# STUDY- EFFECTS OF SWINE INFLUENZA VIRUS (SIV) IN PIGS AND HUMAN

**Dheeraj Kumar[1] and Dr.Usha Yadav [2]**

[1]*Research Scholar, Deptt. Of Chemistry, Singhania University, Rajasthan.*

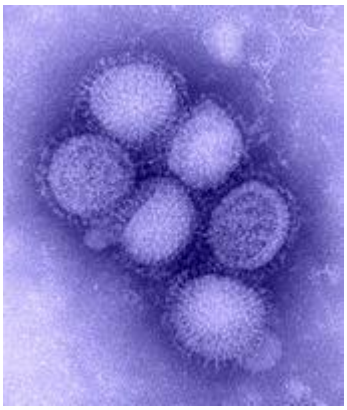
## ABSTRACT

*Swine influenza, also called pig influenza, swine flu, hog flu and pig flu, is an infection caused by any one of several types of swine influenza viruses. Swine influenza virus (SIV) or swine-origin influenza virus (S-OIV) is any strain of the influenza family of viruses that is endemic in pigs. The SIV- strains include influenza C and the subtypes of influenza A known as H1N1, H1N2, H2N1, H3N1, H3N2, and H2N3. Swine influenza virus is common throughout pig populations worldwide. Transmission of the virus from pigs to humans is not common and does not always lead to human flu, often resulting only in the production of antibodies in the blood. If transmission does cause human flu, it is called zoonotic swine flu. People with regular exposure to pigs are at increased risk of swine flu infection.*

***Key Words:*** *Swine influenza, strains include influenza C,H1N1, H1N2, H2N1, H3N1, H3N2, and H2N3, zoonotic swine flu.*

## INTRODUCTION

The influenza virus is roughly spherical. It is an enveloped virus; the outer layer is a lipid membrane which is taken from the host cell in which the virus multiplies. Inserted into the lipid membrane are "spikes", which are proteins—actually glycoproteins, because they consist of protein linked to sugars—known as HA (hemagglutinin) and NA (neuraminidase). These are the proteins that determine the subtype of influenza virus (A/H1N1, for example). The HA and NA are important in the immune response against the virus; antibodies (proteins made to combat infection) against these spikes may protect against infection. The NA protein is the target of the antiviral drugs Relenza and Tamiflu. Also embedded in the lipid membrane is the M2 protein, which is the target of the antiviral adamantanes amantadine and rimantadine.



**Electron microscope image of the reassorted H1N1 influenza virus photographed at the CDC Influenza Laboratory. The viruses are 80–120 nanometres in diameter.**

## REVIEW OF LITERATURE

Swine influenza was first proposed to be a disease related to human flu during the 1918 flu pandemic, when pigs became ill at the same time as humans. The first identification of an influenza virus as a cause of disease in pigs occurred about ten years later, in 1930. For the following 60 years, swine influenza strains were almost exclusively H1N1. Then, between 1997 and 2002, new strains of three different subtypes and five different genotypes emerged as causes of influenza among pigs in North America. In 1997–1998, H3N2 strains emerged. These strains, which include genes derived by reassortment from human, swine and avian viruses, have become a major cause of swine influenza in North America. Reassortment between H1N1 and H3N2 produced H1N2. In 1999 in Canada, a strain of H4N6 crossed the species barrier from birds to pigs, but was contained on a single farm.

The H1N1 form of swine flu is one of the descendants of the strain that caused the 1918 flu pandemic As well as persisting in pigs, the descendants of the 1918 virus have also circulated in humans through the 20th century, contributing to the normal seasonal epidemics of influenza. However, direct transmission from pigs to humans is rare, with only 12 recorded cases in the U.S. since 2005. Swine flu has been reported numerous times as a zoonosisin humans, usually with limited distribution, rarely with a widespread distribution. Outbreaks in swine are common and cause significant economic losses in industry, primarily by causing stunting and extended time to market. For example, this disease costs the British meat industry about £65 million every year.

## 2015 INDIA OUTBREAK

Swine flu outbreaks was reported in India in 2009 and early 2015. The disease affected more than 30,000 people and claimed over a 5,000 lives and in only Ahmedabad claimed over a 1,000 lives. The largest number of deaths due to swine flu is in India's western part. Many states like Delhi, MP, Rajasthan, Gujarat etc has been effected by this virus. In 2015 the

instances of Swine Flu substantially increased to five year highs with over 10000 cases reported and 660 deaths in India. The states reporting the highest number of cases and deaths are Rajasthan, Gujarat, Madhya Pradesh, Maharashtra, Delhi, and Telengana.

## MATERIAL AND METHOD

Of the three genera of influenza viruses that cause human flu two also cause influenza in pigs, with influenza A being common in pigs and influenza C being rare. Influenza B has not been reported in pigs. Within influenza A and influenza C, the strains found in pigs and humans are largely distinct, although because of reassortment there have been transfers of genes among strains crossing swine, avian, and human species boundaries.

## INFLUENZA C

Influenza viruses infect both humans and pigs, but do not infect birds. Transmission between pigs and humans have occurred in the past. For example, influenza C caused small outbreaks of a mild form of influenza amongst children in Japan and California. Because of its limited host range and the lack of genetic diversity in influenza C, this form of influenza does not cause pandemics in humans**.**

## INFLUENZA A

Swine influenza is caused by influenza A subtypes H1N1, H1N2, H2N3,H3N1, and H3N2. In pigs, four influenza A virus subtypes (H1N1, H1N2,H3N2 and H7N9) are the most common strains worldwide. In the United States, the H1N1 subtype was exclusively prevalent among swine populations before 1998; however, since late August 1998, H3N2 subtypes have been isolated from pigs.

## TRANSMISSION

**Transmission between pigs:-**

Influenza is quite common in pigs, with about half of breeding pigs having been exposed to the virus in the US. Antibodies to the virus are also common in pigs in other countries.

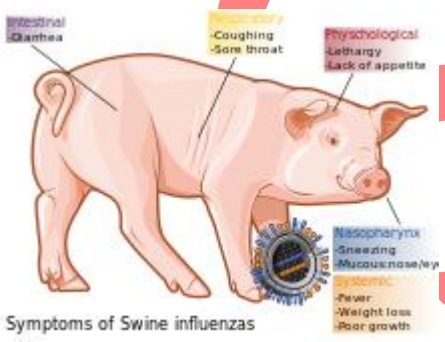
The main route of transmission is through direct contact between infected and uninfected animals. These close contacts are particularly common during animal transport. Intensive farming may also increase the risk of transmission, as the pigs are raised in very close proximity to each other. The direct transfer of the virus probably occurs either by pigs touching noses, or through dried mucus. Airborne transmission through the aerosols produced by pigs coughing or sneezing are also an important means of infection. The virus usually spreads quickly through a herd, infecting all the pigs within just a few days. Transmission may also occur through wild animals, such as wild boar, which can spread the disease between farms.

## TRANSMISSION TO HUMANS

People who work with poultry and swine, especially those with intense exposures, are at increased risk of zoonotic infection with influenza virus endemic in these animals, and constitute a population of human hosts in which zoonosis and reassortment can co-occur. Vaccination of these workers against influenza and surveillance for new influenza strains among this population may therefore be an important public health measure

## INTERACTION WITH AVIAN H5N1 IN PIGS

Pigs are unusual as they can be infected with influenza strains that usually infect three different species: pigs, birds and humans. This makes pigs a host where influenza viruses might exchange genes, producing new and dangerous strains. Avian influenza virus H3N2 is endemic in pigs in China, and has been detected in pigs in Vietnam, increasing fears of the emergence of new variant strains. H3N2 evolved from H2N2 by antigenic shift.



Symptoms of Swine influenzas

**MAIN SYMPTOMS OF SWINE FLU IN SWINE**

## CONCULSION AND RESULT

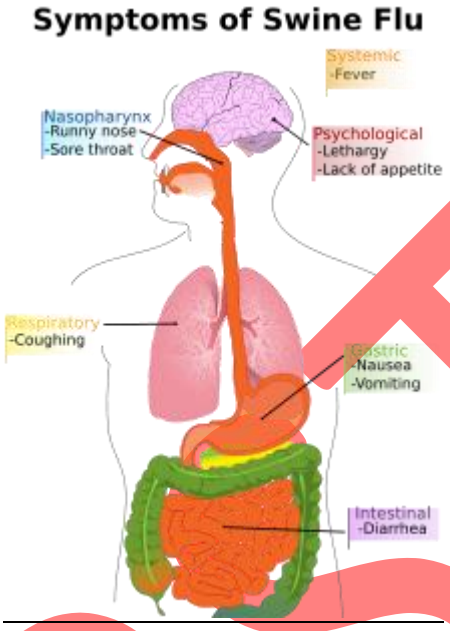
**IN SWINE:-**

In pigs, influenza infection produces fever, lethargy, sneezing, coughing, difficulty breathingand decreased appetite. In some cases the infection can cause abortion. Although mortality is usually low (around 1–4%), the virus can produce weight loss and poor growth, causing economic loss to farmers. Infected pigs can lose up to 12 pounds of body weight over a three- to four-week period.

**IN HUMANS:-**

Direct transmission of a swine flu virus from pigs to humans is occasionally possible (zoonotic swine flu). In all, 50 cases are known to have occurred since the first report in medical literature in 1958, which have resulted in a total of six deaths. Of these six people,

one was pregnant, one had leukemia, one had Hodgkin's lymphoma and two were known to be previously healthy. Despite these apparently low numbers of infections, the true rate of infection may be higher, since most cases only cause a very mild disease, and will probably never be reported or diagnosed.




The most common cause of death is respiratory failure. Other causes of death are pneumonia (leading to sepsis), high fever (leading to neurological problems), dehydration (from excessive vomiting and diarrhea), electrolyte imbalance and kidney failure. Fatalities are more likely in young children and the elderly.

## PREVENTION

Prevention of swine influenza has three components: prevention in swine, prevention of transmission to humans, and prevention of its spread among humans.

### IN SWINE:-

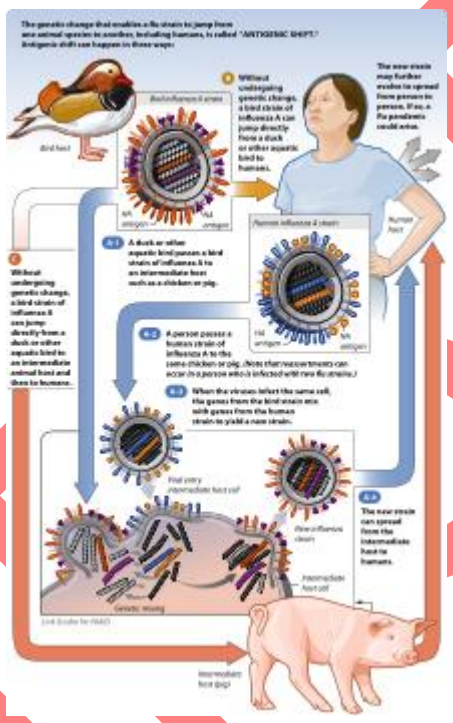
Methods of preventing the spread of influenza among swine include facility management, herd management, and vaccination (ATCvet code: QI09AA03). Because much of the illness and death associated with swine flu involves secondary infection by other pathogens, control strategies that rely on vaccination may be insufficient.

### IN HUMANS

### PREVENTION OF PIG-TO-HUMAN TRANSMISSION

Swine can be infected by both avian and human flu strains of influenza, and therefore are hosts where the antigenic shifts can occur that create new influenza strains.

The transmission from swine to humans is believed to occur mainly in swine farms, where farmers are in close contact with live pigs. Although strains of swine influenza are usually not able to infect humans, this may occasionally happen, so farmers and veterinarians are encouraged to use face masks when dealing with infected animals. The use of vaccines on swine to prevent their infection is a major method of limiting swine-to-human transmission. Risk factors that may contribute to swine-to-human transmission include smoking and, especially, not wearing gloves when working with sick animals, thereby increasing the likelihood of subsequent hand-to-eye, hand-to-nose or hand-to-mouth transmission.



## PREVENTION OF HUMAN-TO-HUMAN TRANSMISSION

Influenza spreads between humans when infected people cough or sneeze, then other people breathe in the virus or touch something with the virus on it and then touch their own face. "Avoid touching your eyes, nose or mouth. Germs spread this way." Swine flu cannot be spread by pork products, since the virus is not transmitted through food. The swine flu in humans is most contagious during the first five days of the illness, although some people, most commonly children, can remain contagious for up to ten days. Diagnosis can be made by sending a specimen, collected during the first five days, for analysis.

**Thermal imaging camera and screen, photographed in an airport terminal in Greece – thermal imaging can detect elevated body temperature, one of the signs of the virus H1N1 (swine influenza).**

## VACCINATION

Vaccines are available for different kinds of swine flu. The U.S. Food and Drug Administration (FDA) approved the new swine flu vaccine for use in the United States on September 15, 2009. Studies by the National Institutes of Health show a single dose creates enough antibodies to protect against the virus within about 10 days.

In the aftermath of the 2009 pandemic, several studies were conducted to see who received influenza vaccines. These studies show that whites are much more likely to be vaccinated for seasonal influenza and for the H1N1 strain than African Americans this could be due to several factors. Historically, there has been mistrust of vaccines and of the medical community from African Americans. Many African Americans do not believe vaccines or doctors to be effective. This mistrust stems from the exploitation of the African American communities during studies like the Tuskegee study. Additionally, vaccines are typically administered in clinics, hospitals, or doctor's offices. Many people of lower socioeconomic status are less likely to receive vaccinations because they do not have health insurance.

**U.S. President Ford receives a swine flu vaccination**

# TREATMENT

## IN SWINE:-

As swine influenza is rarely fatal to pigs, little treatment beyond rest and supportive care is required. Instead, veterinary efforts are focused on preventing the spread of the virus throughout the farm, or to other farms. Vaccination and animal management techniques are most important in these efforts. Antibiotics are also used to treat this disease, which although they have no effect against the influenza virus, do help prevent bacterial pneumonia and other secondary infections in influenza-weakened herds.

## IN HUMANS:-

If a person becomes sick with swine flu, antiviral drugs can make the illness milder and make the patient feel better faster. They may also prevent serious flu complications. For treatment, antiviral drugs work best if started soon after getting sick (within two days of symptoms). Beside antivirals, supportive care at home or in a hospital focuses on controlling fevers, relieving pain and maintaining fluid balance, as well as identifying and treating any secondary infections or other medical problems. The U.S. Centers for Disease Control and Prevention recommends the use of oseltamivir (Tamiflu) or zanamivir (Relenza) for the treatment and/or prevention of infection with swine influenza viruses; however, the majority of people infected with the virus make a full recovery without requiring medical attention or antiviral drugs. The virus isolated in the 2009 outbreak have been found resistant to amantadine and rimantadine.

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| Antiviral drugs | • Arbidol<br>• Adamantane derivatives<br>  • Amantadine<br>  • Rimantadine<br>• Neuraminidase inhibitor<br>  • Oseltamivir<br>  • Laninamivir<br>  • Peramivir<br>  • Zenamivir<br>• Peramivir (Experimental) |
| Vaccines | • Flumist<br>• Fluzone<br>• Pandemrix |
| Outbreaks H5N1 | • Croatia (2005)<br>• India (2006)<br>• UK (2007)<br>• West Bengal (2008) |
| Pandemics HIN1 | • 1918 ("Spanish flu")<br>• 2009 ("Swine flu") |

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