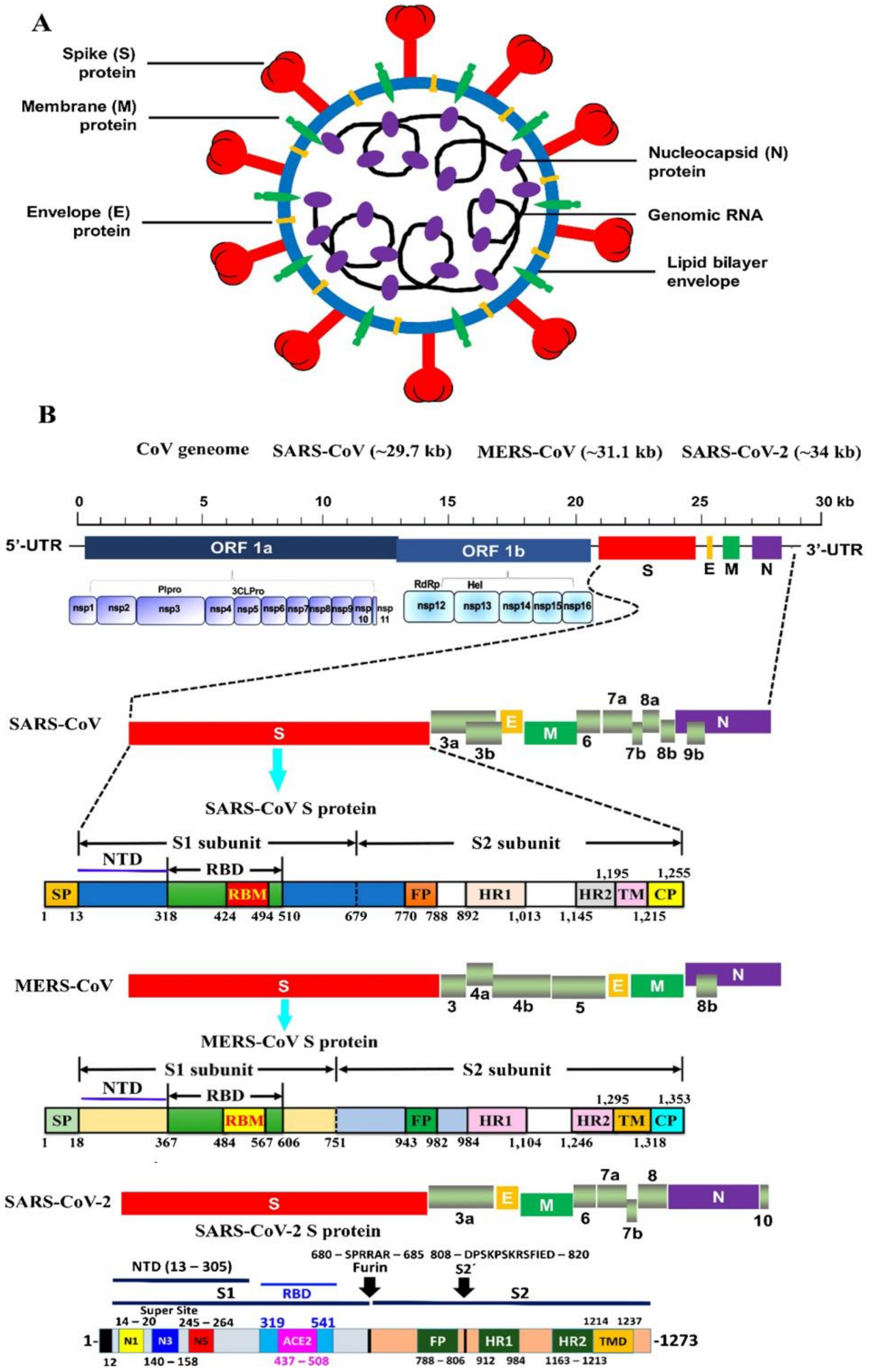
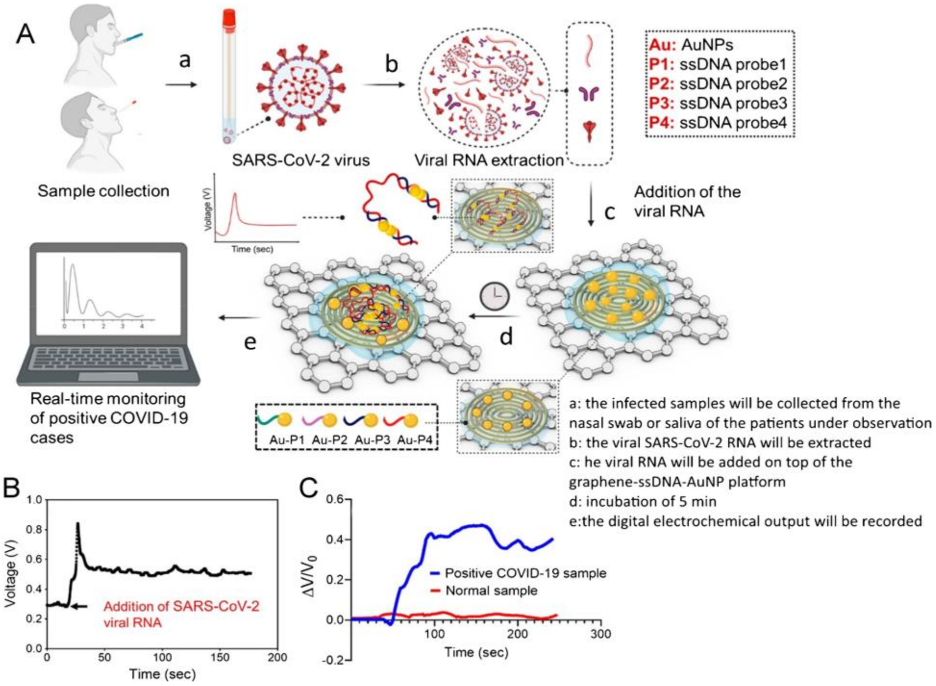


Fig. 2 A Schematic structure of Corona viruses.[17] B Schematic representation of the genome organization and functional domains of S protein for SARS-CoV, MERS-CoV and SARS-CoV-2. Reproduced with permission from.[17,18] The genomes of CoVs consist of 2 partially overlapping replicase open reading frames (OFR1a and 1b) and several downstream ORFs that encode viral functional structural proteins and other proteins with unknown function. 50-UTR and 30-UTR, untranslated regions at the N and C-terminal regions, respectively. Kb, kilo base; pair SP, signal peptide; NTD, the N-

terminal domain; RBD, receptor-binding domain; RBM, receptor-binding motif; FP, fusion peptide; HR1 and HR2, heptad repeat 1 and 2; TM, trans membrane domain; CP, cytoplasmic domain

Origin and spread of covid 19

Corona viruses, which are single- stranded and positive- sense RNA viruses, have the longest genome of any given RNA virus, with a genomic content (GC) ranging from 32 to 43.[19] They've a globular shape with pooching branches and a crown, and this spatial shape has led to the picking of this viral family as Corona virus. The root of this name is deduced from the Latin word nimbus, meaning crown.[20] Corona viruses beget 15 of respiratory ails and generally don't beget an acute form of the complaint, but they can beget mild upper respiratory infections. This viral family infects a wide range of creatures (mammals) and humans.[20,21] According to exploration on Corona viruses since 1965, these viruses have the eventuality to infect creatures and humans, and some have the capability to transmit from creatures to humans or vice versa.[22] Studies since the SARS epidemic have shown that batons carry colorful Corona viruses that have the eventuality to infect humans.[20] Experimenters uprooted the inheritable material of the new virus from people who studied it and set up that the new nimbus virus had a analogous origin to the SARS virus and may have begun in batons or snakes, but that other creatures could still be intermediated hosts.[23]



a: the infected samples will be collected from the nasal swab or saliva of the patients under observation
b: the viral SARS-CoV-2 RNA will be extracted
c: he viral RNA will be added on top of the graphene-ssDNA-AuNP platform
d: incubation of 5 min
e:the digital electrochemical output will be recorded

Fig. 3A: Schematic illustrations of the principle of the COVID-19 electrochemical sensing platform. B Sensor output signal as a function of time with the addition of

SARS-CoV-2 viral RNA load. C Real-time response of the sensor chip toward COVID-19-positive clinical samples and healthy samples. Reproduced with permission from.[24]

Symptoms

A wide range of symptoms are set up in COVID- 19 cases, ranging from mild/ moderate to severe, fleetly progressive, and fulminant complaint. Symptoms of COVID- 19 are non-specific and complaint donation can range from asymptomatic to severe pneumonia. Prevalence of asymptomatic cases ranges from1.6 to51.7 and these people don't present typical clinical symptoms or signs and don't present apparent abnormalities in lung reckoned tomography. The most common symptoms of COVID- 19 are fever, cough, myalgia, or fatigue and atypical symptoms include foam, headache, haemoptysis, puking, and diarrhoea. Some cases may present with sore throat, rhinorrhoea, headache, and confusion a many days before the onset of fever, indicating that fever is a critical symptom, but not the original incarnation of infection. Likewise, some cases experience loss of smell (hyposmia) or taste (hypogeusia), which are now being considered early warning signs and suggestions for tone-insulation.[25]

The most common symptoms of COVID-19 are

The most common symptoms of COVID- 19 are

- Fever.
- Dry cough.
- Fatigue.

Other symptoms that are less common and may affect some cases include

- Loss of taste or smell.
- Nasal business.
- Conjunctivitis (also known as red eyes).
- Sore throat.
- Headache.
- Muscle or joint pain.
- Different types of skin rash.
- Nausea or vomiting.
- Diarrhoea.
- Chills or dizziness.

Symptoms of severe COVID- 19 complaint include

- Briefness of breath.
- Loss of appetite.
- Confusion.
- Case pain or pressure in the casket.
- High temperature (above 38 °C).

Other less common symptoms are

- Irritability.
- Confusion.
- Reduced knowledge (sometimes associated with seizures).
- Anxiety.
- Depression.
- Sleep conditions.
- More severe and rare neurological complications analogous as strokes, brain inflammation, distraction and vagrancy- whams damage. People of all ages who witness fever and/ or cough associated with difficulty breathing or briefness of breath, casket pain or pressure, or loss of speech or movement should seek medical care immediately. However, call your health care provider, hotline or health installation first, If possible call your health care provider, hotline or health facility first, so you can be directed to the right clinic.[26]

Virus characteristics

Virus characteristics The genome of the new Corona virus SARS- CoV- 2, causing atypical pneumonia in humans’ population of Wuhan, had 89 nucleotide identity with club SARS- like- CoVZXC21 and 82 with that of mortal SARS- CoV and proved this as a new virus strain called SARS- CoV- 2 or COVID- 19.[27] Phylogenetic tree analysis using the whole genome sequences of SARS- CoV- 2 with five severe SARS CoV b sequences, two MERS- CoV sequences and five from club SARS - like Corona virus) from China origin showed that SARS- CoV- 2 have formed different cluster and were more analogous to Bat SARS - like Corona virus(nearly 80).[28] mortal angiotensin converting enzyme receptor(ACE2 cell receptor) was honoured by both SARS- CoV and Novel Corona virus SARS- CoV- 2 by preliminarily formalized beast models trials.(29,30) SARS- CoV- 2 genome is made up of globular or pleomorphic (having periphery of roughly 60 – 140 nm), single- stranded enveloped RNA patch covered with club shaped glycoprotein.[31] The genome consists of 29891 nucleotides which encodes 9860 amino acids. The Structural proteins are decoded by the four structural genes, including shaft (S), envelope (E), membrane (M) and nucleocapsid (N) genes.[32]

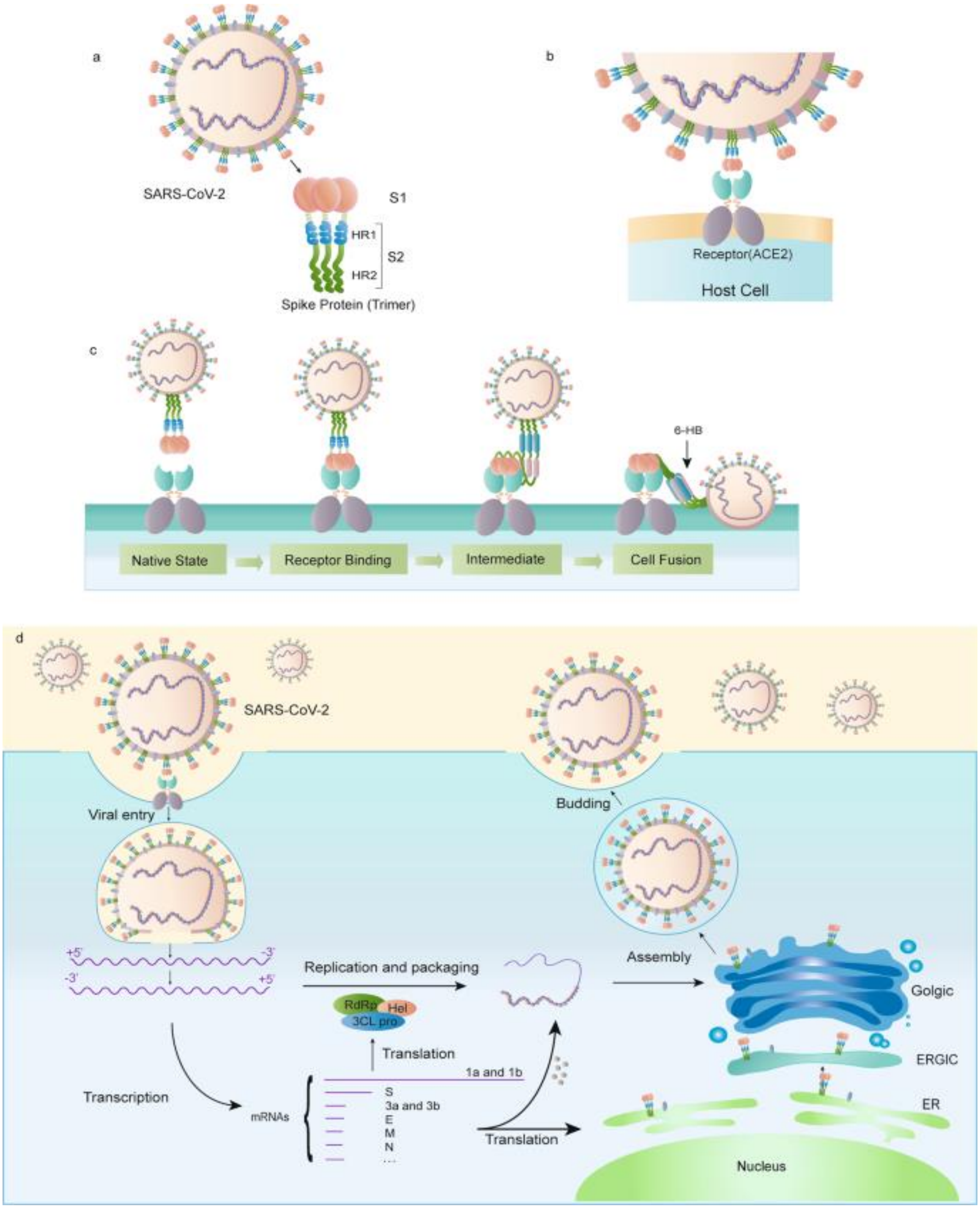


Fig. 4a: The schematic structure of the S protein. b The S protein binds to the receptor ACE2. c The binding and virus–cell fusion process mediated by the S protein. d the life cycle of SARS-CoV-2 in host cells.[33]

Emergency and spread

In late December 2019, several health installations in Wuhan, in Hubei terrain in China, reported clusters of cases with pneumonia of unknown cause.[34] also, to cases with SARS and MERS, these cases showed symptoms of viral pneumonia, including fever, cough and casket discomfort, and in severe cases dyspnoea and bilateral lung infiltration.[34,35] Among the first 27 proved rehabilitated cases, utmost cases were epidemiologically linked to Huanan Seafood Wholesale Market, a wet request located in megacity Wuhan, which sells not only seafood but also live beasties, including meat and wildlife.[36,37] According to a retrospective study, the onset of the first known case dates back to 8 December 2019. On 31 December, Wuhan Municipal Health Commission notified the public of a pneumonia outbreak of unidentified cause and informed the World Health Organization (WHO)[38] (Fig. 5) The first genome sequence of the new Corona virus was published on the Virological website on 10 January, and more nearly complete genome sequences determined by different exploration institutes were also released via the GISAID database on 12 January.[39] latterly, further cases with no history of exposure to Huanan Seafood Wholesale Market were linked. Several domestic clusters of infection were reported, and nosocomial infection also passed in health-care installations. All these cases handed clear confirmation for mortal- to-mortal transmission of the new virus.[40,41,42] On 30 January, the WHO declared the new Corona virus outbreak a public health exigency of transnational concern.[43] On 11 February, the International Committee on Taxonomy of Viruses named the new Corona virus ‘SARS-CoV- 2’, and the WHO named the complaint ‘COVID- 19[44] The outbreak of COVID- 19 in China reached an epidemic peak in February. According to the National Health Commission of China, the total number of cases continued to rise sprucely in early February at an average rate of further than 3,000 recently vindicated cases per day. To control COVID- 19, China executed unprecedentedly strict public health measures. The megacity of Wuhan was shut down on 23 January, and all trip and transportation connecting the megacity was blocked. In the following couple of weeks, all out- of- door exertion and gatherings were confined, and public installations were closed in utmost megalopolises as well as in country.[45] Owing to these measures, the quotidian number of new cases in China started to drop steadily.[46]

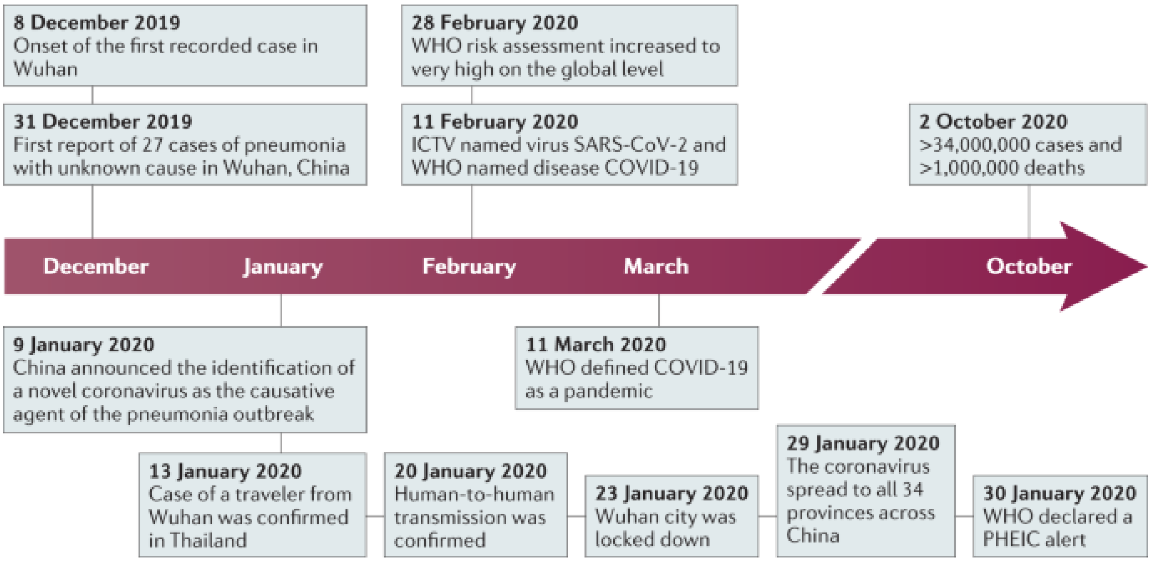


Fig. 5: Timeline of the key events of the COVID-19 outbreak.

The first recorded cases were reported in December 2019 in Wuhan, China. Over the course of the following 10 months, more than 30 million cases have been confirmed worldwide. COVID-19, Corona virus disease 2019; ICTV, International Committee on Taxonomy of Viruses; PHEIC, public health emergency of international concern; SARS- CoV-2, severe acute respiratory syndrome Corona virus 2; WHO, World Health Organization.[47]

Clinical and epidemiological features

It appears that all periods of the population are susceptible to SARS- CoV- 2 infection, and the median age of infection is around 50 years.[48,49,50,51,52] However, clinical manifestations differ with age. In general, older men (>60 years old) with co- morbidities are more likely to develop severe respiratory disease that requires hospitalization or even die, whereas most young people and children have only mild diseases (non- pneumonia or mild pneumonia) or are asymptomatic.[48,52,53] Notably, the risk of disease was not higher for pregnant women. However, evidence of transplacental transmission of SARS- CoV-2 from an infected mother to a neonate was reported, although it was an isolated case.[54,55] most people showed signs of conditions after an incubation period of 1 – 14 days (most generally around5 days), and dyspnoea and pneumonia developed within a median time of 8 days from illness onset.[48] In a report of 72,314 cases in China, 81 of the cases were classified as mild, 14 were severe cases that needed ventilation in an ferocious care unit (ICU) and a 5 were critical (that is, the cases had respiratory failure, septic shock and/ or multiple organ dysfunction or failure).[48,56] Most patients also developed marked lymphopenia, similar to what was observed in patients with SARS and MERS, and non- survivors developed severer lymphopenia over time.[49,50,51,52] Compared with non- ICU patients, ICU patients had higher levels of plasma cytokines, which suggests an immune pathological process caused by a cytokine storm.[50,56,57] Utmost cases also developed pronounced lymphopenia, analogous to what was observed in cases with SARS and MERS, and non- survivors developed severer lymphopenia over time. Compared with non- ICU cases, ICU cases had advanced situations of tube cytokines, which suggests an vulnerable pathological process caused by a cytokine storm. In this cohort of case, around2.3 people failed within a median time of 16 days from complaint onset.[48,56] Men aged than 68 times had a advanced threat of respiratory failure, acute cardiac injury and heart failure that led to death, anyhow of a history of cardiovascular complaint[57] (Fig. 6). utmost cases recovered enough to be released from sanitarium in 2 weeks[48,51] (Fig. 6).

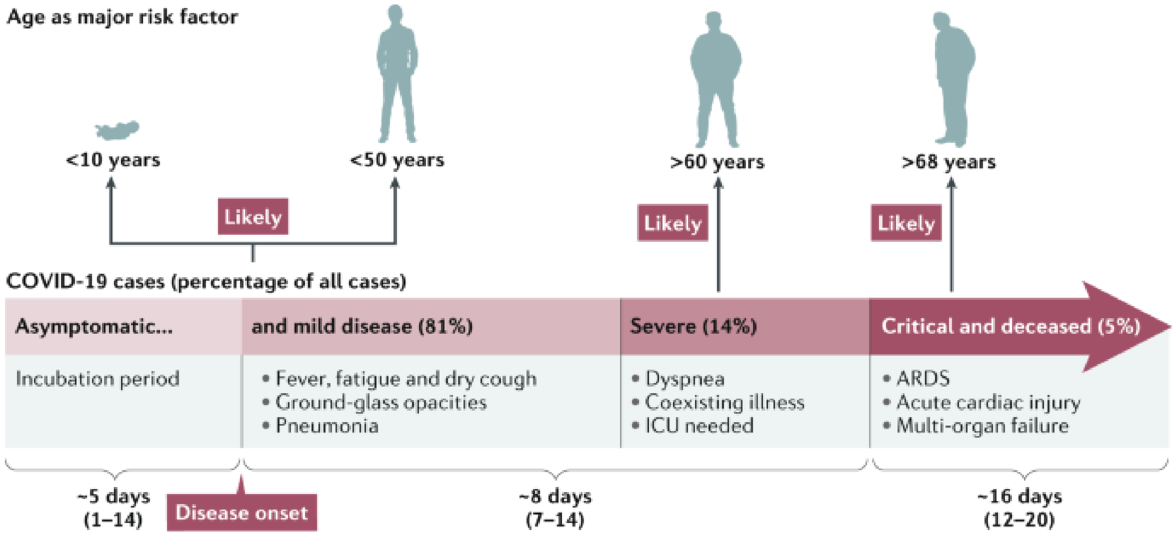


Fig no 6: Typical symptoms of Corona virus disease 2019 (COVID-19) are fever, dry cough and fatigue and in severer cases dyspnoea.

Many infections, in particular in children and young adults, are asymptomatic, whereas older people and/or people with co-morbidities are at higher risk of severe disease, respiratory failure and death. The incubation period is ~5 days, severe disease usually develops ~8 days after symptom onset and critical disease and death occur at ~16 days. ARDS, acute respiratory distress syndrome; ICU, intensive care unit.

Types of Corona virus

Corona viruses are classified into four subtypes nascence, beta, gamma and delta, which scientists use these groups to classify different species. Seven Corona viruses have been linked to mortal complaint. The upper and lower airways, nose, sinuses, mouth and lungs are affected by four of these, including mortal Corona virus 229E and NL63 (which belong to nascence- CoVs)[58], as well as mortal Corona virus OC43, and HKU1 (which belong to beta-CoVs)[59] as shown in Fig. 2. These viruses are wide in the world, counting for 15 – 30 of all common snap. They only spread to the lower respiratory tract in a small chance of cases. Three further Corona viruses surfaced from beast infections. These viruses developed over time and were eventually passed on to humans. These Corona viruses are more dangerous to people’s health. They're listed as below • Severe acute respiratory pattern Corona virus (SARS CoV), which caused the SARS epidemic in 2002 – 2003.[60]

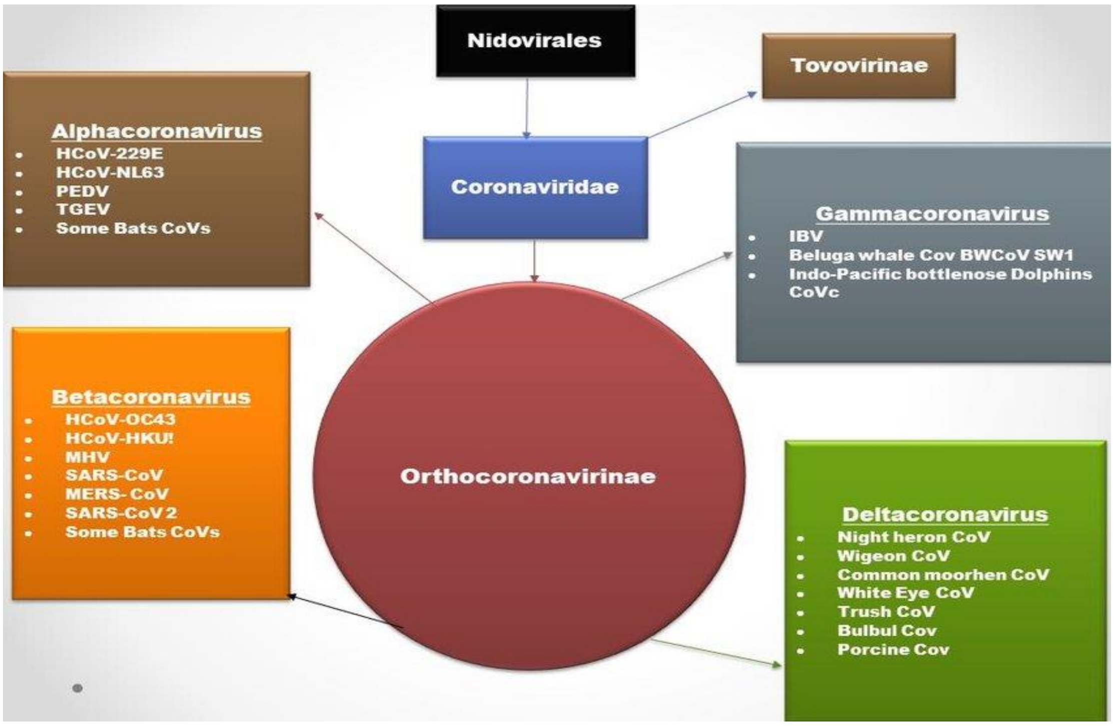


Fig no 7: Classification of different types of Corona viruses within the family Coronaviridae, subfamily ortho coronavirinae, and the respective genera: alpha-, beta-, gamma-, and delta Corona viruses. The SARS-CoV-2 is classified as a beta Corona virus.[61]

Evolution of the Corona virus

Corona virus were named after the Latin word nimbus, meaning crown or halo, owing to their crown- suchlike harpoons on the face as seen when viewed under an electron microscope.[62] Corona viruses belong in the subfamily corona virinae of the coronaviridae family, in the order of nidovirales. The Corona virinae subfamily consists of four rubrics nascence Corona virus, beta Corona virus, delta Corona virus and the gamma Corona virus, with the SARS-CoV- 2 strain being classified under the beta Corona virus rubric grounded on the genome sequence analysis.[63,64] The Corona virus genome is known to have a 50 cap and a 30 poly (A) tail; thus, upon infecting the host cell, the genome acts as an mRNA for restatement of the replicase poly proteins needed for viral replication.[65] Corona viruses have been reported to generally live in a beast force, similar as batons, mice, rats, cravens, tykes, pussycats, nags, and camels.[66,67] Lately, the virus has developed the capability to initiate an epidemic by conforming to humans via zoonotic transmission, analogous to the former Zika virus outbreak in 2015.[68,69] Batons have been reported to be the primary carrier and force for a vast range of viruses, including the Corona virus, therefore making the beast – mortal species hedge cross largely probable due to the large number of batons that congregate within the community and their capability to travel long distances.[70] Human Corona viruses were first discovered in the 1960s.[71] To date, studies have reported seven different strains of mortal Corona viruses. The four common Corona virus strains, including 229E, NL63, OC43 and HKU1, are known to beget mild respiratory tract infections worldwide.[72,73] Corona viruses preliminarily known to infect creatures may evolve and acclimatize to infect humans, therefore performing in the emergence of a new virus and the possibility of a epidemic outbreak.[74] The SARS- CoV, MERS- CoV and the more recent SARS- CoV- 2 are exemplifications of viruses crossing the beast- to- mortal species hedge and are known to beget more severe symptoms in cases.[75]

Table 1: Properties of SARS-CoV-2, MERS-CoV and SARS-CoV (* updated as of 8 October 2020).

	SARS-CoV-2 *	**MERS-CoV**	**SARS-CoV**
Outbreak Date	December 2019	April 2012	November 2002
Epicenterm of Disease Outbreak	Wuhan, China	Jeddah, Saudi Arabia	Guangdong, China
Original/Intermediate Animal Reservoir	Bats, Pangolins and potentially other mammals	Bats/Camels	Bats/Masked palm civets
Number of Cases	36,401,583	2494	8096
Number of Deaths	1,060,567	858	744
Transmission Rate	3–4	<1	3
Fatality Rate	1.4%	37%	10%
Countries/Territories affected	214	27	26

COVID-19 Transmission

Although multiple reports have mentioned that a carrier must be present for SARS CoV- 2 to transmit, there are fresh forms of viral transmission that have been observed throughout this epidemic.[76,77,78] A study recently performed by Chan et al.[79] reported viruses 2021, 13, 202

4 of 25 the case reports of a family of six cases who have been tested positive for the SARS- CoV- 2, including their contact- tracing history and epidemiological, clinical, radiological and microbiological findings. Of the six family members, one member, who had not travelled to Wuhan municipality and yet had tested positive for SARS- CoV- 2 after close contact with the family members, was among the first suggestions of positive person- to- person transmission of COVID- 19.[79] Primarily, it's now recognized that the main form of mortal-to-mortal transmission occurs through respiratory droplets expelled by an infected existent; hence, coughing and sneezing renders SARS- CoV- 2 airborne, putting on- infected individualities at trouble of contracting the complaint.[80,81] Also, data have indicated that SARS- CoV- 2 transmission can also do as a result of contact with defiled insensible objects, also known as fomite transmission.[82]

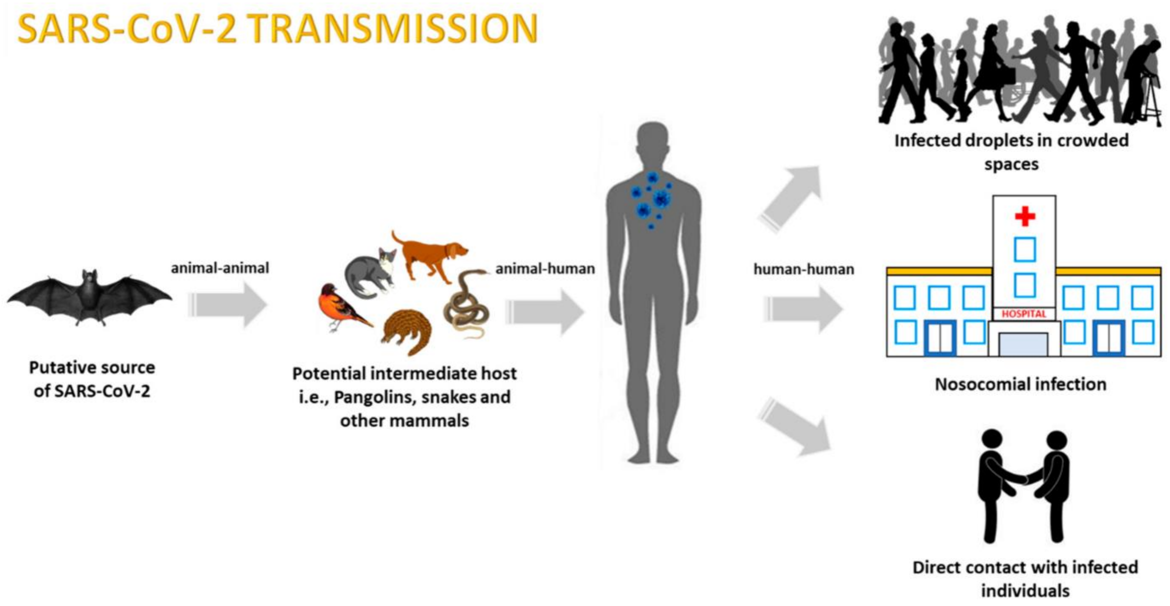


Figure 8: Representation of the zoonotic COVID-19 modes of transmission.

4. COVID-19 MODES OF DETECTION

4.1. Reverse Transcription Polymerase Chain Reaction (RT-PCR)-Based Testing

Whole genome sequencing analysis of the new nimbus virus has been performed lately and has allowed the analysis and selection of genes that are specific to the virus. This allows accurate and precise testing to be performed for the conformational opinion of infected cases using conventional real- time or RT- PCR. With this information, Chan et al.[79] developed and optimized manuals for RT- PCR for the discovery of the shaft gene (S) that's specific only to the new nimbus virus. The forward and rear manuals are as follows 50 CCTACTAAATTAAATGATCTCTGCTTTACT- 30) and 50-

CAAGCTATAACGCAGCCTGTA- 30), independently. In addition, a study by Corman et al.[83] reported manuals specific to other genes of the new Corona virus, similar as the RdRp gene, the E gene and the N gene. Any of the following case samples slaver, respiratory, coprolite, urine or serum or tube — are acceptable to use for viral RNA insulation with this system. The detailed conditions for this assay can be set up in the published composition by Chan et al.[79] More lately, a protocol for simple, accelerated and sensitive discovery of SARS- CoV- 2 using slaver samples, known as the Saliva Direct assay, has entered exigency use authorization from the Food and Drug Administration.[84]

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