

Coronavirus and Influenza Viruses: An Overview of Their Differences and Similarities

Coronavirus ve Influenza Viruslar: Farklılıklar ve Benzerliklerine Genel Bir Bakış

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ABSTRACT

SARS-CoV-2 is a new virus that is the cause of the current COVID-19 pandemic. We currently do not have a cure and immunity against this pathogen. Influenza viruses, on the other hand, are constantly evolving and undergo various levels of antigenic drift and shift that will become less recognizable by our immune system. This makes it difficult to develop a widespread effective influenza vaccine and also poses a risk of pandemics by leading to the emergence of new strains of zoonotic Influenza. Both Coronaviruses and Influenza viruses are enveloped RNA viruses and one of the primary pathogens affecting human respiration. COVID-19 and Influenza infections have similar transmission routes and symptoms. The reviewed literature indicates that there are important structural differences between COVID-19 and Influenza. These include differences in genome structures, surface proteins, number of strain and subtypes. In addition, incubation times, risk groups, asymptomatic transmission and transmission rate are important difference between the two viruses. However, unlike Influenza, the lack of vaccines and treatments for COVID-19 poses serious difficulties in controlling the spread of the disease. As a result, Coronavirus is spreading rapidly and due to the risk of possible co-infection with Influenza virus, it is extremely important to evaluate COVID-19 and Influenza infection together and developing public health measures accordingly.

Keywords: Coronavirus, COVID-19, Flu, Influenza Virus.

ÖZ

Mevcut COVID-19 pandemisi'nin nedeni olan SARS-CoV-2 yeni bir virüstür. Bu patojene karşı mevcut tedavi ve bağışıklığımız bulunmamaktadır. Influenza virüsleri ise sürekli olarak evrimleşmekte ve bağışıklık sistemimiz tarafından daha az tanınabilir hale gelecek çeşitli düzeylerde antijenik sürüklenme ve kayma geçirmektedir. Bu, geniş ölçüde etkili bir grip aşısının geliştirilmesini zorlaştırmakta ve aynı zamanda yeni zoonotik influenza suşlarının ortaya çıkması pandemi riski oluşturmaktadır. Hem Coronavirüsler hem de Influenza virüsleri, zarflı RNA virüsleridir ve insan solunumunu etkileyen birincil patojenlerden biridir. COVID-19 ve Influenza enfeksiyonları benzer bulaşma yollarına ve semptomlarına sahiptir. İncelenen literatürler, COVID-19 ve Influenza arasında önemli yapısal farklılıklar olduğunu bildirmektedir. Bunlar, genom yapıları, yüzey proteinleri, suş sayısı ve alt tipleri içerir. Bunlara ek olarak, inkübasyon süreleri, risk grupları, asemptomatik bulaşma ve bulaşma hızı iki virüs arasındaki önemli farklılıklardır. Bununla birlikte, gripten farklı olarak COVID-19 için aşı ve tedavilerin olmaması, hastalığın yayılmasını kontrol etmede ciddi zorluklar ortaya çıkarmaktadır. Sonuç olarak Coronavirüs hızla yayılıyor ve influenza virüsü ile olası ko-enfeksiyon riski nedeniyle COVID-19 ile birlikte grip enfeksiyonunun değerlendirilmesi ve buna göre halk sağlığı önlemlerinin geliştirilmesi son derece önemlidir.

Anahtar Kelimeler: Coronavirus, COVID-19, Grip, Influenza Virus.

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INTRODUCTION

One of the primary pathogens affecting the human respiratory system is the Coronavirus and Influenza viruses.^{1,2} Currently, global efforts are focused on reducing the spread and impact of this virus simultaneously.³ It is important to consider the difference and similarities between the flu and COVID-19 as we enter the Flu season. This could have important implications for public health measures to be taken against COVID-19 and Influenza infections.¹

Coronaviruses

In Wuhan, Hubei Province, China, a cluster of pneumonia cases of unknown etiology was identified on 31 December 2019. On 11 March 2020, the World Health Organisation (WHO) characterized COVID-19 as a pandemic.⁴ As of October 17, 2020, there have been global COVID-19 deaths surpass 1 million.⁵

The first case of the Coronavirus pandemic was announced in Turkey by the Ministry of Health on March 10, 2020. On March 15, 2020, the first death due to Coronavirus disease occurred.⁶ In Turkey, 17 October 2020, there have been 345.678 confirmed cases of COVID-19, including 9.224 deaths, reported Ministry of Health.⁷

Coronaviruses (CoVs) belonging to the Coronaviridae family infect a variety of vertebrates. They are commonly seen in bats, but can also be found in many birds and mammals, including humans. Coronaviridae consists of four alpha, beta, gamma and delta genera. SARSCoV-2 are in the Beta-CoV genus.⁸⁻¹⁰

Influenza Viruses

With its high morbidity and mortality, flu caused by influenza viruses is a significant public health issue all over the world. Influenza has the ability to affect a significant part of the human population, with epidemics, and pandemics. Seasonal Influenza epidemics affect an estimated 10 percent -20 percent of the world 's population

each year. An Influenza pandemic is a global outbreak of a new Influenza A virus. In the 20th century, three flu pandemics occurred: "Spanish Flu", "Asian Flu" and "Hong Kong Flu". Many believe, it is inevitable that period Influenza pandemics will continue to occur in the future.^{8,11-15}

Genome

Both Coronaviruses and Influenza viruses are single-stranded, enveloped RNA viruses.^{16,17,18} When the differences of both viruses are evaluated in terms of genomes; Influenza virus consists of 8 single-stranded negative-sense viral RNA segments.^{16,18} SARS-CoV-2 has a single-stranded, non-segmented, positive-sense viral RNA.^{16,17}

Surface Proteins

Both viruses have differentiating surface proteins that function as essential infection virulence factors.¹⁶⁻¹⁸ The spike protein (S) coverings the surface of SARS-CoV-2 is the key mechanism facilitating its entry into the host cell.¹⁷ Unlike COVID-19, Influenza A virus has HA and NA surface proteins, which play an important role in the entry and release of the virus from host cells.¹⁸

Strains and Subtypes

There is only 1 SARS-CoV-2 strain.¹⁶ There are 4 distinct influenza virus strains (A, B, C and D). Influenza A viruses are the only flu viruses known to cause pandemics.¹⁹ Based on its HA (Hemagglutinin) and NA (Neuraminidase) surface proteins, the Influenza A virus is further split into subtypes. There are 131 subtypes in nature.¹²

Table 1. Comparison of the Differences Between Influenza and SARS-CoV-2¹⁶

Virus Properties	SARS-coV-2	Influenza Virus
Strain and subtypes	1 strain	4 strains,multiple subtypes
Genome	(+) strand, non segmentedRNA	(-) strand, segmented RNA
Surface proteins	Spike (S) protein	HA and NA surface proteins
Enveloped	+	+

Haemagglutinin (HA),Neuraminidase (NA)

Etiology

Coronaviruses are infecting many animals; human-adapted viruses are likely to be introduced from animal reservoirs through zoonotic transmission. The majority of identified human Coronaviruses are related to mild upper respiratory disease.

There are animal roots for all human coronaviruses. Pets can play a role as vectors in the transmission of the virus to humans. Since the species Alphacoronavirus and Betacoronavirus are only present in bats, the main natural reservoir for these viruses is possibly bats.

Coronaviruses are infecting many animals; through zoonotic transmission, human-adapted viruses are likely to be introduced from animal reservoirs. The majority of human Coronaviruses reported are linked to mild upper respiratory illness.⁸⁻¹⁰

Wild waterfowl are believed to be the primary natural source of influenza viruses. Periodically, by a mechanism called reassortment, genetic material from avian virus strains is passed to virus strains infectious to humans. Since both avian and human virus strains can infect pigs, and different reassortants have been isolated from pigs, they have been suggested as an intermediary in this phase.^{13,14,20}

Transmission

For viruses to infect the new host organism, it is necessary to maintain their infectivity in the environment and to reach the target cells in sufficient amount of virus.²¹ COVID-19 and Influenza are transmitted by contact, droplets and fomites.^{1,22,27}

No known asymptomatic transmission has been identified for COVID 19 to date.¹⁻³ On the contrary, A key factor in the spread of influenza is that, long before symptoms occur, an infected person can spread influenza viruses early in the infection and can be transmitted to those around them.^{1,24,25}

The Speed of Transmission

The speed of transmission between the two viruses is an important point of distinction.¹ The median incubation duration (time from infection to onset of symptoms) and the serial interval (time between successive cases) of Influenza are shorter than those of COVID-19. The serial interval is calculated to be 5-6 days for the COVID-19 virus, while the serial interval is 3 days for the influenza virus. This means Influenza will spread more rapidly than COVID-19.¹

SARS-CoV-2 and Influenza Seasonality

SARS-CoV-2 has demonstrated no seasonal pattern as such so far.²⁶ Although the reason for this is not well known, Influenza epidemics show seasonal trends.¹¹

Table 2. Characteristics of COVID-19 and Influenza

	Influenza	Covid-19	Both
Semptom	1-4 days after exposure	2-14days after exposure	Fever Chills Cough Shortness of Breaths Fatigue
		Change in or loss of smell or taste	Stuffy nose Runny nose Sore throat Muscle pain Headaches Vomiting&diare
Transmission			Droplets, Contaminated surface & then touching eyes, nose and mouth
Vaccines&Treatments	Precription antiviral medicine & FDA approved vaccines	Currently no FDA approved treatments & vaccines	

Signs and Symptoms

Since the main symptoms of COVID-19 and Influenza are similar, it is difficult to tell the difference based on symptoms.^{1,2,16,29}

COVID-19 and Influenza have a similar clinical appearance. Symptoms of both diseases are fever / chills, cough, shortness of breath or shortness of breath, tiredness, sore throat, runny or stuffy nose, muscle pain or body aches. Some people may have headache, vomiting, and diarrhea, but this is more common in children than adults.^{1,2,23,25} COVID-19 can involve a change or loss of taste or smell, unlike the flu.^{2,24,30}

Incubation

For decision-making around infectious disease control in human populations, accurate estimates of the incubation period are significant.³¹ The incubation period for the flu is 1-4 days.^{16,32} Latest estimates of COVID 192 incubation period vary from 1-14 days between infection and the onset of clinical signs of the disease, with a median of 5-6 days. WHO suggests that the follow-up of contacts of confirmed cases is 14 days.^{1,31}

Risk Groups

Identifying at-risk populations is essential now not for making projections of the in all likelihood health burden in countries, but additionally of positive strategies that goal to reduce the risk of transmission to in goal groups.³³ Evidence to date suggests that those over the age of 60 and those with underlying

conditions such as cardiovascular disease, diabetes, cancer, etc., are at risk for COVID-19.^{33,34}

There are different risk groups for Influenza from COVID-19, pregnant women, children and healthcare workers.^{27,35}

Unlike influenza, COVID-19 causes a relatively rare and mild infection in children. This continues to be an important knowledge gap in the fight against the pandemic.^{36,37} Flu is a widespread pathogen detected in children and causes a major healthcare burden worldwide.³⁸ Pregnant women have a higher risk of death from severe Influenza and Influenza-related illnesses. In addition, stillbirth, neonatal death and premature birth appear to be associated with Influenza disease during pregnancy.³⁹ Despite limited evidence, COVID-19 does not appear to be associated with serious illness in pregnancy and neonates.⁴⁰

Vaccines and Treatments

Currently, no approved vaccines or therapeutics are available for COVID-19. Currently, research continues on at least 166 COVID-19 vaccine candidates that are in pre-clinical and clinical development^{21,22} In contrast, antivirals and vaccines are available for the Influenza.²¹ For the treatment and prevention of influenza, there are a range of FDA-approved medications. Currently, antivirals approved for Influenza are not expected to be used in the treatment of COVID-19.²²

CONCLUSION AND RECOMMENDATIONS

As a result, it is known that infection with more than one respiratory virus is possible. It is important to consider the difference and similarities between

Influenza and COVID-19 as you enter flu season. This awareness can have important implications for public health measures and pandemic mitigation efforts.

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