

CONTINUED MEDICAL EDUCATION

Newer insights of H1N1: Swine Flu Virus

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ABSTRACT

Swine flu, caused by the H1N1 influenza virus, is a subtype of influenza A that affects both the upper and lower respiratory tracts. It is primarily found in pigs and can be transmitted to humans through genetic variations in the virus. The 1918 Spanish flu pandemic resulted in the deaths of 50 to 100 million individuals. In 2009, the pandemic affected 178 countries, resulting in an estimated 43 to 89 million cases and 1799 deaths. The pathophysiology of H1N1 involves inflammation of the respiratory tract, with an incubation period of 1 to 4 days and a contagious period lasting 5 to 7 days. The signs and symptoms of swine flu include cough, sore throat, fever, myalgia, congestion, headache, rhinorrhoea, dizziness, sneezing, loss of appetite, fatigue, abdominal pain, shortness of breath, and in rare cases, vomiting and diarrhoea. The most common cause of death is respiratory failure, and neurological symptoms can occur due to high fever. To diagnose swine flu, various tests such as haematological, biochemical, and microbiological tests are conducted, including the collection of nasal or oral swabs for reverse transcriptase polymerase chain reaction (RT-PCR). Prevention and control measures include managing swine flu in pigs through herd management, hygiene practices, and vaccination. Treatment options vary based on the severity of the case. Mild to moderate cases can be managed with rest, antipyretics, NSAIDs, antihistamines, and oral rehydration therapy. Severe cases may require intravenous hydration, antibiotics for bacterial infections, antiviral therapy, and respiratory support.

KEYWORDS

H1N1 Swine Flu Virus, Respiratory Tract Infection, Epidemiology of H1N1, Pathophysiology of H1N1, Treatment of H1N1

INTRODUCTION

H1N1 swine flu virus is a subtype of influenza A virus. It is viral type of communicable disease. It causes respiratory tract infection which involves both upper and lower tract. It causes symptoms like fever, chills, nasal secretion,

loss of appetite, and involves respiratory tract. It is found commonly in pigs, worldwide. So, this is called swine flu. It affects mainly individuals who are involved in pig care and handling. When there was change in antigenic characteristics of swine flu virus through

reassortment, it became capable of infecting human beings. Transmission of virus between person to person is inefficient usually. Pandemics usually occur when there was efficient person to person transmission as in 1918 and 2009.

Spanish flu occurred in 1918, infected around 500 million people approximately, caused by deadly H1N1 influenza virus. It resulted into death of around 50 to 100 million people. In 2009, World Health Organization (WHO) labelled it as pandemic as newer strain of H1N1 influenza virus spread so rapidly between human to human. However, that virus was not transferred from pigs to humans, so it was not called as zoonotic swine flu. At that time, this virus spread through air transmission between humans to humans as well as through contaminated objects. Swine flu does not spread through eating pig products like ham, bacon and other pig stuff. (1,2)

ETIOLOGY

The H1N1 influenza virus is an orthomyxovirus type and produces 80 to 120 nm diameter virions. Size of RNA genome is approximately of 13.5 kb. Genome of this virus has 8 different regions of segmented form and capable of coding around 11 types of different proteins.

Envelope Protein: Neuraminidase and Hemagglutinin

Viral RNA Polymerases : PB1, PB1-F2, PB2, PA and PB

Matrix proteins: M1 and M2

Nonstructural Proteins: required for viral replication and pathogenesis

It can only cause infection to human beings if antigenic characters of virus get changed. (3,4)

EPIDEMIOLOGY

In the United States, swine flu was first recognized by veterinarians and pork producers in 1930s. It causes flu in pigs for next 60 years, worldwide. It causes infection in pig handlers as well as in pigs. It produces flu like symptoms and cross transmission occurs between humans and pigs. Cross species transmission is only possible because of genetic variation of swine flu virus. In 2009, swine flu strain called novel H1N1 flu was first identified in Mexico.

Novel H1N1 virus consist of:

2 main surface antigens i.e. Hemagglutinin type 1 & Neuraminidase type 1

8 RNA strands : one from human flu strain, five from swine flu strain, two from avian flu strain
The Centre for Disease Control and Prevention (CDC) estimated around 43 to 89 million cases during 2009 pandemic with 1799 deaths involving 178 countries worldwide. Around 10,000 cases were reported across India in the year of 2015 by H1N1 2009 pandemic strain. 774 deaths were reported.

People on higher risk of having infection are:

- Children younger than 5 years
- Adults older than 65 years,
- Adolescents between 10 to 19 years
- Immuno-compromised subjects having diseases like AIDS
- Pregnant females
- Patients having chronic diseases such as cardiovascular diseases, bronchial asthma, chronic obstructive pulmonary disease, obesity, diabetes mellitus or neuromuscular disease. (5,6,7)

PATHOPHYSIOLOGY

H1N1 virus causes inflammation of respiratory tract including upper respiratory passages, trachea and lower respiratory passages also. There is incubation period of around 1 to 4 days with average period of around 2 days. But, it may be longer as 7 days in few individuals. There is contagious period of around 1 day in adults before any symptoms appear and it last around 5 to 7 days after the person develops symptoms. If a person is immune-compromised, contagious period may be longer.

HISTOPATHOLOGY

Swine flu virus causes histopathological changes in upper and respiratory changes. Only few considerable changes are found in mild cases but major pneumonia like changes are found in case of severe cases. Changes include potential desquamation and multifocal destruction of columnar and pseudo columnar epithelial cells. It also causes edema and hyperemia in the submucosa. At bronchial level, thrombus formation may also occur. It

may also possible sometimes, there was desquamative bronchiolitis and haemorrhagic tracheobronchitis results into necrosis of the bronchial wall. This further leads into neutrophilic and mononuclear cell infiltration.

Signs and Symptoms

- Cough
- Sore throat
- Fever
- Myalgia
- Congested eyes
- Chills
- Headache
- Rhinorrhoea
- Dizziness
- Sneezing
- Loss of appetite
- Fatigue
- Abdominal pain
- Shortness of breath
- Vomiting (rare)
- Diarrhoea (rare)

Most common cause of death is respiratory failure. High fever may also lead to neurological symptoms. Pneumonia may increase up to the extent of sepsis. Vomiting and diarrhoea can cause dehydration and electrolyte imbalance which further leads into other complications.(8)

Evaluation

Swine flu virus shows wide variety of sign and symptoms with numerous pathological findings. Haematological, biochemical, microbiological tests will be performed to confirm diagnosis. Nasal or oral swab have been collected for Reverse transcriptase polymerase chain reaction (RTPCR) to confirm diagnosis of swine flu.

TREATMENT

Best way of management of swine flu pandemic is its prevention. First, prevention of swine flu in pigs, then from pigs to human transmission of virus, and preventing its transmission from human to human. Prevention of swine flu in pigs: herd management, hygiene of pigsty, and vaccination of pigs are concrete steps for prevention of swine flu.

Prevention of transmission from pigs to human: Usually, swine flu first occurred in handlers of pigs and persons having close association with pigs. As, this disease happens after antigenic shifts that occurred involving avian as well as human strains of influenza virus, pigs become primary host for swine flu virus. Pig handlers should take proper care of their hygiene, should wear masks on face during pigs handling. Vaccination is the most remarkable step in prevention of swine flu.

Prevention of transmission from human to human: Person suffering from swine flu has respiratory systems like coughing, sneezing and sore throat. Virus is present in mucous membrane of respiratory tract. This leads to spread of infected droplets in environment by coughing and sneezing. Virus spread through these droplets and infect the other person via entering through mouth, nose, eyes or contamination through infected objects. Regular washing of hands using alcohol-based sanitizers or soap, wearing mask and keeping social distancing helps to prevent spread of swine flu.

Vaccination of persons in endemic area helps a lot in preventing swine flu.

Medication

- **Mild to moderate cases:**

Rest at home, symptomatic use of antipyretics like paracetamol, NSAIDS for headache or myalgia with paracetamol, antihistaminic for rhinitis and nasal congestion. Oral rehydration therapy for maintaining hydration and electrolyte balance.

- **Severe cases:**

Intravenous hydration for maintaining hydration and electrolyte balance

Antibiotics for super added bacterial infection

Antiviral therapy: zanamivir, oseltamivir, and peramivir

Non-invasive or invasive ventilation for patients developing acute respiratory distress syndrome

Zanamivir is contraindicated in patients having egg allergy. CDC declared that 99.6 % patients are resistant to oseltamivir in 2008 and no resistance to zanamivir. CDC

also recommends that pregnant women have greater risk for swine flu complications so, they are request to have swine flu vaccination. In case of pregnancy, body goes through many hormonal, physical and metabolic changes which leads to make them immune compromised. It is risky for both pregnant female as well as growing fetus.(9,10)

DISCUSSION & CONCLUSION

Swine flu is fatal disease caused by H1N1 influenza virus. It causes great loss to mankind many times by becoming pandemic. It involves mainly respiratory symptoms and leads to acute respiratory distress syndrome. Usually, symptoms are not very severe and patients can be managed by home care. Vaccination and maintenance of personal hygiene is key to fight the battle of swine flu. Pigs are primary host and it involves human only when there was antigenic shift by involving avian and human influenza virus. So, it is necessary to take precautions to prevent it from becoming pandemic and aware people about its management and counsel them for not creating panic.

AUTHORS CONTRIBUTION

All authors have contributed equally.

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