Review

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New Coronavirus: SARS-CoV-2

Yeni Koronavirus: SARS-CoV-2

Kurtulus Buruk[1], Tevfik Ozlu[2]

[1]Dept. of Medical Microbiology, Karadeniz Technical University Faculty of Medicine, Trabzon, Turkey, [2]Dept. of Pulmonary Medicine, Karadeniz Technical University Faculty of Medicine, Trabzon, Turkey

Abstract

The World Health Organization reported in the early days of 2020 that the world was facing a new coronavirus, a potential pandemic agent. Its etiological agent is the SARS-CoV-2 from the Coronaviridae family, located in the same subfamily as the SARS-CoV, which also appeared in China in November 2002. The agent is an enveloped, positive-stranded RNA virus. It is thought to be of bat origin. While its disease has been initially described as a non-fatal pneumonia, it is now described as Covid-19 disease with a 3.4% mortality rate. The virus, hence the disease, which began in China in late 2019, has spread to 133 countries and autonomous regions, including Turkey in mid-March of 2020. High fever, following dry cough, fatigue, sputum production, respiratory distress, sore throat, headache, muscle and joint pain are the most common symptoms. It can be fatal in the elderly and those with some comorbid diseases. Although various antivirals are tried for its treatment, no approved specific treatment is found yet, and mostly symptomatic agents are used. Vaccine development studies are ongoing. Therefore, today the most effective way of protection is to be careful for the correct personal hygiene and to change of some social behaviors.

Key words: *SARS-CoV-2*

Özet

Dünya Sağlık Örgütü, 2020 yılının ilk günlerinde, dünyanın potansiyel pandemi ajanı olan yeni bir koronavirüs ile karşı karşıya olduğunu bildirmiştir. Etiyolojik ajanı Coronaviridae ailesinden, 2002 yılı Kasım ayında yine Çin'de ortaya çıkan SARS-CoV ile aynı alt aileye konumlandırılan SARS-CoV-2'dir. Etken zarflı, pozitif polariteli bir RNA virüsüdür. Yarasa kökenli olduğu düşünülmektedir. Yaptığı hastalık başlangıçta ölümcül olmayan bir pnömoni olarak tanımlanırken günümüzde %3.4 ölüm oranına sahip Covid-19 hastalığı olarak nitelendirilmektedir. Virüs, dolayısıyla hastalık, 2019 yılının sonlarında Çin'de başlamış, 2020'nin Mart ayının ortalarında Türkiye dâhil 133 ülke ve özerk bölgeye yayılmıştır. Yüksek ateş, takip eden kuru öksürük, yorgunluk, balgam üretimi, solunum güçlüğü, boğaz, baş, kas ve eklem ağrıları en sık görülen hastalık belirtileridir. Yaşlı ve bazı komorbid hastalığı olanlarda ölümcül seyredebilmektedir. Tedavisinde çeşitli antiviraller denenmesine karşın henüz onaylı tedavi bulunmamaktadır, daha çok semptomatik etkili ajanlar kullanılmaktadır. Aşı geliştirme çalışmaları sürdürülmektedir. Bu nedenle günümüzde en etkili korunma yolu, doğru kişisel hijyen davranışlarını önemseyerek uygulama ve bazı sosyal davranışların ertelenmesidir.

Anahtar kelimeler: *SARS-CoV-2*

Corresponding author: Kurtulus Buruk, Dept. of Medical Microbiology, Karadeniz Technical University Faculty of Medicine, Trabzon, Turkey
Phone: +90 533 369 6882, E-mail: ckburuk@yahoo.com
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Introduction

WHO (World Health Organization) announced in a report released on March 14, 2020 that the potentially fatal disease identified as COVID-19, whose causative agent is SARS-CoV-2, is detected in 133 countries and in the autonomous region including Turkey. Also, they update the patient management guides of the disease, and highlighted that Europe is new epicenter for the disease.[1] In this review, SARS-CoV-2 and disease (COVID-19) which it caused will be briefly reviewed in the light of the latest literature in various aspects.

Etiology

Coronaviruses (Coronavirus-CoV) are enveloped, RNA viruses with positive polarity. They are pleomorphic in structure, and their size is 60-140nm in diameter. The name is given due to the electron microscopic appearance of the crown-like (corona = "crown" in latin) formed by the round shaped of main geometry and the glycoprotein (S gp) protrusion on its envelopes. Coronaviruses are found in four genus classified as alpha, beta, gamma and delta coronavirus in the Orthocoronavirinae subfamily under the Coronaviridae family.[2]

Coronaviruses are zoonotic agents whose origin is thought to be bats and poultry. They cause respiratory, enteric, hepatic and neurological diseases in animals.[3]

Although four types of coronavirus, HCoV-OC43, HCoV-HKU1, HCoV-229E and HCoV-NL63, are the most common agents of the common cold disease, they can cause serious disease in immunocompromised and elderly individuals.[4] The other types of the coronavirus that are more mortal on human are SARS-CoV, MERS-CoV, and the newly encountered coronavirus with a mortalitiy rate of about 10%, 35% and 3%, respectively.[5, 6]

After WHO identified the epidemic in China caused by a new coronavirus on 9 January 2020, it was decided by the International Committee on Taxonomy of Viruses to call the virus as SARS-CoV-2 (**S**evere **A**cute **R**espiratory **S**yndrome-**C**oronavirus-2).[7]

The genome of the SARS-CoV-2 consists of 29891 nucleotides. When this genome information has been compared with the genome informations of other coronaviruses, SARS-CoV-2 has been found to be similar to a bat coronavirus (batSV-like-CoVZXC21), another bat coronavirus (BatCoV RaTG13), and SARS-CoV with the rate of 89%, 96%, and 81%, respectively.[8,9] Although it has not yet been confirmed, SARS-CoV-2 has been thought to be of bat origin, first transmitted to intermediary animals (such as other mammals), then to these agents, or directly to human beings.

SARS-CoV-2 binds to the ACEII (angiotensin converting enzyme II) receptor on eukaryotic cells with its S glycoprotein, like SARS-CoV.[9]

COVID-19

Since the beginning of January 2020, WHO has commenced to make public statements about the outbreak after being informed of the pneumonia cases that occurred in Wuhan, the capital of China's Hubei state in late 2019. Later, with the identification of the etiological agent and accumulation of data of the number of cases and disease, WHO decided to call the disease caused by SARS-CoV-2 as COVID-19 (Coronavirus Disease-2019).[10]

The virus can be found in the respiratory secretions of the patients 1-2 days before onset of the clinical symptoms and two weeks after the disease symptoms.[11] In addition, the presence of the virus was demonstrated in whole blood, serum, urine, and fecal samples, and also, pediatric patients were reported to harbor the virus in their feces for one month.[12-16] Although the first route of transmission of the disease has not been determined yet, it is reported that it can be transmitted from person to person as a result of contact with the droplet path, the body surface containing the virus and inanimate environments nowadays.

The incubation period of the virus has been reported to be an average of 6.4 days (between 2.1 and 11.1 days).[17]

The most common clinical symptoms were high fever (88%), subsequent dry cough (68%), fatigue (38%), sputum production (33%), dyspnea (19%), sore throat (14%), headache (14%), and myalgia or arthralgia (15%).[18]

Approximately 80% of the patients show mild symptoms, whereas 20% have severe disease. Almost 5% of patients have critical disease symptoms such as respiratory arrest, septic shock, multiple organ failure.[19] Patients over the age of sixty, males, who have hypertension, diabetes, cardiovascular disease, chronic lung disease or cancer had more severe disease.[20]

Treatment

There is still no specific treatment for the disease however, clinical trials have been conducted using various antivirals.

Prevention

Some animal experiments and phase 1 level vaccination studies have been conducted for SARS-CoV-2. Now, the effective way to prevent disease is to prevent the spread of the virus. SARS-CoV-2 is sensitive to ultraviolet rays and heat. In addition, since it is enveloped, it is sensitive to lipid solvents such as ether, alcohol and chlorinated disinfectants. Frequent washing of the hands for protection, avoiding close contact with individuals with respiratory symptoms and their environment, taking measures to prevent the spread of the virus during coughing and sneezing, taking care of their personal hygiene to prevent contamination from other individuals, avoiding contact with pets and wild animals, taking strict hygiene measures in emergency departments, and keeping vulnerable individuals away from the crowd (especially those who are immunosuppressed) are major prevention measures.[18]

Results

The world is challenging with an infection with a new respiratory virus, which can have serious consequences. For now, the most valid way to struggle with SARS-CoV-2, which has no specific treatment and vaccine, is to educate and raise the public about virus biology, disease and prevention methods. Every step taken for this purpose will contribute to protection from SARS-CoV-2 as well as protection against other infectious agents.

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