ejpmr, 2023, 10(4), 481-484

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Review Article

ISSN 2394-3211

EJPMR

ACUTE RESPIRATORY VIRAL INFECTIONS

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Article Received on 18/02/2023 **Article Revised on 10/03/2023** **Article Accepted on 31/03/2023**

ABSTRACT

Background: Respiratory viral infections are serious as they disrupt the normal respiratory function and which in lead to a high mortality and morbidity. **Methods:** This research focuses on the effects of ARVI mainly influenza and COVID on human immune system and management strategies. This uses extensive research and analytic methods to create a complete study that provides clearer insights in a simple manner.

KEYWORDS: "ARVI"," Influenza", "COVID-19", "GISRS", "Brain fog".

ABBREVIATIONS

Acute respiratory viral infection	ARVI
Severe acute respiratory syndrome	SARS
Lower respiratory tract	LRT
Angiotensin converting enzyme 2	ACE2
Acute respiratory distress syndrome	ARDS
Global influenza surveillance and response system	GISRS
World Health Organization	WHO
Global influenza programme	GIP
Global influenza surveillance network	GISN
National influenza center	NIC
Middle east respiratory syndrome	MERS
Attention deficit hyperactivity disorder	ADHD
Traumatic brain injury	TBI
N-acetylcysteine	NAC
Post traumatic stress disorder	PTSD

INTRODUCTION

ARVI is a dangerous illness that predominantly affects elderly people and young children. It substantially disrupts daily activities for people and interferes with the healthy operation of the respiratory system. Acute respiratory infections kill 2.6 million children worldwide each year, according to the WHO. The most common etiological agent is the influenza virus, but we are mostly aware of SARS-CoV 19, which caused a serious pandemic and claimed many lives.

The orthomyxoviridae family, which the influenza virus is a member of, has 4 types: A, B, C, and D. Shifts and drifts of antigen can cause viruses to mutate continuously. There can only be A type pandemics. The H1N1 influenza pandemic, known as mother of all pandemics, plagued the world from 1918 to 1919 and was brought on by a particularly deadly new strain of the influenza A virus. Flu incubation typically lasts between one and four days, however it might take longer or shorter depending on the individual.

SARS-CoV2 was the cause of the coronavirus. Like the cold and the flu, SARS is an airborne virus that can spread through minute salivary droplets. SARS typically takes 2 to 7 days to incubate, even longer.

PATHOPHYSIOLOGY

Children of age 2 - 17 are believed to be the most important and efficient influenza spreaders. Children who have never before been exposed to the flu virus shed it for a longer duration than other kids do.

The respiratory system is the primary site of entry for influenza virus, usually through the mouth or nose. The respiratory tract's epithelial cells become infected by the

virus once it has entered the body. The virus multiplies by bursting host cells and releasing new virus particles using its own enzymes. By moving from infected to uninfected cells, the virus reproduces and causes more harm. The body's immunity responds to the virus by producing antibodies and activating immune cells such T cells and natural killer cells to battle the infection and infected cells. The body's immune reaction and viral multiplication cause symptoms including fever, coughing, sore throats, and body pains to emerge. The virus may occasionally lead to serious respiratory issues such pneumonia, bronchitis, and the escalation of pre-existing respiratory disorders. The majority of individuals regain health after flu in 2 weeks, a few might experience serious side effects including pneumonia, which can be fatal.

The LRT and other organs can be infected by corona viruses using the critical cell receptor ACE2. Human infection results from inhaling respiratory droplets from infected people, both asymptomatic and symptomatic. Coronavirus depends on some of the cellular proteases to break the viral spike protein and produce a new structural alteration that raises the risk of infection include cathepsins, transmembrane protease serine 2, and human airway trypsin-like protease. The virus penetrates the host cell and attaches to the ACE-2 receptor, viral RNA is released by combining with the host membrane in the cytoplasm. The majority of ACE 2 inhibitors are found in the heart, LRT, kidney, liver and intestinal tract, as well as in these organs where the virus is also primarily found. The 20-kb replicase gene encodes a large protein complex called viral replicase, which participates in the coordinated synthesis of RNA during replication and transcription of virus in the cytosol. The processing of the structural and nonstructural viral proteins takes place in the endoplasmic reticulum and Golgi bodies of the host cell. These proteins combine at the host cell membrane to create mature viral offspring, infecting nearby cells, secretory vesicles release them. A few of these fresh viral offspring enter the bloodstream and produce viremia (primary). As the virus multiplies and settles in the numerous ACE2 receptor-containing body organs, ARDS develops. Strong host immunological responses are also present throughout this phase, which lead to unregulated synthesis of chemokines and cytokines that harm the respiratory tissue.

THE GLOBAL INFLUENZA SURVEILLANCE AND RESPONSE SYSTEM

The GISRS is an international network of laboratories whose goal is to track the spread of influenza in order to provide the WHO with data on influenza control. It was founded in 1952 to carry out worldwide influenza surveillance. Governments across the world support GISRS, which is coordinated by WHO. GISRS utilizes a network of about 150 laboratories in 114 countries, or 91% of the world's population, to test over 2 million respiratory specimens annually to track the spread and evolution of influenza viruses. A website for virologically monitoring influenza is called FluNet, and it is run by GISRS.

A GIP for the investigation and management of influenza was approved by the WHO Interim Committee of the UN in 1947. A significant influenza outbreak in Europe and the discovery of suitable viruses for a vaccine against potential circulating virus strains were both of immediate concern. In 1948, regional influenza centers were first established. The need for an influenza surveillance system to inform disease prevention and control strategies led to the establishment of the GISN five years after the creation of GIP.

The GISRS network has grown to encompass 127 nations, regions, and territories since its founding in 1952. The network now consists of 158 organizations, including 148 NIC, which the WHO has recognized in 124 Member States, seven WHO Collaborating Centers, four Essential Regulatory Laboratories, and 13 H5 Reference Laboratories. In 2022, GISRS celebrated 70 years of nations collaborating to combat the threat of influenza and other respiratory diseases, setting an example for international cooperation and collaboration. Although it was initially designed to combat influenza, GISRS has proven to be a crucial resource for nations dealing with emergencies related to non-influenza respiratory diseases. Along with the influenza pandemics of 1957, 1968, and 2009, GISRS has also coordinated the global response to sporadic human infections with the avian influenza A(H5N1) virus since 1997, the first outbreaks of SARS, which occurred in 2002, and the MERS, which appeared in some countries in 2012.

Most recently, during the COVID-19 pandemic, GISRS proved to be a crucial global resource. The SARS-CoV-2 virus, which causes COVID-19, is tested and analyzed primarily at NIC, which also collects influenza virus specimens and performs preliminary analysis. Countries used their NIC's infrastructure and expertise to launch an immediate response to the COVID-19 pandemic and use influenza surveillance systems to find SARS-CoV-2 viruses that were mutating.

BRAIN FOG

Long-haulers, often known as those with extended COVID, may experience symptoms that last months or even years. The most common complaint made by patients is "brain fog," a term used colloquially to describe serious, persistent cognitive deficiencies with constant degradation of executive functions and memory. Long-haul drivers may experience memory problems, mental fog, poor focus and attention, multitasking challenges, and other problems. The COVID brain fog lasts anything between a few weeks to several months. Another option is to have none of it. For brain fog to be considered a sign of long-term COVID, it must be present for least 12 weeks following the initial COVID infection. Microglia, an immunological cell inside the brain, become stimulated and activated even months

after a modest COVID-19 infections, according to the pathophysiology that is now understood. As this takes place, the brain finds it challenging to carry out some routine functions, such as generating new neuron in the brain, which is essential for learning and memories. As of right now, there is no particular diagnostic method that can pinpoint brain fog after COVID. The reported symptoms are used to make the diagnosis instead. Until two researchers showed that combining two different medications might lessen or even completely eradicate brain fog, there had been no effective post-COVID treatment.

Yale researchers have published preliminary evidence that 2 currently available medications, when combined, can reduce or even completely eliminate brain fog. They did this by the knowledge of their deep expertise with the two medications. The two medications are guanfacine, which was prescribed to treat ADHD in 2009 but is now widely used to treat other prefrontal cortical disorders like TBI and PTSD, and N-acetylcysteine, an antioxidant also prescribed to treat TBI. The combination therapy was effective in helping the patients' brain fog.

Guanfacine is used to protect against stress and inflammation as well as to strengthen prefrontal cortex connections. This medication improves memory and executive function. NAC, a potent anti-inflammatory and antioxidant, is also used to treat prefrontal cortex disorders.

CONCLUSION

Despite the fact that ARVI encompasses a wide variety of infections, influenza and COVID were the ones that devastated the world by taking untold numbers of lives. The respiratory tract is harmed by the influenza virus either directly through viral infection or indirectly through immune system damage. An outbreak brought on by the new coronavirus COVID started in Wuhan, China. A pandemic was declared in March by WHO. The GISRS system was put in place to keep track of global influenza outbreaks in the future, track how they develop, and manage them by developing vaccines. A variety of symptoms that were noticed after post-covid infections are collectively referred to as "brain fog" in common parlance. There was no curative therapy until some researchers used a drug combination therapy that effectively treated the brain fog.

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