



Biological Story of The New Coronavirus SARS-COV-2

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Makalenin Alanı: Sağlık

Makale Bilgileri	Öz
Geliş Tarihi 05.11.2021	Bu çalışmanın amacı, halk sağlığını tehdit eden Covid-19 pandemisi hakkında doğru bilgilenmektir. Yöntem: Pubmed, Web of Science ve Google Scholar veri tabanlarında ve Google arama motorunda Covid-19'un bilimsel ismi olan "SARS-CoV-2" ve "Coronavirus" anahtar kelimeleri aranarak bulunan ilgili makaleler çalışma kapsamına alınmıştır. Bulgular: SARS-CoV-2 olarak adlandırılan bu virüs, büyük bir virüs ailesinin bir alt türü. Ancak yeni virüs dahil sadece yedi tanesi insanlara bulaşabiliyor. Çin'in Wuhan kentinde ortaya çıkmış ve Covid-19 adı verilen hastalığa yol açan koronavirüs salgını dünyanın neredeyse bütün ülkelerine yayılmış ve çok kısa bir sürede yüksek sayıda ölümlere neden olmuştur. Sonuç: Covid-19 Pandemisi konusunda bilgi kirliliğini önlemek ve doğru önlem ve tedaviyi sağlamak amacıyla literatür taramasına dayalı derleme çalışmaları önem taşımaktadır.
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Anahtar Kelimeler Coronavirus, Covid-19, Literatür taraması, Pandemi, SARS	

Article Info	Abstract
Received 05.11.2021	The objective of this study is to gain knowledge about a new coronavirus Covis-19 epidemic that threatens public health. Method: "SARS-CoV-2" and "Coronavirus" keywords were searched in the Pubmed, Web of Science, and Google Scholar databases and in the Google search engine; relevant articles were studied. Findings: This virus, called SARS-CoV-2, is a subspecies of a large family of viruses. But only seven, including the new virus, can infect humans. The coronavirus outbreak that occurred in Wuhan, China, caused the disease called Covid-19, spread to almost all countries of the world, and caused a high number of deaths in a very short time. Conclusion: In order to prevent information pollution about the Covid-19 Pandemic and to provide the right prevention and treatment, compilation studies based on a literature review are important.
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INTRODUCTION

In parallel with the high balance sheet of the Coronavirus epidemic in the World, researchers are rapidly continuing their studies on therapeutic drugs and preventive vaccines. All viruses known as obligate intracellular parasites are non-living viruses that use host cells and enzymes to reproduce spontaneously, but can also reproduce in the presence of relative viruses; but are defined as entities that are on the verge of life (Dhama et al., 2020; Güven et al., 2021) Viral diseases that seriously affect human health such as AIDS (Acquired Immune Deficiency Syndrome), CCHF (Crimean-Congo Hemorrhagic Fever), West Nile Virus Outbreak, Avian Flu, Swine Flu, Ebola, Marburg, Lassa Fever, and Rabies have been seen in Türkiye and

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the world. It has been found that they can cause a wide variety of respiratory tract infections in humans, ranging from the common cold to pneumonia. However, until 2002, only the HCoV virus, called HCoV-229E and HCoV-OC43, was known to cause infection in humans. By 2003, the new Coronavirus pandemic started to manifest itself with a respiratory infection more severe than the common cold (Ksiazek et al., 2003; Peirir et al., 2003; WHO, 2020). Although it is not yet known exactly what the real culprit of the virus that caused the deaths of thousands of people and how it spread is not certain, different information is given (Dhama et al., 2020; Ksiazek et al., 2003; WHO, 2020). There are many research that it is of great importance to learn the source of the virus, to prevent it from spreading and to be protected. It has been stated that the source of the coronavirus is bats in the Guangdong region of China. According to the first information that started, a bat in a region of China leaves a coronavirus with its feces in one of the forests where it takes off from the sky. The pangolin (anteater), one of the creator animals in the forest, is transmitted to this feces and catches the infection. Then a hunter hunts this infected animal and brings it to the animal market, causing an epidemic that reaches global dimensions (Zaki et al., 2012; Xie et al., 2018; Scanlon, 2018; Navas Martin and Weiss, 2004). The virus, which comes to the market without harming its hosts, causes severe infections in humans. Bat, one of its hosts, can fight against the virus thanks to its strong immune systems as well as the high energy that enables the DNA damaged by the viruses to flay, it can repair that area and continue its life without getting sick. According to another study, bats, as single-flying mammals, use excessive energy and cause the release of DNA particles in various parts of their bodies are perceived as the invasion of viruses that cause disease (Xie et al., 2018; Scanlon, 2018; Navas Martin and Weiss, 2004).

It was pointed out that Christian Drosten, one of the scientists who detected the SARS virus in 2003, could be the raccoon dog unique to the Chinese. In 2012, the epidemic was defined as MERS-CoV by cell culture and genome sequencing in Saudi Arabia, WHO's November 2014 report reported 909 identified MERS-CoV cases and 331 deaths, while the fatality rate was stated to be 36.4 per thousand (Akbaba et al., 2004).

Today, the virus known as SARS-CoV-2, according to the analysis results of samples taken from more than a thousand wild animals in China; it is stated that the genome sequence of the coronavirus found in the scaly anteater is the same as SARS-CoV-2, which causes 99% epidemic (Ak, 2020; Atakan, 2016). Experts state that the number of bats and pangolins used in the research and they're to obtain precise information, and they state that taking great

precautions in animal markets from one species to another will make a significant contribution to preventing the spread. The aim of this study, which is primarily based on the protection of public health, is to determine the risks that cause the virus to be transmitted from/to humans and the risks that cause the virus to spread in order to prevent the occurrence of a virus, which causes epidemics in the World, and at the same time, in the process of combating the disease. Also, the individual transforms the sociological and psychological, changing his old achievements and habits; to Show the most accurate and sustainable ways to comply with this new order that questions different areas of life.

METHOD

By using the keywords SARS-CoV-2 “pandemic” and “Coronavirus” articles from the search engine in Web of Science, Pubmed and Google Scholar databases were included in the study and examined. In addition, articles on the web pages of various organizations (World Health Organization (WHO), World Animal Health Organization (OIE) and American Food and Drug Administration (FAD) World Public Health of Agency and Ministry of Health of China were used.

Transmission Routes of SARS-CoV-2

Zoonotic Transmission

Each virus has its own specific transmission cycle and host spectrum. Coronaviruses infect many living species. Some virus types cause disease only in humans, some virus types in both humans and animals, and some virus types cause disease only in animals. For example, the bovine coronavirus causes bronchitis that only infects cattle, and the coronavirus FIP (Feline Infectious Peritonitis) in cats. Although there is no coronavirus transmitted from pets to humans so far, there are several viruses that pass through wild animals. However, according to information shared by the OIE, a virus was also detected in the dog of a citizen with a Covid-19 case. This suggests that the virus may be transmitted from humans to animal (Hussian et al., 2020; Wang et al., 2018). Although there is no evidence of the transmission of Covid-19 from animal to animal, there are many assumptions put forward. In addition to all these, the virus does not be affected by the virus thanks to the receptors and defense system elements on the membrane surfaces of the cells that make up some tissues. This is why young people are not harmed by the virus. The virus, which emerged in Wuhan, China in December, was

first identified as a coronavirus epidemic. On February 11, the WHO President Tedros Adhanom Ghebreyesus named it Covid-19. It was stated that this name is derived from the “Co” of “corona”, the “vi” of the “virus” and the “D” of the word “disease” (Ksiazek et al., 2003). Wuhan pneumonia was among the names used by various media organizations (Ak, 2020; Hussian et al., 2020; Wang et al., 2018). In March 2020, WHO declared the coronavirus outbreak to be a pandemic and to be an International Public Health Emergency (PHEIC) (WHO, 2020; Gu et al., 2020). The way of transmission of the virus is usually when the droplets formed during the sick person’s coughing and sneezing enter the respiratory tract at close contact up to 1-1.5 meters. According to the information given so far, although it is a weak possibility, it is stated that the possibility of transmission to inanimate surfaces with hands after contact with hands, while some argue that the virus can survive on surfaces and objects for a long time and can be transmitted to people who come into contact with these objects (Gu et al., 2020; Contini et al., 2020).

Biological features of the virus

Coronaviruses are pathogens that have a serious impact on human and animal health. They often cause severe and life-threatening enteric or respiratory diseases (Wilde et al., 2018). These viruses cause a variety of illnesses ranging from the common cold to more serious illnesses such as Middle East Respiratory Syndrome (MERS-CoV) and severe Acute Respiratory Syndrome (SARS-CoV) (Ahn et al., 2020).

In the Orthocoronavirinae subfamily of the Coronaviridae family, four distinct genera were found, namely, alphacoronaviruses, betacoronavirus, gammacoronaviruses, and deltacoronaviruses, and it has been reported that the host and the form of infection of each differ (Lu, et al., 2012; Al-Tawfiq, 2013; Holmes and Dominguez, 2013). They are viruses whose genetic material consists of a single strand of RNA, a viral particle wrapped in a protein envelope. Generally, the virus replicates itself using some components of that cell while invading its hosts and infects other cells with copies. However, since RNA viruses cannot correct the errors by using DNA copies of the host cell during the replication process, their probability of making mistakes increases and cause new mutations. Some of these mutations are known to generate new cell types, resulting in the ability to infect new species (White and Fenner, 1994; Kùlah, 2009; Zhou et al., 2019).

Today's coronavirus, like other RNA viruses, has a capsid helical structure that protects RNA inside and has the ability to pack only RNA. There are structures called envelopes towards the outside of the RNA-containing part called the nucleocapsid. The virus has four structural proteins called nucleocapsids, envelopes, members, and rod-like protrusions (spines). Since these protrusions are called corona (crown), these viruses are called coronaviruses.

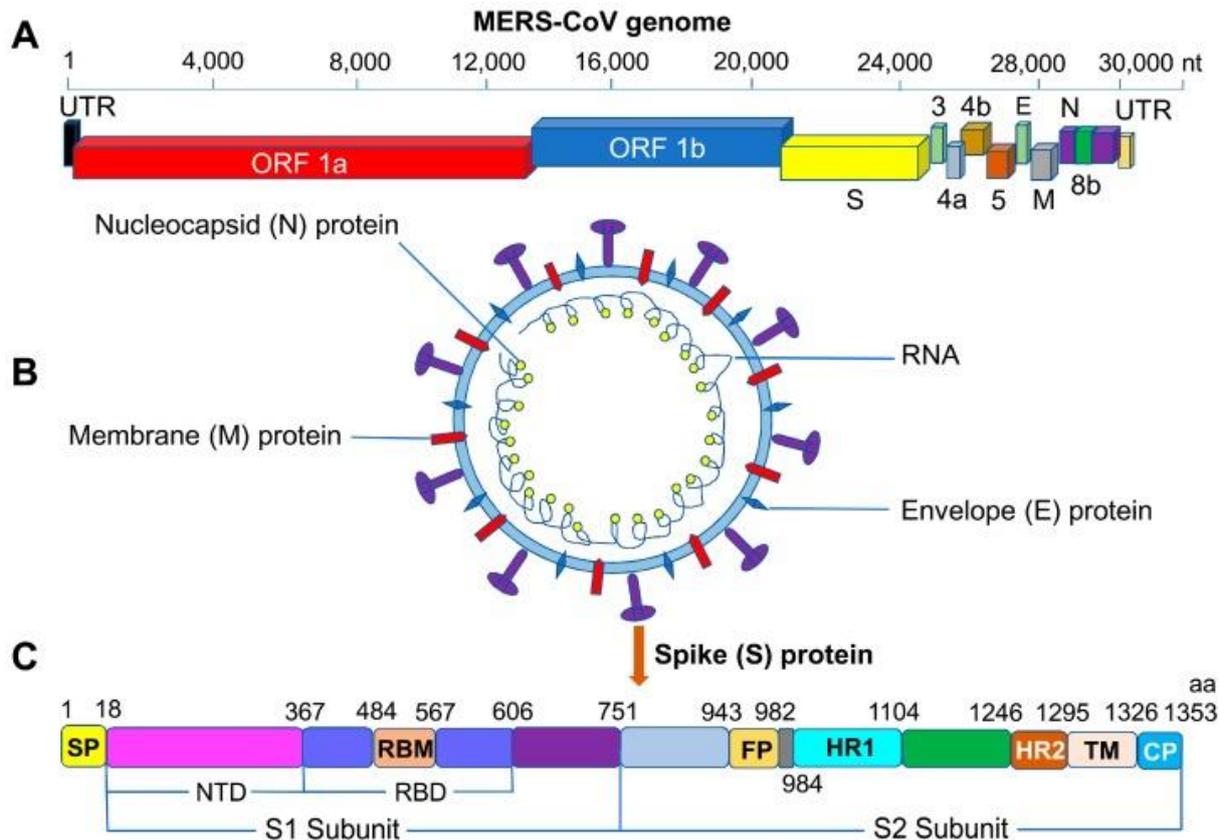


Figure 1. Schematic structure of the Coronavirus (Zhou, et al., 2019)

MERS-CoV genomic structure, with the untranslated region (UTR), open reading frame regions ORF1a and ORF1b, spike (S), envelope ϵ , membrane (M), and nucleocapsid (N) gens. **B** Schematic structure of the MERS-CoV virion and its major structural proteins. **C** Schematic structure of the MERS-CoV S protein and its functional domains, including the N-terminal domain (NTD), receptor-binding domain (RBD), receptor-binding motif (RBM), fusion peptide (FP), heptad repeat region 1 and 2 (HR1 and HR2), transmembrane region $^{\text{TM}}$, and cytoplasmic (CP). Aa, amino acid; MERS-CoV, Middle East respiratory syndrome coronavirus; nt, nucleotide.

There is the genetic material in the structure formed by nucleocapsid, envelope and membrane proteins. The crowns, on the other hand, assume the function of identifying the

cells that the virus will infect and connecting to the receptors. While the analyzes performed, the coronavirus that causes Covid-19 binds to the ACE2 receptor and causes lower respiratory tract infection, while the fact that it does not infect the ACE2 receptor in the heart raises the suspicion that the virus uses other receptors. Thanks to the halper proteins in the virus, the host can escape from the innate immune response (Wilde et al., 2018; Zhou et al., 2019). In a new study published in The Lancet Magazine, it was stated that the genome sequences of the coronavirus isolated from 9 people in China were 99.98% similar to the same two SARS and 50% to MERS (<https://bilimakademisi.org/>,2020).

Effects of SARS/MERS-CoV-2

Since viral epidemics become understandable when hundreds of thousands of people die, losses are always high. It is thought that the virus, which is transmitted from person to person through droplets formed as a result of cough, may also be the result of touching the person's own nose, mouth and eyes after touching surfaces contaminated with the virus. It takes 2-14 days for the viruses to appear in humans. The standard diagnostic method is real-time reverse transcriptase polymerase chain reaction (rRT-PCR) tests to be performed with a nasopharyngeal swab taken from the person (<https://bilimakademisi.org/>,2020). Viruses have replication cycles that vary according to their characteristics such as nucleic acid structures (RNA or DNA) nucleic acids being single or double-stranded, enveloped or non-enveloped, and the chemical composition of the envelope. The SARS/MERS-CoV-virus that exists today primarily binds to the target tissue and uses the S protein (spike glycoprotein) on its surface and the angiotensin-converting enzyme (ACE2) that surrounds the lung epithelium. Hydrogen bonds, ionic attraction, Van der Waals forces also play a role here. Again, side factors such as pH, and salt concentration should not be ignored. After binding, the permeability of the cell membrane is increased and the part containing the nucleic acid of the virus (ribonucleic acid RNA in the case of the corona) (nucleocapsid) enters the cell as a result of some kind of fusion of the virus sheath and cell membrane. Here, RNA or DNA separated from its capsid by means of cellular enzymes (depending on the virus type) replicates with various mechanisms and creates many viral nucleic acid molecules in the same structure. Each of these nucleic acid molecules are surrounded by nucleocapsid, capsid proteins and move towards the cell membrane, leaving the cell either by budding from the membrane (in enveloped viruses) or by breaking the cell membrane (in non-enveloped viruses). The newly released virus particles

continue to multiply by infecting other cells in the region with the same mechanism. During the whole process, functional and structural changes or death naturally occur in the cell, which means that it results in infection (Al-Hazmi, 2016; Oberemok et al., 2020; Caly et al., 2020). High fever begins, followed by dry cough, shortness of breath, and some symptoms that affect the lungs and lead to pneumonia. The majority of cases develop acute respiratory distress syndrome (ARDS) leading to respiratory failure, septic shock, or multiorgan failure. Septic shock or multi-organ failure. Sepsis, abnormal blood clotting and heart, kidney and liver damage are among the other complications associated with Covid-19. Abnormal coagulation, specifically an increase in prothrombin time was observed in 6% of hospitalized patients, and abnormal kidney functions were reported in 4%. Liver damage that can be measured by blood tests is also a common complication in severe cases. Many of the people who died from Covid-19 have been found to have pre-existing diseases such as hypertension, diabetes and cardiovascular diseases (WHO, 2020; Fang et al., 2020; Heymann et al., 2020; Cascella et al., 2020; Zhou et al., 2020). In every epidemic from the past to the present, people who are resistant to their bodies will get sick, recover, and those who are immune to drugs and vaccines. The result is that he will need. Protection and Treatment Procedures It has always been difficult to fight viruses that do not contain cellular organelles, are not affected by antibiotics and have high resistance. In previous epidemics, viruses were fought with interferon (proteins synthesized from body cells, inhibiting the protein production of the virus through the host) and antiviral methods. After the announcement of the pandemic, in many countries of the World in 2012, as the Ministry of Health of Saudi Arabia did, it warned those over the age of 65 and those with chronic diseases (heart, kidney, respiratory system diseases and diabetes), immunodeficiency, malignancy and terminal patients, pregnant women and children under 20 years of age. He had decided to close the entry and exit to the country in a controlled or complete manner. However, there is no basic article and no pathogen-specific treatment related to the Covid-19 outbreak, which is based on the drug recommendations or research of the FAD and other organizations until now (Zaki et al., 2012; Scanlon, 2018). By mid-June, numerous preventive strategies and non-pharmaceutical interventions were used to mitigate the spread of the disease. Management focuses heavily on supportive care and oxygen therapy represents the major therapeutic intervention. Medical therapy including corticosteroids and antivirals as part of critical management schemes has also been encouraged (Nicole et al., 2020). Therefore, the treatment strategy is more symptomatic and

directed toward preventing complications. In some instances empirically comprehensive use of antibiotics, antiviral agents such as oseltamivir and/or acyclovir, and antifungal agents may be used to prevent infections with opportunistic pathogens. Replacement treatments for organ failure and lung protective ventilators for ARDS were used. Extracorporeal membrane oxygenation (ECMO) has been tried in some cases. There are no case-control studies evaluating the effectiveness of such initiatives yet. Although it was aimed to ease respiratory distress and prevent lung fibrosis with high doses of corticosteroids, no success was achieved. To date, no antimicrobial agent has produced successful results in severely progressive patients (Nicole et al., 2020). Applying appropriate infection control measures in cases with possible or definite SARS-CoV-2 infection plays an important role in preventing the spread of the virus. Over time, our knowledge about the disease increases, but there are still some questions we cannot answer. Many questions such as the transmission routes of the disease, the incubation period, its actual frequency in humans and animals, and specific treatment options are seeking answers. Vaccine and drug research continues rapidly in order to prevent the coronavirus (Covid-19) epidemic that killed 404396 people in the World today. The quality of vaccine is the isolation of the virus (Ahn et al., 2020).

RESULT

SARS-CoV-2, which has affected the whole World; it has entered our lives by confining people to their homes for months and introducing a compulsory quarantine-based new lifestyle that limits social life it is a member of the coronaviruses that Show a fatal interaction with the fast transmission and spreading action defined as Covid-19, which is responsible for his process. This pandemic and struggle process, which reminded us the past pandemics in the World and questioned our knowledge on this subject, made its power felt a little more every day with statistical data including the number of infections and deaths from different countries. In order to prevent the spread of the virus, a series of measures such as staying at home, traveling, maintaining social distance, and wearing a mask have caused us to enter a new life-limiting and compelling way of life. This form of struggle will change the old achievements and habits by affecting the social, health and psychological life of society in every aspect, by undergoing different transformations in society.

In addition to all these, the measures taken for the health personnel and veterinarians who have to work are insufficient. While partially updated information reaches the public for

employees of the Ministry of Health; in the field of cat and dog treatment, poultry farms, veterinarians and healthcare professionals engaged in breeding measures and dissemination of them provide statistical information that can be considered serious (Xie et al., 2018). A few months after the initial report, SARS-CoV-2 spread throughout China and the World, reaching epidemic levels. As Covid-19 triggers massive human losses and serious economic loss that poses a global threat, there is an urgent need to understand the ongoing situation and develop strategies to include the spread of the virus (Ahn et al. 2019).

Each infected individual differently, pathogen-resistant individuals will always remain in the host population, while the virus will never complete, because evolutionarily such an event is at stake as an obligate intracellular parasite for the virus. On the other hand, it is generally stated that the virus is due to new protein properties that make the host immunity more intensively infected, and thus more easily transmitted in the host population (Chine 2013). According to the same research, if the pandemic does not stop, within a few decades, four non-severe acute respiratory syndromes of SARS-CoV-2 could be controlled as much as human coronavirus (HCoV-NL63, HCoV-HKU1, HCoV-OC43 and HCoV). In this context, research groups of various disciplines, who have significant experience in the diagnosis, epidemiology and quarantine measures of viral diseases, are especially important in their efforts to take precautions on time with animal studies. In addition, viral and bacterial vaccines for animals are produced in Veterinary Control and Research Institutes, and wild studies should continue with international standards. Although the source of Covid-19 is thought to be animals, there is no clear information about where the disease originated, but the “single health” concept created by WHO, OIE and FAD by assuming that it can be passed from wild animals to humans, from human to human, from object to human, and from human to domestic animals. With interdisciplinary cooperation in all areas of its services, it has accelerated its work on the source, spread and treatment of the virus. In addition, by creating the Triple Zoonoses Guideline (TZG), it was aimed to help countries make the most of border resources while preventing incidents but important social losses such as the restriction of livelihoods of small producers, poor nutrition, trade and tourism (Dae-Gyun et al., 2020; Contini et al., 2020; Wilde et al., 2018).

In line with all this information; as the research on the Covid-19 epidemic increase, primarily, the data to be obtained will enable the detection of viruses that may cause possible human and animal epidemics in the future. There are currently no antiviral drugs to treat the

disease. No significant results have been obtained in treatment with antiviral drugs used for other viral diseases.

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