

# ORIGIN, EVOLUTION AND HISTORY OF COVID 19 - A REVIEW

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## ABSTRACT

The coronavirus disease (COVID-19) is a highly transmittable and viral infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which arises in Wuhan, China and spreads all around the world. The Genomic analysis shows that SARS-CoV-2 is related to severe acute respiratory syndrome-like (SARS-like) bat viruses, so bats could be the possible primary reservoir for this disease. The intermediate source of origin is not known, the rapid human to human transfer has been confirmed largely. Most adults or children with COVID-19 infection are with mild flu-like symptoms and a few patients are in critical condition and develop acute respiratory distress syndrome, respiratory failure, multiple organ failure, even death of the individuals. The most commonly reported Symptoms are fever, cough, myalgia or fatigue, pneumonia, and complicated dyspnea, where's less common reported symptoms include headache, diarrhea, halmoprysis, runny nose, and phlegm producing a cough. Still There is no clinically approved antiviral drug or vaccine available for COVID-19. Few broad-spectrum antiviral drugs have been evaluated against COVID-19 in clinical trials, resulting in clinical recovery. The current review is about the history of covid 19.

**Keywords:** coronavirus, origin, evolution, transmission, treatment, prevention.

## INTRODUCTION

The human coronaviruses history starts in 1965 where Tyrrell and Bynoe found a virus named B814. It was found in human embryonic tracheal organ cultures obtained from the respiratory tract of an adult with a common cold [1]. In the late 1960s, Tyrrell was virologists working with the human strains and number of animal viruses. This included mouse hepatitis, infectious bronchitis virus, virus and transmissible gastroenteritis virus, all of which had been morphologically the same as seen through electron microscopy. This new group of viruses was named as coronavirus. The name was given due to its crown-like appearance on their surface.. and was later officially accepted as a new genus of virus [2]. Ongoing research are ongoing using serologic techniques has resulted in a considerable amount of information regarding the epidemiology of the human respiratory coronaviruses [3]. It was found that coronavirus is associated with climate, respiratory coronavirus infections occur more often in the winter and spring than in the summer .The evolution of this virus incontestable that coronavirus isn't a stable virus and might adapt to become a lot of virulent, even deadly, to humans. Indeed, an- alternative eruption in Saudi Arabia in 2012 resulted in several deaths and spread first to other countries in the Middle East and then worldwide, resulting in renewed interest in studies of this new form of coronavirus [4]. The Center for Diseases Control and Prevention and World Health Organization maintain a website that is

updated frequently with new cases of MERS-CoV infection. In this review, we describe the history and evolution of this novel virus. Studies of the genetics and molecular mechanisms of this virus are expected to facilitate the development of vaccines in the future. We searched PubMed for all published articles regarding COVID-19. After careful screening, published articles with confirmed cases were identified and included in this review.

**METHODOLOGY**

The review was done based on the articles obtained from various platforms like pub med, PubMed centre and google scholar. They were collected with restrictions on time basis from 1960-2020 . The inclusion was an original research paper, in vitro studied among various conditions and articles with coronavirus topics. Exclusion criteria are articles related to other topics and articles of other language.All articles selected based on coronavirus.

They are determined by article title, abstract and complete article.When article holder websites were analysed on the topic of coronavirus more than 100 articles were found where it is shortlisted based on inclusion and exclusion criteria , the number of articles were lowered to 36. This article is reviewed from 36 articles collected. Quality of articles used was assessed using a quality assessment tool and graded as strong, moderate, weak which is shown in table 1.

Table 1: Quality analysis of studies referred

S.NO	Author	Year	Taken from	Quality of research
1	Tyrell et al	1966	Pubmed	strong
2	Almeida JD et al	1975	Google scholar	strong
3	Mcintosh K et al	1970	Pubmed	weak
4	Zhu N et al	2019	Pubmed	weak
5	Yin Y et al	2018	Pubmed	moderate
6	Zhou P et al	2020	Pubmed	moderate
7	Perlman et al	2007	Google scholar	weak
8	Kahn JS et al	2005	Pubmed	strong
9	Fehr AR et al	2015	Pubmed	strong
10	Shaffer T et al	2007	Pubmed	strong
11	Li F et al	2016	Pubmed	weak
12	Guan X et al	2020	Pubmed	moderate
13	Zhang W et al	2020	Pubmed	moderate
14	Wang P et al	2019	Google scholar	weak
15	Chowell G et al	2015	Pubmed	weak
16	Li Y, Xu S et al	2020	Pubmed	moderate

17	Singhal T et al	2020	Pubmed	strong
18	Kam YW et al	2007	Google scholar	moderate
19	Sarkar B et al	2020	Pubmed	strong

## ORIGIN

The SARS-COVID is a  $\beta$ -coronavirus, which is enveloped non-segmented positive-sense RNA virus (subgenus sar- becovirus, Ortho Coronaviridae subfamily).[5] Corona- viruses (CoV) are divided into four genera, including  $\alpha, \beta, \gamma, \delta$  cov.  $\alpha$ - and  $\beta$ -CoV cause infection in mammals, while  $\gamma$ - and  $\delta$ -CoV cause infection in birds. The other two known  $\beta$ -CoVs, SARS-CoV and MERS-CoV cause severe and fatal respiratory tract infections [6]. It was found that the genome sequence of SARS-CoV-2 is 96.2% identical to a bat CoV, It shares 79.5% identity to SARS-CoV. Based on virus genome sequencing and evolutionary analysis shows that bat is the natural host of virus origin, and SARS- CoV-2 may be transmitted from bats via unknown intermediate hosts to humans. It is clear that SARS-CoV-2 use the angiotensin-converting enzyme 2 (ACE2), the same receptor as SARS-CoV[7] The epidemic of unknown acute respiratory tract infection broke out first in Wuhan, China, since 12 December 2019, related to a seafood market. Several studies proved that bat may be the reservoir of SARS-CoV-2 [8]. The pandemic has forced many people around the world to stay at home and self-isolate for a period of time.

## CORONAVIRUS GENOME AND STRUCTURE

Coronaviruses are RNA viruses medium-sized with characteristic appearance in electron micrographs of negatively stained. The nucleic acid of this virus is about 30 kb long, positive sense, single stranded and polyadenylated. The RNA of the virus is the largest known viral RNA and it codes for a large polyprotein [9]. The genome is packed inside a helical capsid formed by the nucleocapsid protein (N) and further surrounded by an envelope. Associated with the viral envelope are three structural proteins: They are membrane protein (M) and the envelope protein (E) are involved in virus assembly, the spike protein (S) mediates virus entry into host cells. Among the structural proteins, the spike in the virus surface forms a large portion, it gives coronaviruses the appearance of having crowns in addition to helping the virus entry [10]. The envelope of the virus in electron micrographs appears as a distinct pair of election dense shells. The ratio of S:E:M is 20: 1:300. On an average, the coronary particle has 74 surface spikes. spikes are of homotrimeric of the S protein, which is Composed of an 8, and S1 subunit. The major protein in it is the homotrimeric s protein which is a class 1 fusion protein which mediates the receptor binding and membrane fusion between the virus and host cell.

## LIFE CYCLE

Infections begin with spike protein attached to the host cell. After attachment protease of host cell cleaves and activates the receptor attached spike protein depending on protease availability cleavage and activation allow the virus to enter the host cell by endocytosis or direct fusion of viral envelope [11] . On entry into the host cell, the virus particle is uncoated, and its genome enters the cell cytoplasm. The coronavirus RNA contains 5' methylated caps and a 3' polyadenylated tail, that permits it to act sort of a RNA and be directly translated by the host cell's ribosomes. [12]. RNA recombination appears to be a major driving force in determining genetic variability. They are capable of jumping from one species to another [13]. The mRNA are translated by host ribosome into protein and more number of accessory proteins are released by cell [14]. The infective agent structural proteins S, E, and M move on the secretory pathway into the Golgi intermediate compartment. There, the M proteins direct most protein-protein interactions needed for assembly of viruses following its binding to the nucleocapsid. relative

viruses area unit then discharged from the host cell by exocytosis through liquid body substance vesicles. Once discharged the viruses will infect alternative host cells.

### **CLINICAL CHARACTERISTIC**

Acute respiratory infectious disease, COVID-19 primarily spreads through the respiratory tract droplets, respiratory secretions, and direct contact with infected people [15]. It has been reported a COVID-19 was isolated from fecal swabs of a pneumonia patient on 10 February 2020 from a critical case in the Fifth Affiliated Hospital, Sun Yat-Sen University, Guangdong, China. Likewise, Zhang et al [16]. It shows the Covid-19 present in fecal swabs and blood, shows the possibility of multiple routes transmission of this virus. ACE2 protein presents in lung alveolar epithelial cells and enterocytes of small intestine remarkably [17]. which may help understand the routes of infection and disease manifestations. The incubation period is 1–14 days, mostly 3–7 days [18] [19]. Most adults or children with COVID-19 infection are with mild flu-like symptoms and a few patients are in critical condition and develop acute respiratory distress syndrome, respiratory failure, multiple organ failure, even death of the individuals [20]. There is no indication that patients with thyroid disease are at high risk of getting COVID-19. Adverse outcomes and death are more common in the elderly and those with underlying comorbidities (50–75% of fatal cases). The limitations are availability of less no of articles and less data and facts about COVID -19. Future scope is to find a Vaccine for COVID-19. [21]

### **TRANSMISSION**

Human-to-human transmission of SARS-CoV-2 occurs mainly between family members, including relatives and friends who intimately contacted with patients or incubation people. It is reported [22] that COVID-19 affects 31.3% of patients recently travelled to Wuhan and 72.3% of patients contacting people from Wuhan among the patients of non residents of Wuhan. Transmission of this virus between healthcare workers occurred in 3.8% of COVID-19 patients, It was issued by the National Health Commission of China on 14 February 2020. Direct contact with intermediate host animals or consumption of wild animals was suspected to be the main route of COVID-19 transmission. Thus, it has been reported that human-to-human transmissions of SARS-CoV occurs by the binding between the receptor-binding domain of virus spikes and the cellular receptor which has been identified as angiotensin-converting enzyme 2 (ACE2) receptor. The sequence of the receptor of COVID-19 spikes is similar to SARS-CoV. This data strongly suggests that entry into the host cells is most likely via the ACE2 receptor. Onychocryptosis does not play a role in transmission of coronavirus. Sleep apnea patients are particularly concerned about transmitting the coronavirus disease [23].

### **TREATMENT**

There's no specific treatment for COVID-19. People who get a gentle case would like care to ease their symptoms, like rest, fluids, and fever management. Take medicine for an inflammatory disease, body aches, and fever. however do not provide Aspirin to youngsters or teens younger than nineteen. Several studies are concentrated on an antiviral medication called remdesivir, which was created to fight Ebola. An emergency FDA ruling allows doctors to use it for people affected by COVID-19 and in clinical trials. Researchers in the U.S. say remdesivir helped to recover from disease by 31% faster. The FDA also issued an emergency use of hydroxychloroquine and chloroquine. These medications are approved to treat against malaria and autoimmune conditions like rheumatoid arthritis and lupus. Studies on their use against COVID-19 have had mixed results, and research is going on. The lack of effective antiviral therapy against COVID-19 [24]. Current treatments mainly focused on symptomatic and respiratory support according to the Diagnosis and Treatment of Pneumonia Caused by COVID-19 (updated to version 6) issued by the National Health Commission of the People's Republic of China [25]. Nearly all patients accepted oxygen therapy, and WHO suggested extracorporeal membrane natural process (ECMO) to patients with refractory hypoxemia [26] Antiviral medicine and general steroid treatment unremarkably

utilized in clinical follow. Neuraminidase inhibitors (oseltamivir, peramivir, zanamivir, etc), acyclovir, and antiviral agent, also as methylprednisolone [27] for influenza virus, are invalid for COVID-19 and not recommended [28].

## **PREVENTION**

Since there are no approved treatments for this infection, prevention is better. Several properties of this virus make prevention difficult, non-specific features of the disease, the infectivity before onset of symptoms in the incubation period, [29] easy transmission from asymptomatic people, long incubation period for this disease, tropism for mucosal surfaces such as the conjunctiva, prolonged duration illness and transmission of virus even after clinical recovery [30]. Isolation of confirmed or suspected cases even mild illness at home is recommended for effective prevention of this disease. The ventilation at home should be good with sunlight to allow for the destruction of viruses. Patients should wear a simple surgical mask and practice hygiene [31]. Caregivers should be asked to wear a surgical mask when in the same room as a patient and use hand hygiene every 15–20 min. Prevention and control Strategies and methods are reported at three levels. They are national level, Case related population level, and general population level. Several public health measures that many prevent or slow down the transmission of the coronavirus were introduced; these include case isolation, identification and follow up Contacts, environmental disinfection and use of personal protective equipment [32], [33].

## **VACCINE FOR COVID-19**

There is no available vaccine against COVID-19, while previous vaccines or strategies used against SARS-CoV can be effective for this covid 19. Recombinant protein from the Urbani strain of SARS-CoV was administered to mice and hamsters, resulting in the production of antibodies and protection against COVID-19 [34]. There are few vaccines in the pipeline against SARS-CoV-2. The mRNA based vaccine prepared by the US National Institute of Allergy and Infectious Diseases against SARS-CoV-2 is in phase 1 trial Soon mRNA based vaccine's sample (prepared by Stermirna Therape Therapeutics) will be available [35]. GeoVax-BravoVax is working to develop a Modified Vaccinia Ankara (MVA) based vaccine [36].

## **CONCLUSION**

Despite some diversity in initial symptoms, most COVID-19 patients have fever and metabolic process symptoms. For now, travel history to epidemic areas is vital to the identification and may be obtained on all patients with flu-like syndromes. If positive, timely referral to the general public health authorities for testing is crucial. Frontline medical employees are at unit in danger and may use protection measures.. Treatment is mainly supportive. This review applied a rigorous search strategy to retrieve relevant articles according to research objectives. This research summarizes scientific foundations, history, origin, evolution, Life cycle and prevention and control of Coronavirus spread. This study will provide some evidence for future Study and control.

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## **CONFLICT OF INTEREST:**

The author declares that there was no conflict of interest in the present study.

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